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The Heritage Management of Wetlands in Europe

WARP

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Cover illustration: The Biskupin fortified settlement, Poland. In foreground, Bronze Age wooden posts in situ being sampled for dendrochronology, and parts of the structure preserved by the surrounding wetland. In background, a house and walkway re-created for public display. The site and its wetland are protected by national legislation. Photo John Coles.

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i. A foreword from the Ramsar Convention on Wetlands

Much of Europe's wealth of archaeological and cultural heritage is closely associated with the great natural richness of the region's wetlands. Our ancient civilisations developed on major rivers and their associated wetlands, and many peoples continue to depend on their resources of water, food and other materials and their many vital functions for safeguarding human health. So wetlands world-wide have a wealth of cultural heritage which takes many forms, from human-made physical structures and artefacts, palaeontological records in sediments and peat, and traditional water and land-use management practices, to places of religious significance to indigenous peoples and the almost intangible 'sense of place' felt by many for these wild and often mysterious places and their wildlife.

Despite the great significance of wetlands for wildlife and people, loss and damage continues. The Convention on Wetlands (Ramsar, Iran, 1971) owes its origins in the 1960s to the urgent need to safeguard wetland habitats and the species that depend upon both inland and coastal and nearshore marine systems. Parties to the Convention (123 countries by December 2000) commit to the wise (ie sustainable) use of all their wetland resources, to paying particular attention to designating and sustainably managing their internationally important sites, and to co-operating internationally.

There is much common ground in the biodiversity and heritage management of wetlands. Both depend on maintaining these places, since their destruction destroys both its natural and cultural heritage. Even though some wetlands can be created or rehabilitated to restore, at least in part, their ecological values and features, once one is destroyed its cultural and historical features are lost forever. Decision-makers and managers of the natural and the cultural features of wetlands are, however, not always fully aware of the benefits of working together to jointly strengthen the safeguarding of this heritage.

The Ramsar Convention has long recognised the vital importance of people and their wetland heritage in achieving its goal. Indeed, the theme of its most recent Conference of Parties to the Convention, in Costa Rica in 1999, was "People and Wetlands: the Vital Link". Furthermore, the importance of people and the cultural significance of wetlands will receive an even higher profile at our next Conference of Parties (COP8 in Valencia, Spain in November 2002) when the theme will be "Wetlands: water, life and culture". COP8 will include a technical session on cultural aspects of wetlands as a tool for their conservation and sustainable use, and the Conference will consider adoption of guidelines for incorporating cultural heritage in the assessment, valuation and management of wetlands.

The initiative by the European Archaeological Council to focus on wetlands and to publish this volume on *The Heritage Management of Wetlands* is, therefore, both most welcome and most timely. *The Heritage Management of Wetlands* will do much to raise awareness of the importance of managing wetlands so as to safeguard their cultural and archaeological richness alongside their natural values and functions - and to demonstrate to those implementing the Ramsar Convention how this can be best achieved on the ground.

The Ramsar Convention looks forward to working closely with the European Archaeological Council, and welcomes the EAC's Statement of Intent published in this important volume as the sound basis for developing collaboration in the coming years to the benefit of all those seeking to maintain this vital part of our global heritage.

Nick Davidson
Deputy Secretary General
Ramsar Convention on Wetlands

ii. Preface

On 26 November, 1999, as part of its inaugural meeting, the newly constituted *Europae Archaeologiae Consilium* (European Archaeological Council–EAC) held a one-day symposium on the archaeological heritage management of wetlands in Europe. The symposium was organised jointly with WARP (the Wetland Archaeology Research Project) and was held at the offices of the Council of Europe in Strasbourg.

The symposium comprised a number of regional reviews of heritage management issues and practices relating to wetland archaeology in Europe and it explored the nature of the management problems facing European archaeologists working in a wetland context. Speakers showed that although there are clear similarities in the wetland archaeological resource across the Continent, the critical issues relating to its management vary considerably from region to region. During the course of discussion, delegates emphasised the urgent need to forge much closer links with nature conservation interests, and in particular to make better use of the workings of the international Ramsar Convention on wetlands which promotes the conservation and wise use of wetlands in 123 countries world-wide.

The EAC had always intended to publish the papers presented to the symposium, but following the discussion in Strasbourg it was decided to expand the scope of the intended volume to include a much broader perspective on the archaeological heritage management of European wetlands than had been possible in the course of a single day. The resulting volume, which has been prepared at the University of Exeter, is divided into four sections, the first of which covers concepts and legislation. In the second section, the number of regional reviews has been increased so that geographical coverage is more even. In the third section, the scope of the proceedings has been extended to include case studies and related topics which bring together heritage management and nature conservation interests, and highlight some of the strategic issues facing both disciplines. The volume concludes with an overview and recommendations for future action by Professor John Coles, and a response by the Board of the EAC setting out a broad strategy to advance the more effective heritage management of wetlands throughout Europe.

At the same time that the Board of the EAC began planning this volume, English Heritage also turned its attention to the need for a strategy for wetland archaeology in England. Following the completion of the four major English Heritage commissioned archaeological surveys of wetlands in the Somerset Levels, the Fens, North West England, and Humberside, English Heritage has now begun to develop a long-term forward strategy for the conservation and management of wetland archaeology. As part of this process, both to inform its own thinking on these issues, and to provide practical and effective support for the work of the EAC and WARP in this area, English Heritage has funded the compilation and production of this volume (including the costs of preparing some of the papers).

It is the hope of all three organisations that this publication will help to encourage the proper integration of archaeological considerations with the concerns of the natural environment in the management of wetland ecosystems. The Ramsar Convention already recognises the importance of cultural, historical and archaeological interests in the management of wetlands, and is taking positive steps to ensure that these issues are higher on the management/designation agenda. This volume focuses on heritage management issues and the close correlation between archaeological heritage and nature conservation interests and emphasises in particular the importance of fully incorporating archaeological heritage management interests in the workings of the Ramsar Convention.

This publication provides a timely and significant opportunity for the EAC to pursue its aims and objectives, by make a real and lasting impact on the protection and heritage management of this fragile natural resource which is so critical for archaeological interests. Archaeology and nature conservation have a great deal in common,

and for both disciplines there are considerable mutual benefits to be derived from the establishment of a close working relationship. The preparations for the production of this volume have already lead to direct and positive contacts between the EAC and the Ramsar Bureau (the Convention's secretariat), and the EAC Board is confident that, through its members, it can make further significant contributions to the work of the Ramsar Convention. In this way we can jointly help achieve the objectives of all our respective organisations by ensuring the better protection and management of our surviving wetlands.

At the next conference of the Contracting Parties to the Ramsar Convention to be held in November 2002, a technical session will focus attention on cultural aspects of wetlands. Our primary objective in this context is to ensure the full representation and recognition, in this forum, of archaeological heritage management issues and interests including the buried and invisible heritage. The most appropriate mechanism to achieve this will have to be discussed and agreed with the Ramsar Bureau, but the publication of this volume gives us a strong base from which to launch this campaign. In addition, the publication of this symposium represents a seminal collection of papers of particular interest to all archaeologists involved in heritage management (as government agencies, consultants or contractors), and academic archaeologists specialising in, or with an interest in wetland archaeology. It will also be of considerable interest to cognate nature conservation interests, and the EAC, WARP, and English Heritage hope that it will prove to be of lasting value to all organisations concerned with safeguarding the natural and cultural environment for the benefit and enjoyment of all.

Acknowledgements
The editors would like to thank the following for their help in the production of this volume: for assistance with information and illustrations - Mike Rouillard, Seán Goddard, Andrew Teed and Barry Phillips (University of Exeter), Michael Thompson, Martin Weiler (Environment Agency); for translation of abstracts into French and German - Julie Ciesielski, Eric and Sammy Frénée, Fritz Lüth, Christina Marangou, Helen Vassallo; for assistance with proof-reading - Charlotte Hawkins and Brynmor Morris; for advice and support throughout - John Coles. The compilation and production of the volume has been funded by English Heritage with assistance from the EAC and WARP.

Adrian Olivier
President
Europae Archaeologiae Consilium

Bryony Coles
Centre for Wetland Research
University of Exeter

iii. The *Europae Archaeologiae Consilium*

Archaeologists and heritage managers working in Europe have long come together in different contexts to discuss issues of mutual concern. For several years representatives of national heritage management organisations had met annually as an informal round table to discuss common heritage management issues. However, despite many such formal and informal contacts, there was still felt to be a very strong need to develop simple, effective, and lasting mechanisms for future co-operation in the sphere of heritage management.

In all European countries archaeological heritage management is a legal concern of the state, but the successful management of archaeological resources also depends on a wide range of factors including, for example, public benefit, integration with planning processes, and interaction with official policies on agriculture, urban development, and infrastructure. All these areas are vital to heritage management, and are increasingly influenced by pan-European developments, and for countries of the European Union, by EU legislation and policy. Heritage managers across Europe thought that it was vital that they should work more closely together to discuss issues of mutual concern in a pan-European context, and in 1998 the round table agreed to create a new organisation specifically to support the management of the archaeological heritage throughout Europe.

In October 1999, after a year's gestation, the statutes of the *Europae Archaeologiae Consilium* (the European Archaeological Council) were approved by royal decree under Belgian Law. This formally established the EAC as an international not-for-profit association of the heads of national organisations charged by law with the management of the archaeological heritage. On November 25, 1999, the new organisation was publicly launched at an inaugural ceremony held in Strasbourg at the offices of the Council of Europe.

The primary purpose of the EAC is to serve the specific needs of national archaeological heritage management agencies by providing a forum for such organisations to establish closer and more structured co-operation and exchange of information. Membership of the Council is open to all national bodies charged with the management of the archaeological heritage throughout Europe, including where appropriate agencies in a federal context (such as the German Länder, and the Swiss Cantons).

The objectives of the EAC are:

- to promote the exchange of information and co-operation between the bodies charged by law with the management of the archaeological heritage of the countries of Europe;
- to provide archaeological heritage management agencies with a forum for discussion and for exchange of information;
- to act as interlocutor for working towards common goals and as a monitoring and advisory body on all issues relevant to the management of the archaeological heritage in Europe, in particular in relation to the European Union and the Council of Europe;
- to promote the management, protection, scientific interpretation, publication, presentation, and public enjoyment and understanding of the archaeological heritage in Europe;
- to work together with other bodies which share its aims;
- to watch over, and act for, the well being of archaeology, in Europe and anywhere in the world.

The EAC is now developing mechanisms to achieve these objectives. It has set up an intelligence service to co-ordinate information about European Union and Council of Europe programmes and projects, and it provides a forum for the discussion and exchange of information about heritage management practices throughout Europe, through mailings, regular meetings, special working groups, an annual heritage management symposium, and appropriate publications. The EAC will provide a single co-ordinated voice to speak out on specific issues that impact on archaeological heritage management, and to influence the development of policies by European agencies.

Four key themes have been identified:

- **Political** - to express the values of archaeological heritage management in a political context by influencing the development of pan-European policies and ensuring awareness, in the European Union and the Council of Europe, of the impact of new policies on the archaeological heritage;
- **Social** - to express the social value of archaeology, and to raise awareness of that value with the public by promoting the contribution archaeology makes to improving the general quality of life;
- **Professional** - to develop and promote consistent high standards in archaeological heritage management;
- **Academic** - to develop a broader understanding of the archaeological resource in a European context by exploring common subjects of particular concern, and advancing and enabling pan-European research programmes.

A small number of special working groups has been convened to address specific subjects of topical importance. The working groups will explore key issues and discuss specific themes and topics (often in partnership with other relevant organisations) in order to inform the development of policy and progress the aims and objectives of the EAC. An Annual European Heritage Management Symposium has been established to discuss and disseminate information on topical themes and subjects relevant to the work of the membership. The papers of the working groups and the proceedings of the annual heritage management symposium will be published regularly, as occasional papers. The collection of papers presented here forms the first volume of this series.

Archaeology in Europe today is strong and healthy. Our conservation legislation and developing policies, methods, and techniques are increasingly sophisticated and are highly regarded throughout the world. As we work more frequently on the international stage, in a pan-European and indeed global context, it is essential that we continue to recognise the need to develop a transnational framework not just for the practical mechanisms of cultural heritage resource management, but also for the underlying research objectives of our discipline. The EAC has come into existence to foster collaborative arrangements and partnerships across Europe, so that we create for ourselves an appropriate European context to promote research as a statement of what is valuable to the archaeological community.

The inaugural meeting of the EAC was a very significant event in the short history of cultural heritage management and its foundation marks a major milestone in the development and growing maturity of our discipline. Many organisations concerned with cultural heritage management were represented at the meeting in Strasbourg, and by the end of its first year's existence, 21 countries will have joined the *Consilium*. This is vivid testimony to the need for such an organisation, and to our determination to make a lasting and positive contribution to the conservation and management of our collective cultural heritage in Europe.

Adrian Olivier
President
Europae Archaeologiae Consilium

iv. The Wetland Archaeology Research Project

The Wetland Archaeology Research Project (WARP) was established in the University of Exeter in 1987 and is now based in the Department of Archaeology, School of Geography and Archaeology at the University. The founders and directors of WARP are Bryony and John Coles, and John Coles is Editor of its newsletter.

The aim of WARP is to promote the development of wetland archaeology throughout the world, by initiating Conferences and other meetings, by publishing Conference Proceedings and other collections of papers, and by disseminating information about wetlands and wetland archaeology through its *NewsWARP*.

The membership of WARP currently stands at about 300 Associates and about 50 Institutions, from around 30 countries. The subjects represented among the Associates range from survey, excavation, conservation and management to environmental and historic studies, and a number of Associates maintain their membership for general interest in all these matters. Institutions contribute to WARP through subscription and exchange of publications and by these means the distribution of information about wetland archaeology and related subjects reaches a wide audience of students and research workers.

The newsletter of WARP, called *NewsWARP*, appears once or twice a year (28 issues since 1987) and is an informal, rapidly-produced series, each issue of 30–50 pages. It contains information about Conferences and publications (both books and journals) concerned with wetlands. It also has news of discoveries, methods of work, commentaries on developments, and a continuing series of academic reports which may be interim statements or, more often, small research papers on wetland studies. The geographical range of *NewsWARP* is world-wide and contributions have recently appeared from New Zealand, Japan, America and Russia, as well as from many European countries.

WARP also initiates Conferences and collaborates with other institutions in international meetings. In the past decade, Conferences have been held in Canada, Denmark, America and Ireland as well as a number in the UK. The Conference themes range from subjects such as excavations and surveys, organic remains, conservation, management of wetlands and bog bodies to more wide-ranging issues and more general studies. Most of the Conferences have been published in *WARP Occasional Papers*, and a list of these will demonstrate the sequence and subjects as well as the institutions with which WARP has collaborated:

1. 1987: *Precision, purpose and priorities in wetland archaeology*. Society of Antiquaries of London.
2. 1989: *The Archaeology of Rural Wetlands in England*. WARP and English Heritage.
3. 1990: *Waterlogged Wood*. WARP and English Heritage.
4. 1990: *Organic Archaeological Remains in Southwest Britain*. WARP and European Social Fund.
5. 1991: *Wet Site Excavation and Survey*. WARP, Museum of London and Nautical Archaeology Society.
6. 1992: *The Wetland Revolution in Prehistory*. WARP and The Prehistoric Society.
7. 1993: *A Spirit of Enquiry. Essays for Ted Wright*. WARP, National Maritime Museum and Nautical Archaeology Society.
8. 1994: *A Celebration of Wood*. WARP and York Archaeological Trust.
9. 1995: *Wetland Management. A Survey for English Heritage*. WARP and English Heritage.
10. 1996: *Enlarging the Past. The contribution of Wetland Archaeology*. WARP and Society of Antiquaries of Scotland.
11. 1998: *Hidden Dimensions. The Cultural Significance of Wetland Archaeology*. WARP and University of British Columbia.
12. 1999: *Bog Bodies, Sacred Sites and Wetland Archaeology*. WARP.

13. 1998: *Changing Landscapes. The Ancient Fenland*. WARP and Cambridgeshire County Council.
14. 2001: *Recent Advances in Wetland Archaeology*. WARP and University College Dublin.
15. in press. *Enduring Records. The Environmental and Cultural Heritage of Wetlands*. WARP and University of Florida.
16. 2001: *The Heritage Management of Wetlands in Europe*. WARP, English Heritage and the European Archaeological Council.

With the publication of *NewsWARP* 28 and *Occasional Papers* 16 (this book), WARP has reached a position where a more academically-focussed and refereed publication will be able to address the major developments and pressures of wetland environments and wetland archaeology. In 2001 a new journal will be established, called *The Journal of Wetland Archaeology*, which will be able to take the subject forward. WARP will continue its informal association of archaeologists and others, and will continue to send out brief reports and news through *NewsWARP*.

John Coles
WARP

Members of WARP from Britain, Japan, Poland, Denmark, Poland, the Netherlands, Switzerland, Germany and France, standing on a reconstruction of the Sweet Track in the Shapwick Heath National Nature Reserve.

Anyone interested in joining WARP as an Associate is invited to write to:

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Section I:
Concepts and legislation

1: A Past Less Foreign: wetland archaeology and its survival in European perspective

Bryony Coles

Abstract: *The heritage value of European wetlands is outstanding, and relevant to wetland management for ecology as well as archaeology. In dryland contexts, much organic archaeological evidence perishes, whereas in wetlands much of it is preserved, having survived in undisturbed waterlogged contexts. Natural remains, of plant and animal origin, provide evidence for wetland histories. Cultural remains provide much of our evidence for the material aspects of the human past, which were predominantly of organic origin until recent times. Evidence for dating is also available, notably high-quality radiocarbon dating and dendrochronology. Putting these different strands together, a detailed understanding can be achieved of wetland development and the associated human activity. Wetland archaeology is equally significant for understanding the wider context, in that much of the evidence relates to wetland and dryland alike, and can be used at different levels of interpretation. Finally, wetland archaeology engages the public, and through its qualities of good preservation and good contextual information, lends itself to reconstruction and experimentation. The heritage component of wetlands is relevant to management of the habitat, it has great potential for enlarging our understanding of the past, and it is extremely vulnerable. The present EAC initiative to promote positive, informed management is therefore timely and welcome.*

Introduction

Europe is a relatively small landmass, much of it influenced by seas, with a long coastline, many small rivers, several major inland lakes and significant mountains. These factors, together with geology, latitude and glacial history, influence the character of wetlands within Europe, as does the social geography of population density, agricultural intensity and urban and industrial development. The latter influences are more significant that a conservationist might desire, and today there are very few European wetlands which remain undamaged by human activity (Hollis & Jones 1991, p.30).

Why should the decline of wetlands be of concern to heritage managers, when for much of the last two centuries governments have promoted wetland drainage and flood control to provide economic, health and social benefits to their countries? Changing perceptions of wetlands are part of the answer, but the main archaeological argument for the protection and management of wetlands lies in their outstanding heritage values. It is the purpose of this chapter to outline those values, and to indicate their relevance to the management of wetlands for their ecology and as an integral part of the European inheritance.

Preservation of organics

Wetlands are land which is predominantly saturated with water, with water often breaking the surface amongst the vegetation: marshes, swamps, peatlands, lake margins, river floodplains, estuaries and lagoons. Wetlands are depositional landscapes, albeit sometimes subject to erosion, and they may be composed of gravels, sands and silts, marls, organic muds and peats, often in successive layers and lenses within an individual wetland as within the floodplains of rivers such as the Seine and the Thames. Other wetlands may be dominated by one particular material, for example the moors of the eastern Netherlands and north-west Germany where metre upon metre of peat has built up over the millennia.

Because conditions were wet as the layers formed, and have remained wet subsequently, oxygen has been largely excluded, and the normal processes of decay through bacterial and fungal activity have been slowed down. Within a wetland, below the surface, organic preservation is therefore usually good and sometimes exceptional. Exactly what is preserved depends on the history of the wetland and its chemistry, but one can generalise to some extent and group the remains into 'natural' and 'cultural' organics. Both are of immense value in the study and understanding of the past.

It should be apparent already that the heritage value of wetlands lies below as well as on the surface, and it is the whole of a wetland body, not just the surface features, which requires protection and management.

The natural organic remains within a wetland can be of plant or animal origin, or a mixture. Peat for example (pl.1.1) consists predominantly of macroscopic plant remains such as partially decayed fragments of moss and heather and leaves, in amongst which there may be beetle wing cases and perhaps a spider leg. Large quantities of recognisable plant fragments can also be found in organic muds and silts. These macrofossils can be used to analyse

and interpret the history of a wetland, since plant species change according to local conditions and this will be reflected in the species preserved in the successive layers building up to the present-day surface.

Often the picture will be amplified by the preservation of pollen, which provides a second means of reconstructing the successive plant communities growing within a wetland, since individual pollen grains can frequently be identified to species. In many cases, pollen preserved within a wetland includes grains which have blown in from the surrounding dry land; their identification contributes to the vegetation history of the surrounding region, often well beyond the wetland.

Other microscopic remains from wetlands include diatoms, which are unicellular algae. Like pollen, these can be identified to species. Diatoms are sensitive to changes in hydrology, thus their identification is particularly valuable for reconstructing the hydrological history of their parent wetland.

Occasionally, substantial remains of trees will be preserved (see Chapter 16, fig.16.4), either from a woodland growing on a land surface shortly before it was overwhelmed by wetland conditions, or from a phase of tree growth during the development of the wetland. In either case, the survival of wood opens up many possibilities for the study of past conditions, both natural and cultural; some of these are described further below.

The macro- and microscopic animal remains from wetlands, used to reconstruct past conditions, include beetles (Coleoptera) and some other categories of insect such as midges (Chironomids), and molluscs, especially snails. For all of these, as for the plant remains, identification of the different species and interpretation of the changing groups of species through time allows the development of a wetland to be charted. The remains of larger animals, such as fish, amphibians, birds and mammals may also be relevant, although not so commonly encountered. In the majority of studies of wetland development, animal remains are used in conjunction with the evidence from plants, rather than in isolation.

Interpretation of wetland development is not always straightforward, and the most interesting and illuminating studies are based on the analysis of a broad range of organic remains. The results from one study may confirm and support those of another or, and perhaps more frequently, the conflicting pictures presented by different sets of evidence lead the investigators to question their material anew, thereby reaching a more subtle understanding of past conditions. At times, the conflicting evidence cannot be reconciled, either for lack of evidence, or because we have yet to understand all the pathways of wetland development. Recent examples of integrated analyses include work on the coastal wetlands of south Wales led by Nayling and Caseldine (1997), where the organic materials studied included pollen, plant macrofossils, diatoms, molluscs, ostracods and insects, all of which had been recovered from a series of later prehistoric palaeochannels sometimes close to and sometimes within the tidal reach of the sea. A second, inland example is provided by the investigations of lake Paladru in eastern France, led by Colardelle and Verdel (1993), where the organic evidence analysed consisted of pollen, macrofossil plant remains, seeds, and fish bones. In both cases, the reconstruction of wetland history was entangled with evidence for human activity, and as we shall see below, this is very often the case.

Cultural remains are the obvious sign of human presence in a wetland, and it is the preservation of organic material culture in the form of objects and structures which is of such value to archaeology. Until recently, the greater part of our buildings, equipment and possessions was made of plant and animal materials (Coles 1984).

It is only in very wet, very dry or very cold conditions that such evidence is preserved. In Europe, there are some examples of preservation in cold or dry contexts, most notably perhaps the body of a Neolithic man found high and dry in the frozen mountains of the Italian-Austrian border (Spindler 1993). By contrast, there are many examples from wetlands of human bodies, personal equipment and clothing (pl.1.2); the evidence, which spans many centuries, has been summarised by Van der Sanden (1996). Wetlands also preserve the structures of everyday life, houses and workshops and stables and trackways, and the not-so-ordinary places and objects, which we associate with ritual activities (Coles & Coles 1989). This extensive record, which is more representative of the past that the dryland record by virtue of the preservation of organic materials, can be used to broaden our general understanding of the human past (Coles & Coles 1995). The variety and detail of specific wetland sites and finds can be seen in numerous European discoveries, some of which are discussed in the papers published in Coles, Coles and Schou Jørgensen (1999), and a number of others are noted elsewhere in this volume.

Some aspects of human culture are known only, or mainly, from the evidence preserved in wetlands, as with the Mesolithic textiles from the coastal site of Tybrind Vig in Denmark (Andersen & Tybrind 1985) and the Neolithic hats and shoes from sites on the shores of the Bodensee (Schlichtherle & Wahlster 1986). The only comparable contemporary evidence from outside a wetland context comes from the spectacular but singular discovery of the Ice-man. Then there are the many objects which we know, from partial evidence, must have existed, but which survive in their entirety only from wetlands, as with the bows and arrowshafts that belong with the arrowheads from Nizhneyé Veretye in Russia (Oshibkina 1982) or the spindles from Fiavé once weighted by stone or bone whorls (Perini 1987). These are all things which people used throughout their inhabited world, not just in

the wetland context, but it is only when they were discarded, dropped or deposited in wetlands that they have been preserved (pl.11.1 & pl.11.2).

The contrast in structural evidence from wetland and dryland contexts can be equally dramatic. Many archaeological excavations on dry land reveal holes in the ground where wooden posts once stood, as for example at the timber castle of Hen Domen on the border between England and Wales, where skilful excavation over many years has revealed the outlines of buildings and associated evidence, enabling the excavators to trace the history of the site although with little detail of the inhabitants' lives (Higham & Barker 2000). A near-contemporary fortification has been excavated at Charavines-Colletière on Lake Paladru, and here the site history is known in some detail, along with direct evidence for the diet, clothing and pastimes of the inhabitants and for the landscape that surrounded them (Colardelle & Verdel 1993). Wetlands in Europe have provided many such examples, where the history of a settlement and the details of its inhabitants' lives can be studied. The majority are of Neolithic or later date, such as those from the circum-Alpine lakes (Egloff 1989) or from the Netherlands (Louwe Kooijmans 1987) or north Germany (Haarnagel 1979), and some are relatively recent, or still inhabited if no longer quite so wet, such as the cities of Dublin (Wallace 2001) and London (Milne 1992), or the Russian town of Novgorod (Thompson 1967).

There is a second category of structural evidence from wetlands, the wooden trackways (pl.4.1) which are known mainly from Ireland, England, the Netherlands and north Germany. These provide evidence of communication routes and wetland exploitation, and can also reveal much of woodland use and woodworking techniques, as well as less prosaic or practical matters (Raftery 1990; Coles & Coles 1986; Casparie 1987). The contrast between the evidence held by a wooden trackway and its surrounding layers of peat, and a dryland footpath, is as great as that between a flint flake and a complete bow and arrow.

Context and Dating

In studying settlements and other structured evidence such as trackways or places of votive deposit, the wetland value lies not only in the preservation of organic material but also in the often undisturbed context. On dry land, ancient settlements are liable to have been disturbed in antiquity, whether by renewed settlement or by agriculture or other activities. In wetland contexts, agriculture is less likely, and although places of successive settlement are known, each phase of occupation may be sealed by sterile deposits, which accumulated between the periods of occupation. In many cases, a settlement or trackway represents a short-lived single phase of activity, the evidence for which survives in a sealed context. Therefore, the evidence subsequently revealed by excavation of the context can be confidently attributed to a well-defined episode, as in the example of Charavines-Colletière noted above.

We know that the fortified settlement at Charavines-Colletière lasted for just a few decades, thanks to another characteristic of wetland archaeology, which is the potential it offers for accurate and precise dating. The survival of organic material enables samples to be taken for radiocarbon dating, both of natural deposits and of cultural evidence. Many pollen sequences have multiple dates, allowing the reconstruction of vegetation in relation to particular periods of the past, and an estimation of rates of change. In some cases, radiocarbon dating of stray finds has enabled their correct chronological attribution, as with a series of objects from the bogs of Scotland (Sheridan 1996), or the wooden anthropomorphic figurines from Britain and Ireland (fig.1.1) (Coles 1990). In both these cases, there had been no sure indication of date from either typology or context.

The most accurate dating available to archaeology is that offered by dendrochronology, or tree-ring dating. Through dendrochronological analysis of oak timbers from Charavines-Colletière, the foundation of the site has been dated to AD 1003, and its abandonment to AD 1034 or soon thereafter. Such precise dating is equally possible for earlier periods, and in the Somerset Levels the building of the wooden trackway known as the Sweet Track has

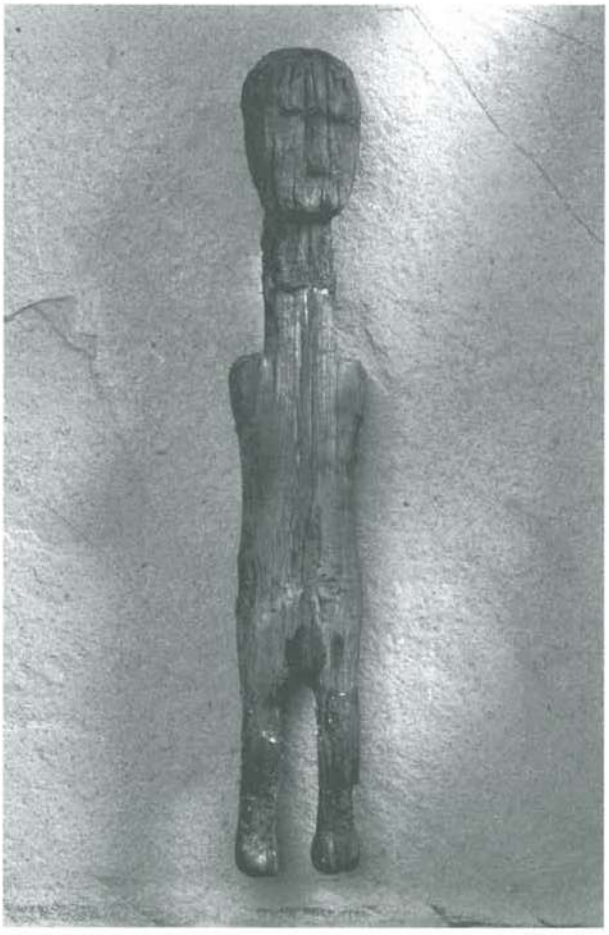

Fig.1.1: A wooden anthropomorphic figure carved from oak wood, and radiocarbon dated to the Iron Age. Found at Kingsteignton, England. Photo Royal Albert Memorial Museum, Exeter.

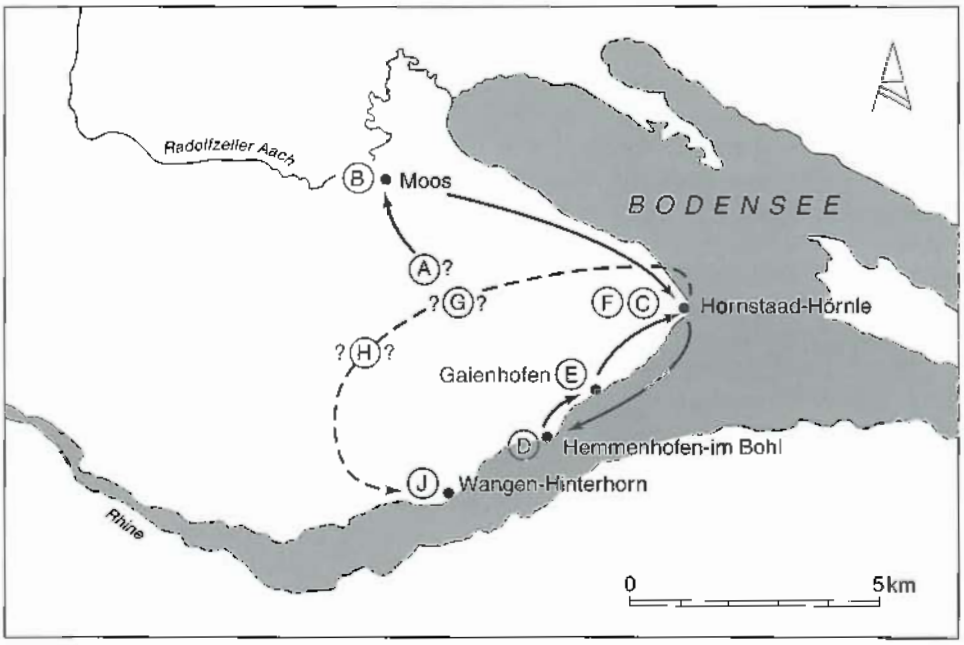

Fig.1.2: Suggested sequence of moves for a single Neolithic community living near or beside the Bodensee in the early fourth millennium BC.

been dated through dendrochronology to 3806 BC. Through dendrochronology and analyses of timber decay and of repairs to the track, its duration is placed at 15 years at most, suggesting that it was abandoned by 3790 BC (Coles & Coles 1995).

Dendrochronology can sometimes be used to date sites that were excavated before the technique was developed, always providing that suitable wood has survived. In western Poland, the lakeside settlement at Biskupin has been known since the 1930s, and excavated at intervals from then until the early 1970s. It was dated to approximately the late Bronze Age or early Iron Age on the basis of the artefacts found within the settlement. In the early 1990s, several of the oak timbers, which remained buried on the site, were sampled for dendrochronological analysis, and the results indicate that the first phase of construction of this fortified site lasted from 742 BC to 726 BC (Wasny 1993). Now this precise dating can be applied to the artefacts sealed in contexts belonging to that first construction phase.

Wetland histories

A number of European wetlands now have quite detailed histories, based on evidence from well dated, securely stratified deposits, and in many cases based on the analysis of a range of different categories of evidence. In England, the four major wetland survey programmes funded by English Heritage, in the Somerset Levels, the East Anglian Fens, the North West Wetlands and the Humber Wetlands have each included detailed analysis of the trajectories of wetland development within the survey areas. In the Fens, complex local variations in conditions were revealed (Waller 1994), and a similar diversity is apparent from the other surveys - disentangling the causative factors is relevant to the present-day management of wetlands, as well as to the understanding of conditions in the past.

Human impact on wetlands can be detected from an early stage, well before the advent of farming communities. In northern Germany, at Friesack, episodes of localised lakeshore erosion, early in the Holocene, can be linked to the repeated visits of groups of people who settled on the lake margin for a few weeks at a time, disturbing the ground cover and causing the erosion (Gramsch 1992). On the shores of lake Neuchâtel in Switzerland, where several of the villages of Neolithic and Bronze Age people have been investigated ahead of motorway development, excavation and analysis of cultural levels, environmental studies, and extensive dendrochronological dating, have indicated that in some cases human settlement soon caused pollution of the local waters. Elsewhere, there is evidence for early peat cutting, as in the Netherlands during the Iron Age (Therkorn *et al.* 1997). In these examples, wetland conditions have preserved the evidence and provided the firm associations and secure dating, which makes it possible to trace the interactions of people and their environments and to argue that human intervention has been an integral part of wetland ecology throughout the Holocene. For successful wetland management in the future, we need to learn more about the influence of human activity in the past.

Wider Contexts

Wetland evidence is relevant to more than wetland histories. In some European countries, it has been embedded in the study of the past since the emergence of scientific archaeology, notably in Denmark and in Switzerland. Elsewhere, there has perhaps been a tendency for dryland archaeologists to regard the evidence from wetlands as specialised and separate, particularly for study of the Neolithic and later periods. But wetland evidence does have a bearing on the wider contexts. It is relevant, as we saw with Biskupin, for the accurate dating of the artefact typologies, which still form the backbone of much dryland chronology. It shows us what people wore and

what their personal and domestic possessions were. It provides information on dryland vegetation history, as for the uplands surrounding the Somerset Levels where the gradually increasing impact of humans has been traced for nearly five millennia.

Sometimes, the combination of site preservation, dendrochronology and dated typologies can provide new insights into the character of human presence in a region. Around the western Bodensee, in the early fourth millennium BC, individual settlements seem to have been occupied for 15 years or so, and then abandoned, and sometimes reoccupied at a later date. A sequence can be established, suggestive of a single community moving around a broad territory, returning to old sites after a generation or so (fig.1.2). There are some gaps, times when the intervals seem longer than usual, or times when the tree-ring evidence points to a major building episode which cannot be identified at any of the known sites. In one or two cases, tentative evidence points to a dryland location for the 'missing' village, although too little is preserved in the dryland contexts to tie any dryland site securely into the sequence known from the lake margin wetlands (Coles 1999). There are two points to note here, the first being that groups of people were not exclusively 'drylanders' or 'wetlanders', but moved from one environment to the other and back again. The second is that the sequence lasts for only a little over a century. If the villages were not dated by dendrochronology, one might have thought that they were all in use throughout the period, giving half a dozen or so contemporary villages and a large population. But, armed with the chronological information provided by dendrochronological analyses, the more accurate interpretation of the local settlement pattern appears to be of a single community shifting around a territory that encompasses both wet and dry environments. There are other indications in the wetland evidence that sites and structures were relatively short-lived, used for a generation rather than a century, and perhaps one of the most interesting questions this raises for archaeology is when and how and why did Europeans develop a culture of permanence.

Engaging the Public

Bog bodies grip the public imagination. This was evident with the amazing gathering of ancient Europeans brought together in Silkeborg in 1996, and equally with the lone Lindow Man displayed in the British Museum. Utzi, the Iceman, on display in Bolzano in northern Italy, also enthrals the visitors. This is one of the qualities of well-preserved evidence from the past, that it is less foreign, less remote than bare bones and stones. People can understand a flint blade when it is hafted like a penknife, they can appreciate the significance of a group of pebbles when they see them wrapped with bark and tied with string into a sausage-like weight for a fishing net. They can compare the size of an Iron Age house with their own, and contemplate walking along a wooden trackway into the marsh. It is not just that wetland evidence is more complete due to the survival of organic components, though that is important. There is also an element of 'people like us', for the wetland evidence is not dominated by palaces and temples and the burials of royalty, but by evidence for hunters and weavers, farmers and fisherpeople, travellers and traders, and the landscapes they inhabited. In this respect, wetland evidence is one of the best tools available for engaging people with the past: there are even gobs of chewing gum, complete with adolescent toothmarks, to cheer the modern teenager (fig.1.3; Nordqvist 1994).

However, wetland evidence is rarely visible in situ, and when it is, it is probably in imminent danger of destruction. Its invisibility, coupled with the relative completeness of preserved evidence, both demands and facilitates reconstructions and replicas to amplify museum displays of conserved material. Europe is fortunate in having a number of open-air reconstructions based on wetland evidence, such as the long-established displays at Unteruhldingen in southern Germany and at Biskupin in western Poland, both initiated in the earlier twentieth

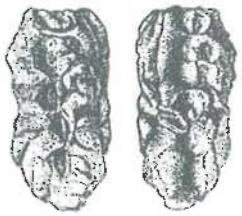

Fig.1.3: Huseby Klev, Sweden. Resin chewing gum, chewed by a 13-year-old. Length 38mm.

century, and a number of more recent developments such as the temporary Pfahlbauland exhibition in Zürich and the reconstructions at Chalain in eastern France, Dispilio in Greece, Flag Fen in eastern England and Loch Tay in Scotland. Reconstructions of houses, trackways, boats and a host of other artefacts offer people the chance to try out some aspects of the distant past in a way that is not possible with original material, even sleeping in the houses and paddling the canoes (pl.1.3; Ruoff 1992; Pétrequin this vol.; Schlichtherle this vol.). This is another facet of the past being less foreign, where the authenticity of the reconstructions is an important element of the dialogue between the archaeologist and the public.

Engagement with the public is all the more necessary because in a wetland context the heritage component of archaeological and environmental evidence is mostly buried below the surface, and invisible. This is not to deny the value of surface evidence, such as canals and boundaries and old peat cuttings and the earthworks of abandoned settlements (eg Rippon 2000), which represents the most recent history of the wetland, but this is slightly less vulnerable to damage because people can see that it is there. The evidence below ground can be irreparably damaged and even disappear without anyone realising what is happening, for instance when drainage of fields causes desiccation and decay of neighbouring wetland deposits, as was the case around the Federsee,

and in the Fens, and in the Åmose. If the European wetland heritage is to be protected and managed for the future, the public need to know what is there and why it is significant, for without their support no long-term strategy is likely to succeed.

Conclusions

The heritage component of a wetland is integral to its present-day value, in that it elucidates its natural and cultural life-history and, literally, physically gives it its character. To manage a wetland successfully requires an understanding of how it came to be what it now is. Moreover, to stand back from the individual wetland and take a view at the European scale, wetland histories hold the clues to their local and regional diversity and to their pathways of change through time. An improved understanding of these synchronic and diachronic differences will also contribute to successful longterm management of wetland habitats in Europe.

Protecting the heritage component of wetlands is of enormous significance for future generations. This is a part of our heritage with potential for research and the development of new techniques of investigation, and for defining whole new areas of understanding about our past. It is a part of our heritage which truly belongs to all of us, representing as it does the material remains of the lives of all sorts of people, lived out on dry land and in wetlands and preserved in the latter. And it is a part of our heritage which is exceptionally vulnerable, as will be all too apparent from the papers which follow. Our wetland heritage is in dire need of positive, informed management and the European Archaeology Council's initiative in this respect is timely and very welcome.

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2: The heritage management of wetlands: legislative designation and protection, a viewpoint from England and Wales

Simon Marsden

Abstract: *This paper provides an overview of the legislation that is intended to designate and protect the archaeological heritage values of wetlands, or that relates to those values. It focuses on a full description of the most significant primary legal source materials at international, European and national levels, but also provides a description of other primary sources at each of these levels.The most significant requirements are the Ramsar and World Heritage Conventions, the European Heritage Conventions, the Habitats and EIA Directives, the Wildlife and Countryside Act, and the Ancient Monuments and Archaeological Areas Act. Other sources include the Berne and Biodiversity Conventions, the Transboundary Watercourses and Lakes and Transboundary EIA Conventions, the Wild Birds Directive, and the Planning (Listed Buildings and Conservation Areas) Act, Town and Country Planning Act, and the Water Resources Act.The paper begins by describing the international law, goes on to describe European law, and continues with a description of legal provisions in England and Wales. Taking each in sequence, a comprehensive outline is provided of all of the laws pertaining to the designation and protection of the archaeological heritage values of wetlands. This is important because although some of the laws relate to one another, others do not. Finally, a brief discussion and analysis of the application of the legislation to a hypothetical development is provided, and conclusions are drawn which focus upon the lack of integration and co-ordination between provisions, and the contrasting purpose of wetlands and archaeological legislation. The paper therefore contributes to an understanding of the entire range of legislative requirements and their relationship to one another, in theory and in practice.*

Introduction

Provisions for the designation and protection of wetlands are found in a wide range of laws and policies. These are applied increasingly to the protection of habitat, the maintenance of which is necessary to ensure the survival of a wide range of values, including archaeological ones. A major challenge is to incorporate biodiversity and heritage considerations into all policy areas (UNEP 2000, p.108) and an understanding of the relationship between archaeology and wetlands in the implementation of policy by law assists in this process.

This paper focuses upon the legal framework with reference to international law, European law, and the law of England and Wales. It will be seen from the material that follows that there are a large number of provisions that are relevant. While some are more significant than others it is necessary to ensure that if policy-makers and administrators concerned with legislative change and implementation are to be adequately and appropriately informed, that they are familiar with all of these (European Commission 1999). The relationship of each of the laws to one another is particularly important (Kramer 1993a; Holder 1997; Redman 1993). By looking at the situation in relation to England and Wales, aspects relevant to other European countries will emerge.

There are many policies that provide for the designation and protection of wetlands, but that are not implemented by law. Significant examples at the international, European and national levels include the Man and Biosphere Programme of UNESCO (UNESCO 2000), the Environmental Action Programmes of the European Commission (the sixth of which focuses upon problems of implementation) (Axelrod & Vig 1999), and various policies of the Ministry of Agriculture, Fisheries and Food and the Environment Agency (Coles 1995). Due to space constraints, policies are not discussed here.

International Law

A number of international treaties have relevance for the designation and protection of the heritage component of wetlands. The most important are the *Convention on Wetlands of International Importance*, 1971 (Ramsar), and the *Convention for the Protection of the World Cultural and Natural Heritage*, 1972 (World Heritage). Several other treaties also contain relevant requirements, particularly the *Convention on the Conservation of European Wildlife and Natural Habitats*, 1979 (Berne), and the *Convention on Environmental Impact Assessment in a Transboundary Context*, 1991 (Espoo). The *Convention on the Protection and Use of Transboundary Watercourses and Lakes*, 1992 (Helsinki), and the *United Nations Convention on Biological Diversity*, 1992 (Rio), are also relevant. Each of these is considered briefly below.

It has been suggested that full compliance with international environmental agreements is dependent and made up of four things: implementation, compliance,

enforcement and effectiveness. 'Implementation' refers to the specific actions that states take to make international treaties operative in their national legal system. 'Compliance' is defined as the extent to which the behaviour of a party to an international treaty actually conforms to the conditions set out in the treaty. 'Enforcement' indicates the methods that are available to force states to implement but also to comply with international treaty obligations. 'Effectiveness' addresses the question whether treaties that are correctly complied with actually achieve the objectives stated in the treaty (Faure & Lefevere 1999, pp.138–139).

Convention on Wetlands of International Importance, 1971 (Ramsar), 11 ILM, 963

This Convention entered into force on 21 December 1975. It requires parties to conserve wetlands as habitats of distinctive ecosystems and to designate Wetlands of International Importance for inclusion in a list to be maintained by the IUCN. Some sites may already be protected under national law before listing; listing then becomes a means of raising their profile and securing national action when they are threatened. Though not required to do so, some parties have enacted legislation requiring environmental impact assessment of projects that may affect listed sites.

The Convention permits sustainable 'wise use' of listed sites, but it neither forbids nor regulates the taking of species for any purpose. However any use must not affect the ecological characteristics of the wetland (Farrier & Tucker 2000). Although the Convention has been amended twice, the lack of amendment procedures is a serious defect since it inhibits the flexibility required to bring about measures that may be urgently required for conservation. The strengthening of administrative procedures, the establishment of a permanent Secretariat, a Standing Committee and a financial regime for contributions will all enhance its effectiveness (Birnie & Boyle 1992, pp.465–8; Birnie & Boyle 1995, pp.447–454). However the Convention has been criticised for being too general and unenforceable (Bell & McGillivray 2000, pp.653–654)

In Great Britain, the Joint Nature Conservation Committee is responsible for the implementation of the Ramsar Convention and other international conventions. The Committee was established under the *Environmental Protection Act* 1990, and it is also responsible for common standards throughout Great Britain with reference to the designation of SSSIs (see below) and other matters (Bell & McGillivray 2000, p.623).

Convention for the Protection of the World Cultural and Natural Heritage, 1972 (World Heritage), 11 ILM, 1358

The Convention entered into force on 17 December 1975. It requires states to conserve elements of world heritage, which can include natural and cultural heritage, although the guidelines laid down for listing natural sites require that physical sites be of outstanding universal value. It establishes a World Heritage Committee and provides procedures for designating such sites in a World Heritage List as well as establishing a Fund for assisting conservation. A list of World Heritage in Danger is maintained.

The Convention recognises that the international community has a duty to conserve heritage of universal value. Parties must do all they can to ensure identification, protection and transmission of the natural and cultural heritage for future generations. The Convention both overlaps and goes beyond Ramsar's scope in preserving habitats, in that it lays more stringent and specific obligations on its parties to take conservation measures. For listed sites, it provides real protection, but the limitations of listing prevent it being the major instrument of habitat protection (Birnie & Boyle 1992, pp.468–79; Birnie & Boyle 1995, pp.375–389).

From signing the Convention in 1984, the British government took the view that its provisions were fully satisfied by existing planning law. It made it clear that a designated site falls within one or more classes of heritage already recognised. Recent policy guidance now refers to World Heritage Sites and recommends that local planning authorities should adopt policies that safeguard their settings (Collcutt 1999, p.499; Pugh-Smith & Samuels 1996, pp.707–708). The fact of designation does not prevent development of a World Heritage Site, as was seen with regard to Hadrian's Wall (Pugh-Smith & Samuels 1996, p.708; Bell & McGillivray 2000, p.658).

Convention on the Conservation of European Wildlife and Natural Habitats, 1979 (Berne), ETS 104

The Convention entered into force on 1 June 1982. Parties are required to take measures to maintain populations of wild flora and fauna, especially endangered and vulnerable species listed on the Appendices. They are also required to ensure the conservation of habitats of the species listed, and endangered natural habitats. The Convention has been implemented by the EC Habitats and Wild Birds Directives (see below) (Birnie & Boyle 1992, pp.446–7; Birnie & Boyle 1995, pp.455–467; Churchill 1991, pp.168–171).

Convention on Environmental Impact Assessment in a Transboundary Context, 1991 (Espoo), 30 ILM, 802

The Convention entered into force on 10 September 1997. It is the first convention to lay down detailed rules, procedures and practices for environmental impact assessment of proposals, where the impacts are likely to cross territorial boundaries. The Convention applies to a wide range of proposed activities that are 'likely to cause significant adverse transboundary impact'. It requires each

party to establish a procedure that permits public participation and the preparation of appropriate documentation. Other states likely to be affected must be notified, and given the opportunity to enter into consultations, and make representations on the assessment. This must be taken into account in any final decision on the proposed activity (Birnie & Boyle 1995, pp.31–49).

Convention on the Protection and Use of Transboundary Watercourses and Lakes, 1992 (Helsinki), 31 ILM, 1312

The Convention entered into force on 6 October 1996. It is important because it is the first to codify on a regional basis, rules governing the protection and use of international watercourses. It contains provisions for the control of pollution, on equitable and reasonable utilisation, and on co-operation. It is progressive in that it requires ecologically sound and rational water management, conservation and the restoration of ecosystems, and the application of the precautionary and polluter pays principles (Birnie & Boyle 1995, pp.345–362).

United Nations Convention on Biological Diversity, 1992 (Rio), 31 ILM, 818

The Convention entered into force on 29 December 1993. Its aim is to provide a global framework for development of measures to conserve the Earth's biodiversity, within which states themselves develop the measures necessary to achieve the objectives. States must develop a national strategy and plan a programme for conservation of biological diversity and the suitable use of biological resources (Birnie & Boyle 1995, pp.390–414; European Commission 1998). The UK Biodiversity Action Plan 1994 was produced to guide subsequent policy and develop action plans, which may be the basis for future conservation measures if new legislation comes into force (Bell & McGillivray 2000, pp.654–655).

In addition to bilateral and multilateral treaties, international law consists of large numbers of non-binding legal instruments ('soft law') and customary law. It also consists of binding acts of international organisations and judgements of international courts or tribunals. A good deal of soft law is relevant to the designation and protection of the heritage component of wetlands, including the World Charter for Nature, the Declaration of the UN Conference on Environment and Development, (Birnie & Boyle 1995, pp.9–20), and Agenda 21 (Bryner 1999, pp.157–189). Much customary law consists of the formulation of principles that are later widely applied elsewhere, with varying degrees of success. An example is the precautionary principle, which is applied within the European Union and in many other jurisdictions (Jans 1995, p.20; Sands 1999, pp.127–130; Freestone & Hey 1996; Morris 2000; Raffensberger & Tickner 1999; Harding & Fisher 1999).

European Law

A number of European Conventions and Directives have relevance for the designation and protection of the heritage component of wetlands (Harte 1997). The most important are those that provide for the *Protection of the Archaeological Heritage* 1992 (revised), the *Conservation of Wild Birds* 1979, *Environmental Impact Assessment of Certain Public and Private Projects* 1985, and the *Conservation of Natural Habitat and of Flora and Fauna* 1992. Each of these is also considered briefly below. Other Directives and measures relating to water protection and waste may also be relevant, but space restraints do not permit consideration here (Kramer 2000, pp.183–202, 236–259; Axelrod & Vig 1999, pp.84–85).

European Convention on the Protection of the Archaeological Heritage, 1992, ETS 143

This Convention was prepared under the auspices of the Council of Europe and follows on from the *European Cultural Convention,* 1954, the *Convention for the Protection of the Archaeological Heritage of Europe,* 1985, and the *European Convention on Offences Relating to Cultural Property,* 1985 (Post 1995, p.209). It is therefore in reality an instrument of international, not European law, although it is discussed here for the sake of convenience. It acknowledges that European archaeological heritage is seriously threatened with deterioration because of the increasing number of major planning schemes, natural risks, clandestine or unscientific excavations and insufficient public awareness.

The Convention is applicable to heritage whether on land or under water. Parties undertake to introduce provisions in their legal system for the maintenance of an inventory of archaeological heritage, and the creation of archaeological reserves. Parties also undertake to introduce measures for physical protection, including the application of environmental impact assessment that includes a full consideration of archaeological sites and settings.

Directive 79/409 on the Conservation of Wild Birds, 1979, O.J. L103/1

The Directive entered into force on 2 April 1981, and was amended by further Directives in 1985, 1990 and 1991. It is an attempt to provide comprehensive, Union-wide protection to birds and their habitats. It protects the habitats of 175 particularly endangered bird species, restricts the number of species that can be hunted and traded commercially and prohibits certain hunting and trapping methods. Full application is encountering difficulties in all Member States. The main problems are the impact upon habitat from agriculture and tourism, and the failure of Member States to adopt suitable measures for their protection (Kramer 1995, p.18; Freestone 1996; Wils 1994; Baldock 1992).

The application of the Directive was considered by the European Court of Justice (ECJ) in *EC Commission v*

Italy [1987] ECR 3073, and *Commission v The Netherlands* [1999] Env.L.R., pp.147–180, which held that Italy and the Netherlands had failed to comply in a number of ways (Kramer 1993b, pp.185–204). Of greater relevance with regard to wetland habitat are the decisions of the ECJ in *Commission v Spain* [1993] ECR 1–4221 and *EC Commission v Germany supported by the UK* [1991] 1 ECR 883. In the first case, the ECJ held that the Spanish Government was in breach of the Directive by failing to designate an important wetland area known as the Santona Marshes as a Special Protection Area (Bell & McGillivray 2000, pp.642–643). In the second case the ECJ held that Germany had also failed to fulfil its obligations, with regard to designation of the areas known as Rysumer Nacken and Leybucht. These are both part of Ostfriesische Wattenmeer, a listed site under the Ramsar Convention (Kramer 1993a, pp.219–231, 399–407; Jans 1995, pp.354–361).

These decisions were later followed by the ECJ with reference to Britain in *R v Secretary of State for the Environment,* ex p *RSPB* [1996] ECR I–3805. Here the RSPB challenged the decision of the Minister to designate the Medway Estuary and Marshes as a Special Protection Area, but to exclude from it an area of inter-tidal mudflat known as Lappel Bank. The basis of the decision was the expansion of the Port of Sheerness, having regard to its economic significance at national and local level. The port is a significant employer in an area with high unemployment. It was accepted that exclusion of the area from designation would 'probably result in a reduction in the wader and wildfowl populations of the Medway Estuary and Marshes'. While the court confirmed that economic considerations have no role to play in designating such areas, it did not deal with the important issue of the size of the site. The court also failed to provide interim relief to prevent the development, which in the meantime had destroyed the habitat (Scott 1998, pp.109–112).

The case began as *R v Swale BC,* ex p. *RSPB* [1991] 1 PLR 6, an application by the RSPB to quash a grant of planning permission for land reclamation works on mud flats at Lappel Bank, arguing that the development should have been subject to EIA under EC law (see below). The RSPB argued that the development was an operation 'to provide ...a trading port' within paragraph 1(8) of Schedule 1 to the 1988 EIA Regulations, as the works were preliminary to a proposed extension to Sheerness Docks. This application failed, as Simon Brown J. held that the question whether the development is of a category described in either Schedule must be answered strictly in relation to the development applied for, not in relation to any development contemplated beyond that. However, he also held that had the development applied for been to provide any of the installations or operations described in the Schedules, then there would have been an obligation to consider whether it 'would be likely to have significant effects on the environment by virtue of factors such as its nature, size or location' (Elvin & Robinson 2000, pp.881–882).

The issue of site size was also at issue in the earlier cases of *WWF-UK and Another v Secretary of State for Scotland* [1999] Env.L.R. 632–714, and *EC Commission v France* [1999] Env.L.R. 781–800. In *RSPB v Secretary of State for Scotland* [2000] The Times Law Report, September 12, it was further held necessary to consider the effect of proposed measures not only in relation to a species overall, but also in respect of the populations of the species in Special Protection Areas.

Directive 85/337 on the Environmental Impact Assessment of Certain Public and Private Projects, 1985, O.J. L175/40, (as amended by Dir. 97/11, 1997, O.J. 73/5)

This Directive entered into force on 27 June 1988. It requires a number of projects to be assessed as to their direct and indirect effects on the environment prior to approval. A second group of projects must undergo assessment if impacts can be expected in view of the nature, size or location of them. The Directive lays down principles for the assessment, consultation of the general public and participation of environmental administrations (Scott 1998, pp.117–126; Jans 1995, pp.279–282). Although it has had some influence on administrative planning at local and regional levels (Elvin & Robinson 2000), administrations have often attempted to circumvent its provisions by deciding on the location of a project before the assessment is carried out (Kramer 1995, p.23).

The Directive was revised in 1997 by Directive 97/11/EC, (which entered into force on 14 March 1999), in order to provide greater clarity and supplement and improve the rules on assessment procedure (Kramer 1997, pp.240–258). However the tenth recital states that a project located in a special protection area designated pursuant to either the Wild Birds or Habitats Directive is not automatically subject to environmental impact assessment; this has attracted considerable criticism, for many reasons. These include its loose drafting, the fact that a developer is not obliged to consider alternatives, and that consent may be granted even where very serious negative effects are expected (Kramer 1997, pp.247–249; Kramer 2000, pp.114–115). The twelfth and thirteenth recitals take account of the *Convention on EIA in a Transboundary Context* (see above). The original Directive has been considered several times by the ECJ. In Case C–72/95 *Kraaijveld* [1995] ECR I–2189, the applicants sought to quash a decision to construct a dyke in the Netherlands (Collins 2000, p.8; Kramer 1997, p.245).

Directive 92/43 on the Conservation of Natural Habitat and of Flora and Fauna, 1992, O.J. L206/7 (as amended by Commission Decision 97/266/EC and Council Directive 97/62/EC)

This Directive attempts to provide for a comprehensive protection of species and their habitats, largely because the Berne Convention (see above) did not achieve satisfactory results (Nollkaemper 1997). In particular, it did not stop the slow but progressive disappearance of natural habitats in Western Europe. The protection system includes designation and protection measures for habitats, with funding available where it is most needed. The intention is to establish 'a coherent European ecological network', known as Natura 2000 (Kramer 1995, p.19; Kramer 2000, p.135; Jans 1995, pp.361–365). This was put in place by the Commission Decision of 18 December 1996, concerning a site information format for proposed Natura 2000 sites.

The Directive permits until 2004 for designations, and allows development of protected areas under certain conditions. In the face of pressure from interest groups, there have been many examples of Member States failing to draw up complete lists, or otherwise failing to comply with the requirements. This has been subject to severe criticism, especially given the lack of success of the Wild Birds Directive (Kramer 1997, pp.12–13, 42; Kramer 2000, pp.135–137; Scott 1998, pp.112–116).

In *R v Secretary of State for Transport and Secretary of State for the Environment* ex p. *Berkshire, Buckinghamshire and Oxfordshire Naturalists' Trust Limited and Others* [1997] Env.L.R. 80–90, the application of the Habitats Directive was examined with regard to the interim protection of sites that were expected to be included on the list. Where the Minister failed to provide this protection, it was held that there was no abuse of power. More recently, the Directive was considered with reference to the territorial waters of a Member State. In *R v Secretary of State for Trade and Industry and Others*, ex p. *Greenpeace* [2000] Env.L.R. 221–265, Greenpeace successfully contended that the Habitats Directive may well apply beyond the 12 mile limit of the UK's territorial waters, despite the limitation of the implementing Regulations to this limit. It was held that since some habitats and species were sea-based, the Directive could only achieve its aims if it extended beyond the 12 mile limit (Coffey 1998; Bell & McGillivray 2000, pp.650–651).

Currently, the ECJ is considering whether economic considerations may be taken into account when designating Special Areas of Conservation, in the same way as this was considered (and rejected) with regard to the Lappel Bank case (see above) under the Wild Birds Directive. See Case C–371/89 *R v Secretary of State for the ETR*, ex p. *First Corporate Shipping Ltd.*

National Law

A number of legislative requirements in England and Wales relate to the designation and protection of the heritage component of wetlands, and implement much of the European law described above. The most important provisions relating explicitly to archaeological values are the *Ancient Monuments and Archaeological Areas Act* 1979, and the *Planning (Listed Buildings and Conservation Areas) Act* 1990, both relating closely to statutory planning provision under the *Town and Country Planning Act* 1990 (Pugh-Smith, Samuels & Harwood 1996). Related supplementary provisions include the *Wildlife and Countryside Act* 1981, which has recently been reformed by the *Countryside and Rights of Way Act* 2000. The *Water Resources Act* 1991 also contains significant provisions. Each is considered below.

Ancient Monuments and Archaeological Areas Act 1979

This Act requires that the Secretary of State compile and maintain a schedule of monuments which may include any monument which appears to be of national importance, on land or in UK territorial waters (Breeze 1997, pp.44–50). Monuments and ancient monuments are subject to different definitions, and only items that can readily be removed by hand are beyond the protection of the Act. The criteria for judging national importance are found in planning guidance (Coles 1995, p.98).

In England and Wales the Department of Culture, Media and Sport is responsible for scheduling monuments, on advice from English Heritage and Cadw. Other than judicial review, there is no appeal against a decision to refuse to schedule, and no provision for the payment of compensation. Scheduled sites are registered as a charge in the local land registry. It is possible for monuments to be listed under the *Planning (Listed Buildings and Conservation Areas) Act* 1990 (see below) as well as scheduled under the *Ancient Monuments and Archaeological Areas Act* 1979. In this situation, scheduling under the latter takes precedence over listing under the former.

The consent of the Secretary of State is required for any works resulting in demolition or destruction of or any damage to a scheduled monument. It is also required for any works for the purpose of removing or repairing a scheduled monument or any part of it, or of making any alterations or additions to it. Finally, consent is also required for any flooding or tipping operations on land in or under which there is a scheduled monument. Under the *Ancient Monuments (Class Consents) Order* 1984 certain activities do not require consent, including some agricultural, horticultural and forestry works.

Management agreements may be entered into for the ongoing maintenance and management of monuments, whether scheduled or unscheduled. The Secretary of State also has the power to enter the site of a scheduled monument if it appears that works are urgently necessary for its preservation. Areas of Archaeological Importance may also be declared by the Secretary of State where it is necessary to investigate a site prior to development (Jagger & Scrase 1997, pp.195–198). Planning guidance provides

for voluntary codes of practice, which are agreed by developers and statutory bodies. These set out and encourage good working practices.

Planning (Listed Buildings and Conservation Areas) Act 1990

The Secretary of State of the Department of Culture, Media and Sport is responsible for listing buildings of special architectural or historic interest, (Suddards 1997, pp.76–88). Different consequences flow from listing depending on whether the property is a church, ancient monument (see above) or is Crown property. There is no right of appeal against listing, although there is a power to amend the list in certain circumstances. DOE *Circular 8/87* provides advice on which building should be listed, and English Heritage advises the Secretary of State on national criteria to be adopted in the selection.

Once a building has been listed, listed building consent is required before any demolition, alteration or extension of the building may take place, and any work carried out without this will constitute an offence. The procedure for obtaining this is found in the *Town and Country Planning (Listed Buildings and Buildings in Conservation Areas) Regulations* 1990. DOE *Circular 8/87* sets out the position of the Department with regard to consent. The Act requires that the local planning authority or Secretary of State must have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest that it possesses. Consent may be granted with or without conditions, and the applicant has a right to appeal to the Secretary of State in certain circumstances.

Carrying out works without consent or in contravention of a condition can lead to prosecution, the issuing of an enforcement notice, or both. The *Planning and Compensation Act* 1991 provides a greater range of penalties than previously, with unlimited fines available. Other criminal sanctions are available under planning law in general (Shelbourn 1998, pp.1035–1042). The rationale for listed building consent and possible reform was recently comprehensively considered (Mynors 1998, pp.101–115).

Town and Country Planning Act 1990

The *Town and Country Planning Act* 1990 requires consent to be obtained before any development may take place unless it falls within an exemption (Bell & McGillivray 2000, p.297). Under the *Town and Country Planning General Development Order* 1988 planning authorities must consult with the Secretary of State before granting planning permission for development that might affect the site of a scheduled monument. An agreement may also be entered into under the Act between a developer and a local planning authority. These may cover a range of matters including financial arrangements for archaeological works (Collcutt 1997, pp.797–814).

Guidance on coastal planning extends the interest of local planning authorities beyond the low-water mark, and the planning system is presented as the primary means of reconciling development requirements with policies for the conservation and improvement of the coastal environment. Archaeological aspects are reasonably well integrated with other aspects in *Planning Policy Guidance Note 20,* which notes that the coastal zone has a rich cultural heritage both above and below the low-water mark (Firth 1997).

The environmental impact assessment requirements of the European Directive as amended (see above), have been introduced in England and Wales through Regulations under the Act. The *Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations* 1999 include the most recent changes (Bell & McGillivray 2000, pp.347–349), with archaeology specifically mentioned as an aspect of the environment (Coles 1995, p.98). An application for planning permission for development triggers the application of the Regulations, and the environmental statement that must accompany the application must contain information necessary to assess the environmental effects of the development. The application of the legislation has recently been considered with reference to the Wild Birds Directive (the Lappel Bank case, see above) (Elvin & Robinson 2000, pp.881–882).

Wildlife and Countryside Act 1981

The *Wildlife and Countryside Act* 1981 (as amended in 1985, 1991 and 2000) is responsible for designating Sites of Special Scientific Interest (SSSIs), the principal means of habitat conservation in England and Wales which protect wetlands. It is an offence to carry out a potentially damaging operation without obtaining consent from English Nature first. SSSIs have recently been subject to considerations of reform (Planning and Environment Law Reform Policy Group 1999). Ramsar sites, Special Protection Areas (SPAs) under the Wild Birds Directive, and Special Areas of Conservation (SACs) under the Habitats Directive (see above for all) are also SSSIs, and are subject to the provisions in the Act. *The Conservation (Natural Habitats etc) Regulations* 1994 have made some changes to ensure compliance with the Habitats Directive.

SSSIs are declared by English Nature as areas of land or water of outstanding value for their wildlife or geology, although SSSIs cannot be notified for waters below the low water mark. It is up to English Nature to define the boundaries. In *Sweet v Secretary of State and NCC* [1989] JEL 245 it was held that it is permissible for land of a lesser scientific interest to be notified if it is part of the same environmental unit as land which is of interest (Bell & McGillivray 2000, p.630). Designation of an SSSI does not mean it is protected from development, but the owner of the land is required to consult with English Nature about any potentially damaging operations. The nature of the

considerations to be had regard to in the notification process was analysed in *R v NCC*, ex p. *London Brick Co Ltd* [1996] Env.L.R 1–16.

National Nature Reserves (NNRs) and Marine Nature Reserves (MNRs) (which may also be declared Ramsar sites) may also be designated under the Act. MNRs may be designated for any area of land or water from the high tide mark to a line three miles out at sea. Both NNRs and MNRs are managed by English Nature, and are designed to provide for conservation and study (Bell & McGillivray 2000, pp.634–636). Another designation, Environmentally Sensitive Areas (ESAs) may be declared under the *Agriculture Act* 1986 for cultivated land (Winter 1991, pp.54–55; Coles 1995, p.22; Bell & McGillivray 2000, p.668). MNRs and ESAs may relate to wetland areas, with payments received by landowners to enable conservation measures to be taken (Warren 1991, pp.69–70; Coles 1995, p.22; Bell & McGillivray 2000, p.669). The protection afforded by SSSIs and other habitat designations has been extensively criticised (Bell & McGillivray 2000, pp.640–642).

Countryside and Rights of Way Act 2000

Shortcomings of the SSSI system, which lies at the heart of habitat protection in England and Wales, were outlined in *Southern Water Authority v Nature Conservancy Council* [1992] 1 WLR 775. The *Countryside and Rights of Way Act* 2000 ('the Act') contains significant changes to deal with these shortcomings; these focus upon the voluntarism of the present system. Part III concerns nature conservation and wildlife protection (SSSIs). S 73 provides that the name of the Nature Conservancy Council (NCC) is formerlly changed to English Nature. Most importantly of all perhaps is that the Act imposes a duty on any Minister, Government department and the Welsh Assembly to have regard to conserving biological diversity in accordance with the Biodiversity Convention.

With regard to SSSIs there is now a power for English Nature to acquire compulsorily any land included in an SSSI if it is not possible to conclude a management agreement with the owner or if it has been breached in a serious way. Where land is so acquired, English Nature may take steps to ensure the SSSI is protected. The Act provides for notification of Ramsar sites to English Nature and other interested bodies. Extensive powers of entry are provided in order to determine matters such as notification, assessment, whether or not to enter into management agreements and schemes, determining whether to acquire compulsorily any land, or whether any offence has been committed.

The Act sets out various amendments to the notification and de-notification procedure with regard to SSSIs, including matters with respect to the enlargement of an SSSI. It also sets out appeals provisions in relation to consent, and imposes duties on statutory undertakers in regard to SSSIs. There is also provision made for management schemes to be entered into in cases of neglect of sites, and for management notices to be served in such circumstances. The Act also contains amendments relating to offences and enforcement powers under Part I of the *Wildlife and Countryside Act* 1981. These also apply to regulations giving effect to the Habitats Directive and related provisions.

Water Resources Act 1991

The *Water Resources Act* 1991 puts a duty on the Environment Agency and the Water Companies in England and Wales to further the conservation and enhancement of natural beauty and have regard to archaeological sites. It is an offence under the Act to cause or knowingly permit any discharge of trade or sewage effluent into controlled waters, or discharges through a pipe into the sea outside the limits of controlled waters, unless consent is obtained (Bell & McGillivray 2000, pp.574–583).

EC law is increasingly the most important force in determining new water quality standards, (Bell & McGillivray 2000, pp.561, 564–574). An example is the *Directive on Waste Water Treatment (91/271)*, which lays down minimum standards for the treatment of urban waste waters. This has had a particular impact on Britain, the only Member State which has carried out sewage sludge dumping. Implemented by the *Urban Waste Water Treatment (England and Wales) Regulations* 1994, the position of the Secretary of State in drawing the boundaries of the Humber and Severn rivers so as to permit lower levels of treatment was successfully challenged. In *R v Secretary of State for the Environment*, ex p. *Kingston upon Hull CC* [1996] Env.L.R 248 (Bell & McGillivray 2000, p.569), this was held to be wrong, and subsequently the boundaries of the estuaries were redrawn.

Discussion and Analysis

The Lappel Bank case considered above is illustrative of the range of legal requirements that have a bearing upon the designation and protection of wetlands. The *EIA* and *Wild Birds Directives* as implemented by the *Wildlife and Countryside Act* and *EIA Regulations* were both considered by the courts, together with the *Town and Country Planning Act*. Had they been in force at the time, the application of the *Habitats Directive* and national implementing *Regulations* could also have been subject to judicial interpretation. Further, if the Medway Estuary and Marshes had then been designated under international law as a *Ramsar* or *World Heritage* site (which it is now), the respective Conventions would also have bound the UK Government. Finally, it is arguable that principles of customary law such as the *precautionary principle* should have ensured that the UK Government did not proceed with its proposals in this particular case.

Lappel Bank therefore provides a helpful overview of many of the legislative requirements that may pertain to any prospective development in any wetlands area. To the above requirements must be added those provisions that are specifically designed to protect archaeological heritage values. Should a proposal be advanced for say a Thames Estuary Bridge or floodplain development, that would have potential impact upon archaeological sites as well as nature conservation sites for example, then the *European Convention on the Protection of Archaeological Heritage* and the *Ancient Monuments and Archaeological Areas Act* would also need to be examined.

All of these provisions have been designed to protect the archaeological heritage values of wetlands and they clearly overlap, operating in a number of different ways and at a number of different levels. Challenges to planning applications and approvals would plead specific reference to each of these provisions as they are relevant in any particular case, within the context of the court or jurisdiction concerned. Reference should always in the first instance be made to the primary legislation and rules of the relevant court or jurisdiction, most usually beginning with the national jurisdiction and proceeding to higher levels of authority.

Conclusions

Three conclusions may be drawn from the foregoing. First, there is a significant lack of integration and co-ordination between the legislative provisions that are intended to designate and protect the heritage management of wetlands. With the possible exception of national legislation implementing European law (which, as the EIA Regulations have shown, do not *always* introduce changes as they should), in most other instances there is an important lack of understanding of how the measures relate to one another, and a consequent failure to consider this not only during legislative drafting and approval, but also during implementation and enforcement. Lappel Bank is illustrative of this.

Second, there is a clear difference of purpose between legislative provisions for wetlands' designation and protection, and provisions for archaeological designation and protection. The former are based upon an area specific approach, and the latter on a site specific approach. There is therefore a need for greater integration and co-ordination between these as well as at different jurisdictional levels when they are implemented and enforced.

Third and finally, an examination of legislative provision from a viewpoint of England and Wales suggests that comparative European experiences may be beneficial for a clearer picture to emerge. Perhaps this may be the subject of follow-up work at some time in the future.

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3: Threats and pressures on wetland environments in England and Wales and the response of the Environment Agency

Gill Walters

Abstract: *This paper describes the work of the Environment Agency, an independent government body covering England and Wales, which aims to provide a comprehensive approach to the protection and management of the environment by combining the regulation of land, air and water. The paper considers problems such as climatic change, water abstraction, water pollution and erosion and their effects on the natural and the archaeological wetland environment, and it considers the reaction of the Environment Agency in tackling these issues.*

Introduction

Britain's early Industrial Revolution has meant that laws and public control specifically related to environmental protection have been in place since the mid-nineteenth century. However, ad-hoc law making since that time means that 'modern Britain has inherited a far less coherent system of pollution control than other countries' (Ball & Bell 1994). The fragmented nature of policymaking and law enforcement in this area is also reflected in the large number of agencies involved in environmental protection. Rationalisation began with the establishment of the National Rivers Authority (NRA) and Her Majesty's Inspectorate of Pollution (HMIP) and this was taken a stage further by the Environment Act of 1995. This act set up the Environment Agency under which the NRA was merged with HMIP and the Waste Regulation function of the Local Authorities. The Environment Agency, which took up its operational role on 1 April 1996, is an independent public body covering England and Wales, whose primary aim is to protect and improve the environment and make a contribution towards the delivery of sustainable development through integrated management of air, land and water. In January 2001 the Agency launched its new vision of 'A healthy rich and diverse environment in England and Wales, for present and future generations' (Environment Agency 2001).

The Environment Agency has specific duties related to conservation, and these include the protection of the natural and historic environment. The fundamental goals the Agency wants to help achieve are:

- a better quality of life
- an enhanced environment for wildlife
- cleaner air for everyone
- improved and protected inland and coastal waters
- restored, protected land with healthier soils
- a 'greener' business world
- wiser, sustainable use of natural resources
- limiting and adapting to climate change
- reduced flood risk

As much of its work relates to rivers, the coastline and wetlands, all of which are important archaeological environments, the Environment Agency is well placed to serve these interests. It also has strength as a conservation organisation due to the fact that it is in a unique position to protect both the nature conservation and archaeological interests of sites in these locations. In carrying out its work the duties of the Agency include the protection and conservation of buildings, sites and objects of archaeological, architectural, engineering or historic interest.

Threats and Pressures

There are many sorts of pressures on wetland environments. The majority of these are the result of man's activities such as development, land-use, water abstraction, and illegal practices, and in some cases lack of management. However the importance of pressure being placed on the environment due to natural forces such as climatic variation and sea level changes also has to be considered.

Climate Change

Although habitats and species found in the United Kingdom largely reflect the influence of the last ice age, climate change continues to be an important on-going natural pressure on the environment. Over the past 130 years, the global average temperature has risen by approximately 0.6°C. This is well within the limits of a natural temperature change over such a period of time, but could also reflect the effect of greenhouse gases on global warming. Recent predictions suggest that by the year 2050 the UK may be on average 2°C warmer, with up to 10% more rainfall (May 1997). Climate change scenarios accompanying this prediction suggest that the south and east of England are likely to experience hotter and drier summers, which will increase the demand for water, thereby placing greater pressures on the resources. As temperatures increase and rain patterns change, natural

habitats, species and farming zones may migrate, if possible, northwards by approximately 50km to 80km per decade.

The overall increased air temperatures are also likely to lead to higher rates of evapotranspiration which will have direct effects on wetlands, open water, rivers and groundwater flows. Besides the direct effects on wetlands there may be other obvious effects. Wetland ecosystems evolve as a result of the interactions between the species that inhabit the particular habitat and variants such as changes in temperature and moisture availability. The relationships between species and habitats are often complicated and not wholly predictable. A change in temperature may only affect a single species within the habitat resulting in minimal change to the habitat but, a particular species may be key to the integrity of the whole ecosystem. Species at the southern limit of their distribution may become extinct, and those species at the northern limit of their distribution or those susceptible to frost may increase in population size.

Whilst there is debate regarding the extent and causes of global warming there can be no doubt that the recent decades have seen much publicity given to the extremes of weather. In Britain there have been periods of drought in the mid 1970s, early 1980s and mid 1990s and more recent frequent episodes of increased rainfall and storminess. Although increased rainfall will maintain water levels on wetland sites benefiting both the conservation and archaeological interest of sites, resultant flooding can also cause erosion on and to features of interest. Frequent inundation in some cases can also cause changes in species composition in the same way that frequent drought can. 'The threat from flooding is always with us. While flood risks can never be eliminated, they can be reduced' (Environment Agency 1998a). Flood defences are concentrated on rivers, flood plains and washland, coastal floodplains and tidal lengths of estuaries, all areas that support wetland habitats. An asset survey of all flood defences was carried out following the Easter 1998 floods by the Environment Agency to determine the current condition and residual life of assets. These surveys identified that many were not only reaching the end of their design life but would need replacing in the very near future. The more recent floods (autumn 2000) have highlighted this need and money is being made available for flood defence work. This means that some wetland habitats will be threatened by the construction of improved and new defences. The environmental assessment process followed should ensure that mitigation measures can be incorporated into schemes to compensate for loss of wetland habitat, but archaeological resources cannot be replaced in a similar fashion.

With regard to coastal defences, allowance has to be made to accommodate storms that have become seasonally more polarised and of increased magnitude, as well as sea level rises. The sea level is changing around Britain with northern Britain undergoing coastal uplift whilst southern Britain is subsiding with the estimate of sea level rise being in the order of 0.6m to 1m over the coming century (Bird 1993). This has already led to natural coastal features being drowned or eroded away as they have become trapped between existing sea defences and rising sea levels. This process is referred to as *coastal squeeze* and is not only confined to the coast, but also applies to estuaries. Those areas that are most likely to be directly affected are low-lying areas around estuaries and coastal plains, both areas which tend to be associated with wetland habitats. A solution to the problem of coastal squeeze is managed setback (also known as managed retreat), a process which involves the setting back of actively maintained defences to a new line, landward of the original, leaving the land in front unprotected from the sea. This option can improve the overall efficiency of flood defences and in some cases expenditure is reduced and with the emphasis being placed on protecting property and urban situations rather than agricultural land, this option is likely to become increasing attractive. However due to the numerous and sometimes competing interests that may be involved it is not an easy solution to achieve. It does offer the opportunity for the establishment of increased areas of inter-tidal habitats, however it may be at the expense of existing wetland habitat.

Human Activity

Although the effects of climate change may seem immediate to those experiencing flooding or drought, climate and sea level changes are to a large extent driven by natural processes and take place over a long period of time. More immediate and perhaps more obvious are the pressures put on the environment by man's activities. Within the relatively small area of the United Kingdom (UK) there is a wide variety of habitat and species but due to this wide variety, habitat and species are vulnerable to a direct loss or fragmentation of habitat. A whole range of activities such as agricultural practices, development, land drainage, water and mineral abstraction and discharges to air and water have caused, or are currently resulting in direct loss or fragmentation of habitats. Freshwater and wetland habitats are particularly subject to habitat fragmentation that then results in small populations being vulnerable to extinction or becoming genetically isolated. Wetlands are particularly threatened by drainage or water abstraction and the UK Biodiversity Action Plan (1995a; 1995b) identified reedbeds and chalk rivers as being at particular risk from abstraction. There are 900 sites, which make up 5,000 hectares of reedbed in the UK but only 50 are larger than 20 hectares. Since 6 nationally rare Red Data Book birds including Bitterns are dependent on reedbed habitat it further emphasises how vulnerable the habitat is and in turn the species such as Bittern are. In the Environment Agency's report *Sustainable Development: A Price Worth Paying* (Environment Agency 1998b) it is reported that 70% of

reedbeds, 60% of wet grassland and 94% of lowland raised bog have been lost since 1945 due to development and drainage. Although there are well-publicised cases of dried-up streams and pools, and suggestions that many more locations are threatened or affected, there are many thousands of well-managed wetlands throughout England and Wales that are not threatened. Wetland habitats require the maintenance of appropriate water levels, flow and quality, but the relationships between these parameters and associated ecological effects are at present incompletely understood.

In March 1999 the government published *Taking Water Responsibly* which set out its decisions following consultation for changes to the abstraction licensing system in England and Wales. These decisions will result in far reaching changes to the system. Many of these changes will require new legislation and a draft 'Water Bill' has been published setting out these changes, but others are achievable within the existing powers of the Environment Agency. A major proposal is the development at a local level of Catchment Abstraction Management Strategies (CAMS). This will require a holistic approach to be taken to management of the water resources within a catchment with the needs of abstractors balanced against those of fisheries, recreation and navigation as well as the need to protect water quality and generally conserve the aquatic environment.

Another key decision in *Taking Water Responsibly* is the intention that most licences will in future be time-limited. Permanent rights to abstract water are no longer compatible with modern pressures on water resources. CAMS will be the vehicle for reviewing time-limited licences, deciding whether they should be renewed and if so on what terms. Where abstraction is found to be damaging the quality of habitats there is now a facility for revoking licences. A new but crucial element of the resource balance is environmental allocation whereby it is now accepted that maintaining the range of water flows experienced throughout the year is as important as protecting low flows. Research is continuing to seek a better understanding of the key interactions between water levels, flow regimes and aquatic plants and animals. There is a range of regional and area initiatives related to water resources and wetlands being carried out. Conservation benefits will also result from the Asset Management Plans programme (AMP 3) for the water industry which as well as addressing water quality issues includes proposals to address over-abstraction.

As well as the obvious loss of species associated with loss of habitat caused by loss of water, within the species action plans of the UK Biodiversity Action Plan (1995a; 1995b), 32 of the 116 species covered will benefit as a result of improved water quality enhancing the habitats in which they occur. Ecosystems are affected by point or diffuse pollution arising from sewage treatment works, industrial processes, leaching from old and unused mines, agricultural practices and chemical spills.

The Environment Agency monitors and classifies surface water quality based on chemical measurements, monitoring of aquatic macro-invertebrates and monitoring of nutrients such as orthophosphate and nitrate. There have been overall improvements in water quality of rivers since 1990 largely attributed to investment by the water companies and at other point discharges. The most common pressure on wetland species and habitat in terms of water quality is that posed by fertiliser run-off and the effluent associated with sewage treatment leading to nutrient enrichment and eutrophication. The nutrients which predominantly contribute to this enrichment are nitrate and phosphorous. Areas of open water or drainage ditches running around or through wetlands are particularly affected by eutrophication with the high levels of nutrients causing excessive growth of blanket weed and algal blooms. The situation is exacerbated by the fact that they are subject to very slow flows. Within wetlands eutrophication tends to lead to changes within the plant communities and increases the breakdown of organic deposits.

There are also issues relating to groundwater, which is monitored by the Environment Agency at strategic locations around public and private supply sources and areas where there are perceived problems. Unlike surface waters, there is currently no legal requirement to monitor for specific substances in groundwater apart from nitrate. A total of 251 groundwater abstractions were identified as being affected by 210 sources of pollution with an additional 368 public and private abstractions being considered at risk from existing point sources of pollution. Groundwater pollution is particularly serious because of its long-term nature (Environment Agency 1996). The situation is further complicated by the fact that for many wetlands there is only a limited understanding of the precise nature of the groundwater sources and their relationship to the site and surface water flows. The lack of national collation and assessment of groundwater data is being addressed by the implementation of an 'Environment Agency Groundwater Protection Policy' formulated as a response to protect groundwater from pollution and over-abstraction. This should protect water supply and streams, rivers and wetland habitats that rely on groundwater (Environment Agency 1996).

As indicated previously, agricultural practices and land management have significant impacts on water quality and particularly if the wetlands are enclosed sites. Reducing the levels of pollutants reaching the aquatic environment is critical, if improvements are to be made in water quality to maintain and enhance wetlands. Attempts have been made to reduce nitrate from agriculture by changing the timing of crop planting and fertiliser application. Typical application rates in 1996

were 125kg N/ha, which had reduced from around 145kg N/ha in 1985 (FMA 1997). Nitrate Vulnerable Zones (NVZs) were set up in order to reduce the load of agriculturally derived nitrate entering both surface and groundwater. Currently there are 68 NVZs in England and Wales covering an area of 600,000 hectares and in December 1998 the Action Programme for Nitrate Vulnerable Zones (England and Wales) Regulations 1998 came into force. Whilst this Action Programme has introduced measures which are compulsory only within the NVZs, they are based on good agricultural practice, they could lead to savings and are recommended for use on all farms.

Water-induced soil erosion occurs over a large area of the country and affects a wide range of soil types. The phosphates, pesticides and other contaminants, which adhere to eroding soil particles, also contribute to pollution. Studies by the Ministry of Agriculture, Fisheries and Food (MAFF) on 12 catchments between 1989 and 1994 recorded water erosion of soil in 39% of the fields monitored. The greatest volume of erosion (79%) took place on sites that had been planted with winter wheat (Royal Commission on Environmental Pollution 1996). To give an idea of the scale of the problem, it was estimated that after one severe storm event in 1989, 1.6 to 2.0 tonnes of phosphorous and 1,120–2,140 cubic metres of topsoil entered the Exe Estuary in Devon; this originated from four fields under winter wheat. Crop production is not the only cause of soil erosion, as high animal stocking ratios tend to cause overgrazing which has led to increased soil erosion particularly along river banks. Wetlands are at particular risk as, apart from the input of chemicals, the additional load of suspended solids from soil erosion is likely to lead to increased rates of siltation, leading in turn to changes in vegetation composition.

The full range of wetland habitats, including standing open waters, rivers and streams, is generally at risk from air pollution. There have been major changes in UK air quality since the 1950s. The widespread use of coal as a domestic fuel has declined substantially with the move to cleaner fuels such as gas and electricity and the general introduction of central heating. Cleaner fuels and less polluting processes have all contributed to lower emissions from industry. During this same period, motor traffic has increased substantially and now vehicles are a major source of pollutants in urban areas (DoE 1996a). The main effect of this pollution is acid rain and the contribution to climate change due to carbon dioxide emission. Nitrogen and sulphur dioxides, carbon dioxide and monoxide and other volatile organic compounds, affect habitats and species. Critical loads can be used to show areas which are adversely affected by acid rain, low level ozone or other pollutants. There are currently large parts of the UK where terrestrial and freshwater ecosystems are at risk of acidification, eutrophication or ozone damage as a result of air pollution. The reduction in authorised sulphur dioxide emission to the atmosphere proposed in the current review of the electricity supply industry will, by 2005, reduce by 43% the area where critical loads are exceeded. This will enhance biodiversity and decrease the risks faced by priority habitats such as lowland heath and blanket bog.

In 1981 just over 10% of the land in England was in urban use. By the year 2016, this figure is expected to reach about 12%. This 2% increase, in reality equates to 169,000 hectares of land changing from rural to urban use (DoE 1996b). This change in land use will tend to be concentrated in areas that already have high population densities such as the south-east and eastern regions of the UK where a 29% increase in households is predicted (DoE 1996a). Besides the direct threat of loss and fragmentation of wetlands, increased development results in increased areas of impervious surfaces including roads, car parks, paved areas etc. This in turn increases the rate of water run-off from the land, which leads to increased erosion, more flooding and a greater demand for flood and coastal defences, as discussed above. New developments also put a strain on water resources, in that an increased number of households will require an increase in water supply. The majority of new development is being targeted in the south of England where there is already an existing problem with low river flows and depleted aquifers, therefore wetlands will be placed under increased and significant threat.

The Environment Agency and Ramsar Sites

The Environment Agency has provision for differing levels of environmental assessment (according to the scale of works being carried out) which are applied to plans, projects and works it carries out. In the unusual event of a Site of Special Scientific Interest (SSSI) or Ramsar site being affected by a proposal, the most detailed level of assessment is likely to be undertaken along with full consultation and advice from English Nature (see Marsden Chapter 2, for legislative designations in England and Wales).

The government's Ramsar Policy Statement specifically refers to the fragility and vunerability of wetland sites and that assessments for these sites need to take particular account of indirect as well as direct effects of proposals and the cumulative effects of piecemeal development. This Policy Statement also recognises that not all development is covered by the development control framework and that the Environment Agency plays an important role in regulating a wide range of activities such as waste management, land drainage, discharges and water abstractions. In issuing consents or licensing such activities, the Environment Agency is expected to follow the approach advocated in *Planning Policy Guidance on Nature Conservation (PPG 9)* with respect to any development or activity likely to have a significant impact on a Ramsar site (DoE 1994). The Environment Agency may already require applicants to provide an assessment of likely impacts on a site, or to provide additional

information or to carry out monitoring prior to issuing a consent and after full consultation with English Nature. If the site is on or adjacent to or likely to impact on an SSSI an authorisation would only be issued after full consultation and consent from English Nature.

Regulation 50 of the Habitats Regulations as amended, requires the review of consents on Natura 2000 sites but not for Ramsar sites, and to date this has been the only difference between the two categories of site. However as only 6 of the 75 English Ramsar sites are not Special Protection Areas (SPAs) or Special Areas of Conservation (SACs) the majority will have a review of consents. As a competent authority, the Environment Agency is expected to review the consents it has issued which are likely to affect sites, and to use whatever powers available to address any potential adverse effects on the integrity of listed Ramsar sites. This review is being undertaken at present but for some of the large and complex estuarine sites such as the Severn Estuary, and large wetlands such as the Somerset Levels and Moors or Ouse and Nene Washes, it is likely to be a complex and difficult process.

Public bodies such as the Environment Agency are also expected to pay particular attention to the wider issues associated with listed Ramsar sites and to incorporate these considerations into their strategic thinking and planning. Wetland sites and the importance of hydrological factors are again highlighted as being of particular importance. The Countryside and Rights of Way Bill places a duty on public bodies to 'further the conservation and enhancement' of SSSIs, a principle which already underpins the Environment Agency's conservation duties. The Environment Agency has done much to promote the maintenance, restoration and creation of wetland and much has already been achieved through working in partnership with others, particularly as the Environment Agency has only limited landholdings of its own. However, competing demands on reduced resources may limit how far the Environment Agency is able to carry out this duty.

English Nature and the Countryside Council for Wales (CCW) are responsible for overseeing the management and general protection of SSSIs including wetlands whereas the Environment Agency is responsible for protecting the water resources that create and sustain them. At area level it is usual for the Environment Agency and English Nature or CCW staff to work closely together on a range of matters including the issuing of Environment Agency consents and licenses. Both the historic and natural environment have been and will continue to be protected through environmental assessment, and all projects and maintenance work will be subject to environmental assessment. This will afford a high level of protection of sites and features as well as possibly offering opportunities for interpretation and enhancement. As Ramsar sites are also SSSIs they are protected through this well-established liaison and procedures at local, regional and national level. The extra level of protection afforded to Ramsar sites, as with SPAs and SACs, is through the Habitats Directive whereby the Environment Agency can require any new development or proposal likely to have a significant impact on a Natura 2000 site to be assessed for its implications in view of the site's conservation objectives. Through the review of consents process, the Environment Agency as a competent authority will be able to identify potential adverse effects on sites and where appropriate it may issue a modification or revocation of a consent or licence. However it should be noted that sites may be affected by activities which occur away from or adjacent to the sites, or by activities and events over which the Environment Agency has no jurisdiction, such as land use of surrounding areas or periods of drought.

Conclusion

One of the strengths of the Environment Agency is that it is in a unique position to be able to protect both the natural and historic environment. Many of the wetland sites of high conservation interest are also likely to be sites of archaeological or potential archaeological interest. At present if any proposals are likely to affect a Scheduled Ancient Monument or Listed Building, the appropriate liaison should take place. Archaeological work has taken place prior to capital schemes, and projects with an archaeological or historical element have been carried out. It is by carrying out routine work and protecting the nature conservation interests of sites that Environment Agency staff are in fact indirectly protecting archaeological or historic features too. However it is only when a designation is developed appropriate to the protection of wetland archaeology, such as Areas of Special Wetland Archaeological Interest, that the archaeological interest of sites will be fully protected.

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Section II:
National and regional overviews of archaeological heritage management of wetlands

4: Britain and Ireland

Bryony Coles

Abstract: *The varied wetlands of Britain and Ireland contribute significantly to their archaeology, but they face both natural and humanly caused threats. These include sea level rise and coastal erosion, while inland the greatest threat comes from drainage, carried out for a variety of reasons, including drainage in the English Fens for agriculture and drainage of the Irish peat for extraction. Drainage for development is common, for industry, housing and roads. Survey and evaluation of wetland archaeology is next examined. In England, there have been major surveys in the Somerset Levels, the Fens, the North West and the Humber Wetlands, and this programme is nearing completion. In Ireland, survey has focussed on the midland peat bogs and the Shannon estuary, with work now underway on lake settlement. In Northern Ireland, scarce resources have limited work to seasonal bog surveys. In Scotland, initial survey of crannogs and of the palaeoenvironmental archive has been followed by limited, project-specific field survey, and current discussion of how the next stages should develop. In Wales, work has concentrated in the south east, where wetlands are most at risk, from development and coastal erosion. Examples of management of wetland archaeological sites are then given. Finally, the potential for co-operation with wetland conservation agencies is explored through the case study of West Sedgemoor, managed by the Royal Society for the Protection of Birds.*

Introduction

In Britain and Ireland (fig.4.1), as in so many other parts of Europe, the wetland heritage is rarely visible. The remains of Britain's best-known lake village, the Iron Age settlement at Glastonbury, lie below a pasture field. The only signs of archaeological wealth are the low surface mounds, which look unusual in a region which is otherwise characterised by flat fields separated by ditches. Over a century ago, it was the mounds that led Arthur Bulleid to excavate here, and when he delved beneath the surface he revealed pathways and fencing, clay and wooden floors and wooden walls, hearths, pottery, wooden bowls and tubs, animal bone and cereals - the homes, belongings and detritus of a community which lived here for a few generations in the later Iron Age (Coles & Minnitt 1995). Bulleid's excavations aroused great popular interest as well as support from the archaeologists of the time, and they led to one of the first English ventures into management of the wetland heritage, when the Glastonbury Antiquarian Society bought the field which held the lake village, in order to ensure its long term protection. Bulleid and his co-director Gray had excavated much of the area of the settlement but not all its depth and they removed much but not all of what they exposed. The remainder was re-buried, and in 1984 small trial excavations confirmed that structural and artefactual evidence still survived, protected by a regime of low intensity grazing and no drainage. The foresight of the Glastonbury Antiquarian Society was exceptional, and it was to take almost a century for serious efforts to be made to identify, protect and manage wetland archaeological sites in Europe's western islands.

Much of the earliest evidence for human activity in these islands comes from wetland contexts in southern England, beyond the reach of Pleistocene ice sheets, from sites such as Boxgrove and Hoxne, or Clacton where an

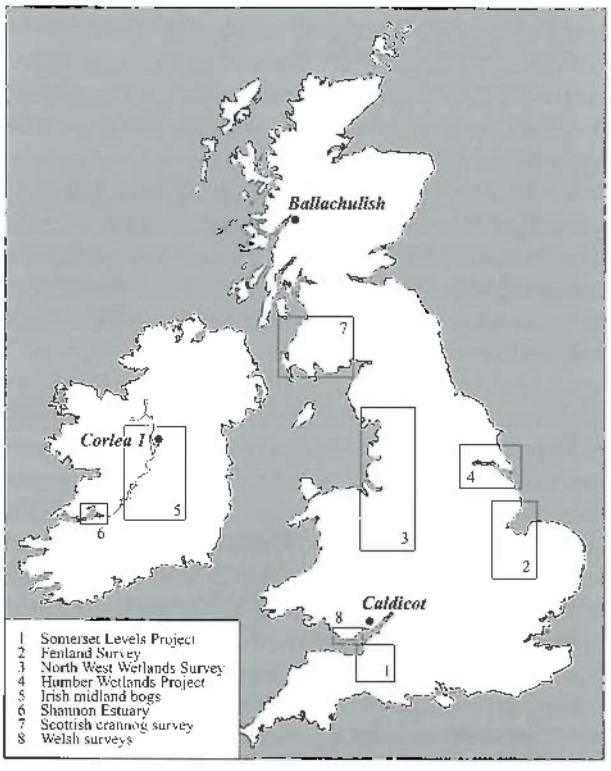

Fig.4.1: Map of British and Irish wetland sites and regions described in this paper.

early Palaeolithic yew wood spear was found. Following the retreat of the ice sheets, wetland sites are known from all periods, from Mesolithic Lough Boora in Ireland and Star Carr in England to the medieval waterfronts of cities such as Dublin, London, York and Perth. Palaeoenvironmental evidence is similarly widespread in space and time, and it forms a significant part of the wetland heritage whether it is directly associated with evidence for human activity, as at Star Carr, or whether it is essentially free-standing, as with the long record preserved at Cors Caron (Tregaron) in the Teifi valley in west Wales.

The nature of the evidence preserved, and the demands of management, vary to some extent with the types of wetland, which in Britain and Ireland are diverse and complex, reflecting the physical geography of the islands. The main wetland types of archaeological importance include raised bogs such as those of central and northern Ireland, west Wales, the Somerset Levels, the Fens, the Humberhead Levels, the Solway Firth and the Firth of Forth. In some of these areas, there are no longer active, living raised bogs, but only truncated drained remnants which are nevertheless of considerable archaeological value. Lake margin wetlands are naturally most common in those regions where lakes are common, in Scotland and Ireland, and it is here that a particular category of wetland site, the crannog, is most common. River valley or floodplain wetlands occur throughout, and can be archaeologically significant whatever their size, although more is known of the larger rivers such as the Shannon, the Bann, the Trent and the Thames; in this context, the heritage value of palaeochannels is increasingly recognised (Brown 1997; Howard & Macklin 1999). Coastal wetlands, which include estuaries, salt marsh and mud flats, are most relevant for their archaeology in those areas where sea level is rising, and somewhat less so in the north where on the mainland isostatic recovery from the weight of ice sheets is still generally outstripping sea level rise. Archaeologically-rich coastal areas, known mainly from exposure by wave erosion, include the Shannon estuary, the south coast of Wales and the south and east coasts of England.

These different categories of wetland suffer to some extent from different threats, although drainage and physical destruction affect them all. Erosion is a particular threat to coastal wetlands, because the waves that reveal sites also remove them, and climate change appears to exacerbate stormy episodes as well as increasing the rate of sea level rise. In the 1980s and 1990s storms along the coast of south east Wales repeatedly exposed and damaged peat beds, revealing and removing evidence for former landscapes and human activity (Pl.4.1); a major programme of archaeological and palaeoenvironmental survey was undertaken, with excavation of selected sites (Bell, Caseldine & Neumann 2000). With sea level rise now predicted at a rate of at least a metre a century and possibly more, many low-lying coastal areas are vulnerable to erosion and flooding, in recognition of which Cadw, English Heritage and Historic Scotland have funded coastal archaeological surveys (see below).

Drainage is a threat to all wetlands, whether it be for agriculture, for extraction or for development. Peat which is drained becomes oxidised and wastes, the whole peat body shrinking rapidly and the peat on exposed surfaces blowing away in the wind. The dramatic effect of drainage was demonstrated at an early date in the Cambridgeshire Fens: in 1848, a metal post was driven through the peats at Holme Fen, down into bedrock. In 1851 a nearby lake was drained, and by 1860 the ground level had fallen 1.45m, through shrinkage not peat cutting. Drainage for agriculture continued and the peat continued to shrink, with a total fall of 4m recorded by 1980 (Godwin 1981). Almost all of the East Anglian Fens, of which Holme Fen is a part, have been drained, a story well told by Darby (1983). Wicken Fen is an exception, having been protected since the nineteenth century for its wetland flora and fauna, and it is in fact the oldest nature reserve in England (see also Coles & Bull, this volume). Otherwise, the Fens are largely destroyed as wetlands, and one result has been the exposure of archaeological sites within and beneath the Fen peats, such as the Neolithic and Bronze Age barrows which emerged through the ploughed fields at Borough Fen in the 1980s, first one or two barrow tops and soon a whole cemetery (Hall & Coles 1994).

Drainage for extraction affects peat and gravels. In Ireland, vast areas of the central boglands have been deep-drained ahead of mechanical peat extraction (Raftery 1999). The drains, in addition to dewatering the wetland, cut through archaeological sites and the subsequent peat extraction causes further physical damage, as at Clonfinlough in Co.Offaly (Moloney 1993). In England, gravel extraction in the floodplains of the Trent has exposed and destroyed medieval bridges and fishing structures (Salisbury 1996).

Industrial and urban development has a similar, doubly detrimental effect on wetlands, of drainage and physical damage. When London spread beyond its original city nucleus, much of its expansion was into the marshes of the Thames and its tributaries where a few settlements already existed on small areas of raised ground called 'eg' in Old English and now commonly rendered as 'ey' or 'ea', hence Battersea and Hackney. Chelsea and Putney, on the other hand, derive their names from 'hyth', meaning riverside landing place, which is confusing but still indicative of former wetland conditions where London now spreads (Gelling & Cole 2000). In northern England, the Industrial Revolution gobbled large areas of the Manchester and Merseyside mosses (Hall *et al.* 1995; Cowell & Innes 1994). More recently, industry and business have sprawled across the Gwent Levels in south Wales and the Thames valley around Reading. In Scotland, new roads have been built along river valleys and across raised bogs, and even wetlands of known archaeological

value have been threatened by housing development (see Ballachulish, below).

There are other threats to the wetlands of Britain and Ireland, such as the acid rain which affects blanket bogs, and the industrial pollution which can seep into lowland wetlands, but drainage, extraction and development are the most serious. In terms of heritage management, drainage is probably the worst of all, being wide-spread and far-reaching yet its effects on the heritage rarely have a dramatic surface manifestation: for every site exposed by peat cutting and at least excavated and recorded before being destroyed, there are an untold number that waste away below the surface of cultivated fields, unseen and unknown.

Protection and management of the wetland heritage is therefore very necessary, and this is recognised by all the relevant government agencies. What is required is action to locate and assess the wetland archaeological resource, action to mitigate existing threats, and action to develop and implement long term strategies for the protection and management of wetlands for their archaeological values. In each of these areas, England, Ireland, Scotland and Wales have taken slightly different approaches and reached different stages, as will be apparent from the following brief outline. Further information and more details of wetland management techniques relevant to archaeology are available in Coles 1995.

The legal framework available for the protection of wetland archaeology is set out by Marsden in Chapter 2, and this aspect will not be discussed further here, except to suggest that the legislation was developed primarily to protect dryland sites and especially visible monuments, and therefore much of it is not effective in the protection of buried, waterlogged material, where control of water levels is of paramount importance.

Survey and evaluation

In England, English Heritage began the funding of wetland archaeological survey in 1973, when it made its first grant to the Somerset Levels Project for work in the peat fields. Funding continued to 1989, and the many peat cutting areas in Somerset were intensively surveyed, as were farmers' fields in the wetlands and around the edges. In all, some 40,000 hectares were covered, leading to the discovery of numerous structures and stray finds, and excavation of those which were threatened (Coles & Coles 1986; see also *Somerset Levels Papers*). In the 1980s, there was nationally increasing emphasis on conservation of archaeological sites in situ, together with mounting pressure for the protection of Britain's remaining lowland raised bogs. In the Somerset Levels, these concerns, together with the results of the archaeological survey which had demonstrated the heritage value of the peatlands, had a considerable influence on the long term management of the area as the peat extraction industry wound down. The outcomes for one particular archaeological site, the Sweet Track, and for one wildlife reserve, West Sedgemoor, are discussed below, and some of the conservation measures for the Somerset wetlands as a whole are detailed in Coles 1995.

In 1976, the Fenland Project was established, covering the extensive former wetlands in Lincolnshire, Cambridgeshire, Norfolk and Suffolk. In a total wetland area of 400,000 hectares, some 240,000 hectares were searched, on foot, and over 2000 previously unknown sites were identified and recorded. The Fens are the most intensively drained and altered of the wetlands surveyed by English Heritage, and the mapping of the ancient wetlands through palaeoenvironmental studies has been crucial to the understanding of the archaeological evidence and to the identification of remaining areas of archaeological significance (Hall & Coles 1994). Following the initial survey programme, the Fenland Evaluation Project examined a number of sites to establish the extent of preservation, with the results contributing to the overall strategy for long term protection and management as well as to the plans for individual sites.

In 1989, English Heritage set up the North West Wetlands Survey, covering Cumbria, Lancashire, Greater Manchester, Merseyside, Cheshire, Shropshire and Staffordshire. The wetlands of the north-west are much more scattered, and varied in terms of size, type and condition, than those of Somerset or the Fens, and this is reflected in the character of the survey. Fewer individual finds have been made, but more has probably been learnt of individual wetland histories, including the history of human activity (Middleton *et al.* 1995; Leah *et al.* 1998), and an essential part of the survey strategy has been the prediction of areas of interest and vulnerability (Middleton 1999).

In 1992, the Humber Wetlands project was initiated, covering the wetlands that converge on the Humber estuary: Holderness and the Hull valley, the Vale of York, the Humberhead Levels, the Trent and Ancholme valley and the Lincolnshire marshes. Here again, many hectares have been surveyed and many sites recorded, and evaluation through excavation, as a part of long term management strategies, has been built into the programme from the start (Van de Noort & Ellis 1997; 2001).

The four major wetland surveys are now complete, or nearing completion. Total English Heritage funding has been in the order of £6 million. The surveys have provided a greatly improved understanding of wetland development, long term human influences, and the current condition of the heritage content of the wetlands, in addition to an impressive database of archaeological and palaeoenvironmental evidence from all periods (see *Current Archaeology* Feb 2001). This knowledge is an essential management tool, enabling work to start on developing and implementing plans for the protection of wetland areas of particular archaeological significance.

Experience gained in Somerset shows that this can be done in conjunction with management plans for other purposes, for example for the protection of a remnant raised bog, so long as regular consultation takes place. It shows too that survey is only the first step, and a site once protected must be watched over, not left to look after itself.

English Heritage has funded archaeological survey in other wetlands, for example in coastal areas (Fulford *et al.* 1997), and along the Thames in partnership with the Environment Agency. Here too, the aim has been to identify and assess the archaeological resource, in order to inform management strategies. In many coastal wetland contexts, long term protection against sea level rise is not likely to be viable, in which case excavation becomes an imperative.

In the Republic of Ireland, despite the impressive quantity of wetland finds in museums, many of which were found during hand cutting of peat, and despite the pace at which the vast peat bogs of the midlands were being consumed to fuel electricity generation, there was little sustained archaeological activity in wetlands (Coles 1986), although individual efforts were made to excavate and record chance finds (Raftery 1999). In the mid 1980s the situation changed, partly through the radiocarbon and tree-ring dating of wooden trackways from the peat, several of which proved to be of prehistoric origin. (This is an interesting aspect of archaeological management, which could usefully be explored further, the way in which chronological 'ownership' of sites gave an impetus to their investigation, whereas few people had felt concerned when the sites were undated.) In 1985, a massive oak trackway in Corlea Bog, Co.Longford, was dated to 148 BC and Barry Raftery, already a leading scholar in Irish Iron Age studies, was persuaded to undertake its excavation. Within a few years, and with support from a European Social Fund programme, run jointly by University College Dublin and the University of Exeter, survey of the cut-over peat bogs of midland Ireland was underway. The many finds, and the undeniable threat of peat extraction, gave weight to Raftery's call for funding for the Irish Archaeological Wetland Unit (IAWU), which was set up in 1990 under the joint auspices of UCD and the Office of Public Works (now Dúchas: The Heritage Service).

By 1998, Raftery was able to report that 20% of the state-owned peat bogs had been surveyed and more than 2000 new sites recorded, and by 2000 *c.*50% of the bogs had been covered. The current level of funding provided by Dúchas for peatland survey is *c.*£IR 200,000 per year. At the same time, the raised profile of wetland archaeology has given new impetus to other research projects, as the pages of *Archaeology Ireland* reveal. Also in the 1990s, significant developer funding was secured for the first time for archaeological and palaeoenvironmental investigations, at Derryville in Co.Tipperary, where the peat bog was to be destroyed as part of a mining operation. Most importantly, in 1998 the Irish Turf Bill became law; section 56 of this bill states 'The company and each subsidiary shall ensure that its activities are so conducted as to afford appropriate protection for the environment and the archaeological heritage' (Raftery 1999). Since 1998, a programme of systematic excavation has been put in place by Bord na Móna (the commercial state body charged with developing the national peat resource) in an effort to mitigate the threat posed by its activities to the archaeological material in the bogs.

Meanwhile, the government-funded Discovery Programme put wetlands on the Irish research agenda, notably with survey of the Shannon intertidal zone (O'Sullivan & Daly 1999) and current work on the Lake Settlement project (O'Sullivan 1998 and forthcoming). This research, together with that of the Irish Archaeological Wetland Unit, has provided a knowledge base of Irish wetlands and their archaeology, somewhat different in its emphases to that of English Heritage but just as crucial if the survival of wetlands and their archaeology is to be ensured.

In Northern Ireland, the level of government funding for archaeological survey as a whole, and for work in wetlands in particular, has been slight compared to the investment made in the Republic. Since 1993, the Environment and Heritage Service has used part of its annual budget to fund bog surveys, mainly in uplands where buried landscapes survive below blanket peat. These once-dry landscapes have survived due to their wet protective covering, and now are liable to be damaged by desiccation and erosion if the peat covering is lost. There has been some survey of lowland wetlands too, increasing the numbers of crannogs, trackways and burnt mounds, and a survey of Strangford Lough (with external assistance). So far, approximately £40,000 has been spent on wetland survey, with useful results but hardly the input which the wealth of wetland archaeology in Northern Ireland needs if reasoned judgements are to be made about preservation for the future.

In Scotland, Historic Scotland first targetted crannogs within the overall wetland archaeological resource, together with an assessment of the palaeoenvironmental archive. A survey of crannogs, carried out in the early 1990s, showed that a high percentage of known sites were being destroyed by drainage, while a lesser number were at risk from erosion (Barber & Crone 1993). A joint project with the Scottish Wildlife Trust, which had received funding from the European Community Life Funds to assess Scotland's raised bogs, led to a database of known archaeological sites and finds from raised bogs (Clarke & Finlayson 1995). With Scottish Natural Heritage, Historic Scotland has also initiated a database of palaeoecological evidence, funded through a Scottish Office Environmental Research Grant (Hingley *et al.* 1999). Both projects have been primarily desk-based, and provide a useful assessment of the current state of

knowledge as well as essential preparation for wetland field survey of the sort carried out in England and Ireland. So far, field survey has taken place in areas of known archaeological potential, and on a fairly small scale, but with promising results (eg at Ballachulish and at Flanders Moss). In the three years from 1997 to 2000, Historic Scotland has used slightly over £190,000 from its archaeology budget to fund wetlands-related work, and discussions are currently underway with a consortium of interested organisations on future developments.

In Wales, wetland archaeological survey has concentrated on the Gwent Levels bordering the Severn Estuary, and its associated coastline. Cadw has funded excavations at Caldicot ahead of a country park development (Nayling & Caseldine 1997), and programmes of survey of the historic landscape of the Gwent Levels (Rippon 1996) and of the eroding coast between Cardiff and Chepstow, the latter with associated excavation (Bell, Caseldine & Neumann 2000). Cadw has also contributed to the archaeological survey and excavation ahead of the Second Severn Crossing (new road bridge and motorway links). Elsewhere, Cadw has commissioned coastal surveys, which include a wetland element, notably for Carmarthen Bay and Swansea Bay. Inland, there has not as yet been targetted wetland survey, although funding has been provided for the excavation of a chance discovery of a wetland site at Abercynafon in Powys. All told, since 1988, Cadw has spent approximately £965,000 on wetland archaeology. This has been mainly for work in the south-eastern coastal wetlands, which is where industrial development and the associated building of roads has concentrated, and the results have been instrumental in protecting parts of the Gwent Levels from development.

Mitigation and monitoring

In this section, a series of case studies will be examined to illustrate the nature of work being undertaken to protect individual wetland sites in Britain and Ireland. Other examples may be found in Corfield *et al.* 1996.

The Sweet Track (Coles 1995; Brunning *et al.* 2000) (pl.4.2 & fig.4.2)

In England, following the Glastonbury Antiquarian Society's early acquisition of the Lake Village, one of the first wetland sites to be actively protected was the Sweet Track, also in the Somerset Levels. Other wetland sites had been listed as Scheduled Ancient Monuments, but this could not prevent surrounding drainage and therefore did little to ensure the survival of wetland archaeological values. The Sweet Track had been discovered in 1970, and excavated in subsequent years in those places along its length where it could not be protected from the effects of peat extraction. In 1980, the track was traced along its whole length, nearly 2000m, and its condition was examined through a series of well-spaced keyhole excavations. In the southern half of the route, a 500m stretch of the wooden structure was found to run below

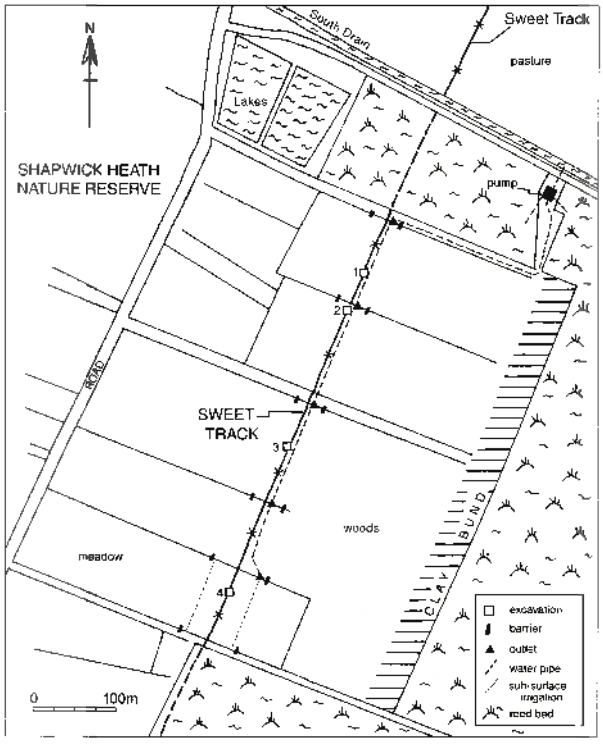

Fig.4.2: Shapwick Heath National Nature Reserve and the protected area of the Sweet Track.

land that was leased by the Nature Conservancy Council from Fisons, the major peat extraction company of the area. This land was managed as a nature reserve, although Fisons held peat extraction rights over it. Both the nature reserve and the trackway below it were threatened by the deep drainage of the surrounding land for peat extraction, and monitoring of water levels in relation to the track showed that at times it fell below track level, especially at either end of the reserve.

Armed with evidence for the archaeological and wildlife value of the reserve, and their vulnerability, the archaeological branch of the Department of the Environment, now English Heritage, and the Nature Conservancy Council, now English Nature, combined forces to obtain a grant from the National Heritage Memorial Fund in 1983. This was used to buy the nature reserve area from Fisons, to set up a system of pumps and pipes to bring in water when necessary and to build a bund to prevent water loss from the sides of the reserve. The day-to-day management of the reserve was placed in the hands of English Nature, in consultation with English Heritage and the Somerset Levels and Moors Archaeologist.

In 1994, prospects for the long term protection of the reserve and the trackway were enhanced when peat extraction ceased in the immediate surrounds, and English Nature took on the management of the abandoned cut-over fields as part of an enlarged reserve. One of their first management actions was to block the drains which had taken water off the peat fields, and to allow the land

to re-wet naturally, which it did with surprising speed.

In 1996, 15 years after it was last seen in the reserve, the physical state of the Sweet Track was checked and a new monitoring system was installed. Four very small trenches were opened, barely big enough for an archaeologist to work in, and the track wood was located and sampled. It was found to be in similar condition to that observed in 1980, indicating that the subsequent management regime had been appropriate. Tests on the wood showed that it was heavily decayed, but on balance the decay was deemed to have taken place in antiquity rather than in recent times. The peat associated with the track wood was also sampled, to assess the condition of palaeoenvironmental evidence, notably pollen, macrofossil plant remains and beetles.

During the 1996 investigations, four monitoring transects of piezometers and redox probes were set up, and conditions over and around the trackway within the reserve continue to be monitored. The surrounding area of former peat fields is now very wet, with strong development of aquatic and semi-aquatic vegetation, and it is inhabited by many birds. It is wet enough to supply water to the reserve if needed, but its very presence around the reserve means that pumping-in of water is barely necessary. The Sweet Track protection and monitoring is one of several such programmes which English Heritage has initiated (Corfield 1998), and the one where protection of wetland archaeology and wetland wildlife are most closely associated.

The Corlea 1 Track (Raftery 1996; Coles 1995) (pl.4.3 & fig.4.3)
The trackway which saw the beginning of modern wetland archaeology in Ireland was the oak timber roadway dated to 148 BC, and now known as Corlea 1. Much of the structure has been lost during Bord na Móna peat extraction prior to the recognition of its archaeological value, but an 80m length survives in an undisturbed area on the fringe of the raised bog. Here, Raftery has brought together government and local interest and support, and assistance from the European Community, to make it possible for the Office of Public Works (Dúchas) and Bord na Móna to protect approximately 4 hectares of the raised bog. Part of the Corlea Track lies buried and undisturbed in the peat, and a surrounding bund ensures its continued waterlogging. There is a Visitor Centre on the site, with a fine display of archaeology and prehistory associated with the massive wooden trackway, and within the Centre a length of the track itself is on display. It consists of the timbers previously excavated by Raftery, which were removed for conservation and have been returned, sufficiently stabilised for display.

Ballachulish (Hingley *et al.* 1999; Clarke 1996) (fig.4.4)
The site of Ballachulish in western Scotland has been known since the 1880 discovery of a large, carved wooden figure found lying on gravel at the base of peat deposits. Other finds were recorded from the vicinity, indicating the likely archaeological significance of much of the low-lying peatlands known as Ballachulish Moss, and not simply the find spot of the figure. In the early 1990s, a proposal was made for housing development on the Moss, prompting a thorough archaeological and palaeo-environmental survey of the area. This was followed by a radar survey of the bog, which indicated three distinct peat-filled basins separated by shallow peat areas, and a series of anomalies in the deepest basin. Excavation in an area of anomalies revealed a spread of quartz and stone with charcoal and worked wood, suggestive of human activity. All told, the survey work confirmed the

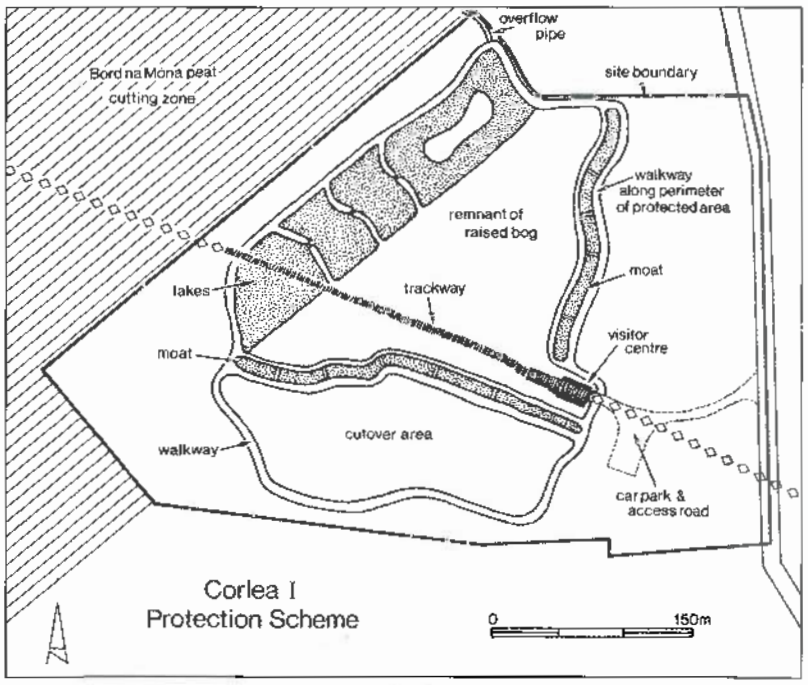

Fig.4.3: Corlea, Co.Longford: The area of raised bog protected by a bund, with part of the Iron Age trackway preserved below the peat and a short length exhibited in the Visitor Centre.

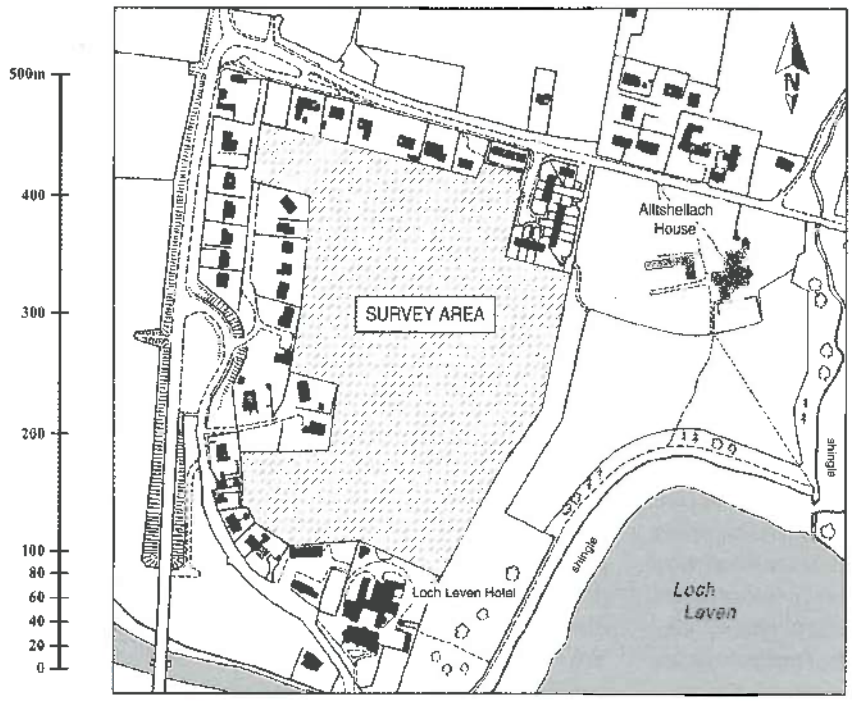

Fig.4.4: Ballachulish Moss, encroached by a housing development. A radar survey of the remaining peat (central shaded area) has revealed three deep basins with probable cultural features. Derived from Clarke 1998.

archaeological significance of the remaining parts of Ballachulish Moss, enabling a sound case to be made for its preservation rather than development.

Caldicot (Nayling & Caseldine 1997) (fig.4.5)
In the coastal belt of south east Wales, outside urban and industrial areas the landscape is predominantly one of pasture dissected by drainage ditches, which in itself is of considerable historical interest, but offers perhaps relatively little in terms of general recreational amenities, and very little to suggest there might be waterlogged archaeological sites below the surface. In the later 1980s, a countryside park was being developed adjacent to Caldicot Castle, one feature of which was a lake beside the Nedern Brook, and in digging out the lake ancient wood and prehistoric artefacts were revealed. Excavations indicated a number of former channels of the Nedern, with various different bridges or fords and associated human activity. As much as possible of the prehistoric wooden remains, palaeochannels and other features were left undisturbed during the investigations, and they were subsequently covered with a geotextile membrane to protect them from the lake which now covers the site. So long as the ground water level is kept up, and water quality does not deteriorate, it is hoped that management of the area as a park will help to ensure the survival of the unexcavated parts of the site.

Wetland management for nature conservation on West Sedgemoor: potential benefits for archaeology? (fig.4.6 & 4.7)

In Britain and Ireland, as elsewhere in Europe, the area of

Fig.4.5: Caldicot: archaeological excavation of prehistoric cultural features in palaeochannels of the Nedern Brook, revealed during excavation of an amenity lake.

wetlands protected and managed for ecology and wildlife is considerably greater than the area where protection of wetland archaeology is the main concern. This is understandable in view of the differences in matters such as legislation and grant-aid, and especially the difference in the scale of public awareness and support. It is also a reflection of the longer history of management for nature conservation, which in England could be deemed to have started when the National Trust took on Wicken Fen in 1899, although active management was a later development.

For each of the brief case studies outlined above, protection of the wetland heritage has to some degree enhanced conditions for wetland wildlife. In the case of the Sweet Track in the Shapwick Heath National Nature Reserve, the management plan has been drawn up to protect both archaeology and ecology, and the dual aims are explicit. Elsewhere in Somerset, on West Sedgemoor, the Royal Society for the Protection of Birds (RSPB) has a reserve where protection of the habitat for birds is the over-riding concern. In 1993, West Sedgemoor was included in a survey of wetland management techniques for English Heritage (Coles 1995), and at the time the potential was evident for protecting archaeology along with the birds. In 2000, a further visit was made to the reserve, to assess developments in the intervening years. Whilst generally positive, these developments show that wetland management demands constant vigilance and adaptation to the changing conditions of the surrounding world.

Fig.4.6: A stop log sluice on the West Sedgemoor RSPB reserve, Somerset, used to control the ground water level of the reserve. Note the grazing cattle, an important part of the reserve's management system.

West Sedgemoor is a narrow basin about 8km long and 2.5km wide, fed by springs and a stream running off the Blackdown Hills into the upper, south-western end of the valley. The stream flows past several small outlying 'islands' of higher ground in the upper moor, and past the large island of Oath Hill to join the River Parrett. Prior to drainage in 1816, there were a number of small meres in the basin but these are now gone, although the remains of two duck decoys may represent their last surface traces. To assist the drainage, numerous rhynes or ditches divided the moor into small pasture field, but it was not until powerful electric pumps were installed in 1989 that drainage really became effective.

Until recently, most of West Sedgemoor was used for summer grazing and for the production of hay. Better control of flooding, and grants to improve drainage, brought the possibility of ploughing to re-seed and improve grassland or to grow arable crops. But the moor was known as an area of significant ecological interest. Because there had been relatively little intensive cultivation, and because the water coming off the hills is slightly calcareous whereas the peat is slightly acid, the moor supported an interesting range of plant communities on the uncultivated, unimproved pasture fields and within their boundary rhynes. In 1983, West Sedgmoor was designated as a Site of Special Scientific Interest (SSSI).

At the same time, pressure increased to drain the moor further and to expand cultivation. Public debate between conservationists and cultivators was fierce. By 1979, the RSPB had started to buy land within the moor, with a view to having control over its management. This policy was pursued vigorously, and once enough land was owned by the RSPB, it became possible for them to control the hydrology of relatively large blocks of fields and to manage them in order to improve conditions for birds, particularly breeding waders and winter migrants. Thus the threat of drastic drainage of the whole moor was averted by land acquisition, with the RSPB owning 510 hectares by 1994, which represented just under half of the low-lying wet moor.

The breeding birds include snipe, redshank, lapwing, curlew and black-tailed godwit, and the wintering species include Bewick's swan, teal and lapwing. Past land-use on the moor, including the recent severe drainage, has left a variety of different habitats which provide the birds with good conditions for feeding, sheltering and nesting. Traditional hay-making and grazing allow the birds to nest undisturbed in the spring and early summer and leave the moor virtually free from disturbance over the winter.

No herbicides or pesticides are used, and no fertiliser other than dung, so that the farming does not adversely affect the birds' food supplies. Ditches are cleared on a seven-year rotation, again to encourage rather than destroy the birds' food. These measures also encourage the wet grassland plant communities of the moor. One lower-lying field is no longer pump-drained, resulting in a shallow pool with bare margins that provides good feeding conditions for chicks in the early summer as well as being attractive to the wintering birds at times when the rest of the moor is not flooded.

Control of the water levels on the moor is complicated, because the RSPB cannot cause flooding on land owned by other people and it must work with the network of rhynes and sluices that covers the whole moor. West Sedgmoor is, however, within the Somerset Levels and Moors Environmentally Sensitive Area (ESA) and the land owners on the moor are eligible for grants to farm with raised water levels. Not all choose to do so, but in general conditions by the mid 1990s were favourable for the RSPB to manage its land holdings as wet grassland, with water at or just below field surface until June, when the level is dropped to allow hay-making and grazing. In November, water levels are raised again, with shallow flooding of some fields.

By 1993, it had cost the RSBP in the order of £5 million to buy land on West Sedgemoor and to employ staff to restore and manage the land. In addition to contributions from the public to the Society, the money came from letting out the land to farmers and from payments under the ESA scheme, which were up to £400 per hectare per year for Tier 3 payments, ie the wettest conditions under the scheme, plus some capital grants for the initial restoration work.

Differences in improved and unimproved fields could still be detected quite easily in the mid 1990s. The former have a very impoverished flora, often with much growth of soft rush, and the ground has lost the springy resilience typical of undrained peat. In many cases, because of peat wastage, the surface of the field has dropped and the 'improved' fields may well be the first to flood.

By the summer of 2000, the RSPB land holdings on West Sedgemoor had increased further, and plans were being drawn up for the hydrological isolation of a large core block of fields. This will enable greater control of water levels and also water quality, by excluding run-off from the surrounding slopes. The birds and plant communities of the moor have continued to benefit from the RSPB management, which has included small-scale surface operations such as the widening of rhynes at junctions to introduce small expanses of open water.

However, external events have impinged on the management plan. Due to the crisis in the British beef industry, fewer farmers have beef cattle and there is less demand to rent the RSPB fields for grazing. This means less income, and more difficulty in maintaining the types of rough grassland beneficial to birds. The problem is compounded by measures introduced to manage the BSE crisis, especially the rule that beef cattle must be slaughtered by 30 months of age, because young cattle do not graze on the tougher grasses and rushes. As a result,

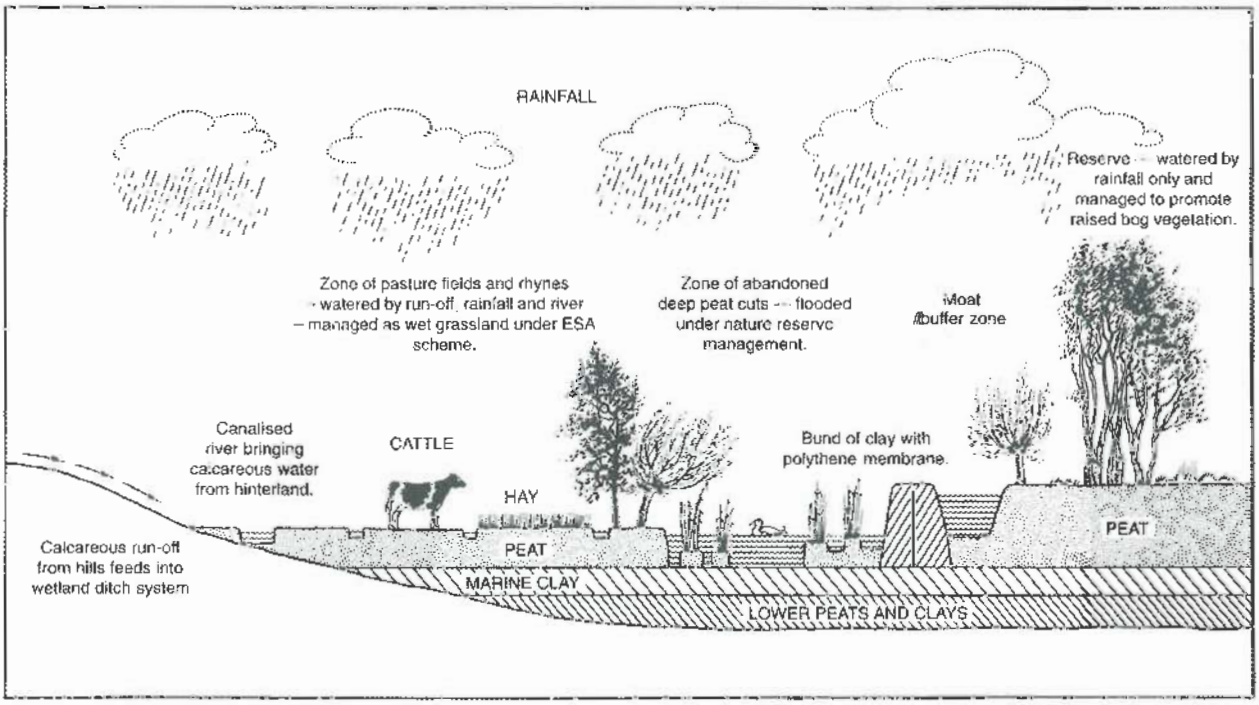

Fig.4.7: A diagrammatic transect across the Somerset Levels, to illustrate the relationship of different land-use regimes and management for nature conservation with protection of the archaeological evidence contained within undisturbed peats.

mechanical cutting of the fields is needed. It may be that in the longer term, the RSPB will develop organic cattle farming, as is the case for the Åmose in Denmark (Fischer, this vol.), to maintain a favourable mix of wet grassland conditions on the moor.

West Sedgemoor has undoubted archaeological potential. A few finds are known from the steep scarp on the southern edge of the moor, and a hand-axe from Oath Hill, but little is known from within the moor because it has been relatively little disturbed for so long. The basin topography, with meres for fish and wildfowl, islands for dry habitation and refuge, and nearby dry ground for cultivation and for forest resources, must always have been conducive to human settlement. The slightly calcareous water supply from the hills has probably ensured a poor-fen vegetation for much of the post-glacial history of West Sedgemoor, with a diversity of plants rather than domination by a single species. Altogether, there is likely to have been much to attract people, and little to disturb the evidence that they left behind in the wetlands. There is some protection of the archaeological potential of the area. Somerset County Council has designated one block of fields on the northern edge of the moor and the fields to either side of Oath Hill as Areas of High Archaeological Potential (AHAPs), a designation which is effective a county level in signalling an archaeological interest to planners and developers.

The RSPB has shown an awareness of archaeology, for example reporting a find of waterlogged wood to the County Levels and Moors archaeologist. This proved to be beaver-chewn wood, of as much ecological as archaeological interest. But archaeology is not as prominent in the management of West Sedgemoor as it could and should be, and this with little or no detrimental impact on the RSPB's primary aim of management for wildlife.

It is important that people working on the reserve are made aware of its wetland heritage value, which includes historic surface features such as rhynes, and the whole body of waterlogged deposits below. From base rock to surface, these deposits hold the history of the natural development of the moor, and the environmental and cultural evidence that pertains to the local inhabitants. A Heritage Management prescription would maintain high water levels and control water quality, both of which fit with the RSPB's aims. When water levels are lowered for summer hay-making and grazing, it would benefit the archaeology for a limit to be set, and for the period of lower water to be kept as brief as possible. Heritage Management would require recording of all surface features, and perhaps limited coring to assess the extent and quality of the wetland deposits. It would otherwise call for minimum ground disturbance. The cycle of rhyne cleaning would be done by people trained in the recognition of anomalies in the stratigraphy, ancient wood and other archaeological materials. Operations which disturb previously intact ground, such as the rhyne widening at corners, would be done in consultation with the County Levels and Moors Archaeologist.

In almost every respect, the heritage component of West Sedgemoor has a more assured future within the RSPB reserve than outside it, and it would be encouraging to see this recognised and promoted by all parties. Consider, for instance, the fate of the pasture fields if drainage had continued and farmers had adapted to falling beef prices by switching to arable crops, or diversifying into fish farms or recreational angling. Protection of the Sweet Track in the Shapwick Heath NNR illustrates joint management for nature conservation and archaeology within an un-farmed wetland. West Sedgemoor could provide an example of a similar joint approach within the very different wetland habitat of wet grassland, of equal heritage value as the wilder peat moors.

Conclusion

The heritage management of wetlands in Britain and Ireland has developed rapidly in the final quarter of the twentieth century, and it has diversified with the recognition that wetlands are complex and varied, with manifold different histories. It has become increasingly clear that survey is an essential prerequisite to effective management, so that the potential of different areas can be evaluated, and scarce resources directed to the areas of greatest heritage value and most in need of protection. Survey has been systematic in some areas, opportunistic in others, absent elsewhere, and one goal for the near future must be a more complete assessment of all the wetlands remaining in Britain and in Ireland.

Resources for management of the wetland heritage are limited, both in the financial sense, and in terms of legislation and public awareness. But the heritage component of wetlands faces much the same severe threats as the wildlife component, and its management requirements are similar to or compatible with those of wildlife. This is particularly clear if one contrasts the fate of a wetland given over to intensive agriculture, or to waste disposal, with that of one managed for its ecological value. The heritage has therefore much to gain from co-operation with wildlife interests. It also has much to offer in return, more than is generally realised. Wetlands are a vast repository of evidence for the history of Britain and Ireland since the end of the last glaciation, for climate change and the pathways of environmental development and for the contribution of humans to the emergence of the varied habitats, flora and fauna which we associate with wetlands today. For a sustainable future for wetlands, the past needs to be understood, and incorporated as an integral component of wetland values.

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5: The Netherlands

Saskia van Dockum, Daan Hallewas, Robert van Heeringen and Erick Jungerius

Abstract: *This paper describes the changing role of ROB, the National Service for Archaeological Heritage, and its main objective, the preservation of sites and monuments in their historically developed landscape. The Netherlands' long association with wetland environments and the current instruments used for managing the archaeological heritage of those environments are considered. The paper describes ROB's current policy of sustainable preservation and the problems of the current policy of passive protection and the resultant loss of wetland sites. A number of case studies of recent proactive and reactive projects in specific regional contexts are described.*

Introduction

Given our growing awareness that the archaeological record is rapidly eroding the mission of the National Service for Archaeological Heritage (ROB; formerly the State Service for Archaeological Investigations in the Netherlands) has changed in recent years (Willems *et al.* 1997). Large-scale rescue excavations in rural areas and towns are gradually being handed over to the private sector. This happens only under strict conditions, and should hopefully be regulated in a new Monuments and Historic Buildings Act in the near future. The focus is now on an integrated conservation policy implemented in close co-operation with provincial and municipal planning departments, other government agencies and private landowners. Preservation of sites and monuments in their historically developed landscapes is one of the main objectives.

This general principle is also applied to the management of archaeological resources in wetlands. The distribution map of wetlands in the Netherlands makes it clear that wetland archaeology is essential to Dutch archaeology as a whole. The western, northern, and central parts of the country form sedimentation basins, with Holocene sediments over 20m thick in some places (fig.5.1 & fig.5.2). Large parts of the pre- and protohistoric wetlands in the Netherlands dating as far back as 5500 BC are now under major pressure from agriculture and urban expansion. This is due to the fact that the Low Countries has been a man-made landscape since the tenth century AD. Actually most of the former wetlands that were inhabited in the distant past are now diked areas with a controlled water level (*polders*). As a result, water depletion and urbanisation have taken their toll on this unique cultural heritage. In this short paper we do not intend to list important excavations over the past few decades or portray the most beautiful wetlands finds. We shall attempt instead to emphasise the fact that the Dutch wetlands are a rich archaeological resource and that this resource is at risk. We hope to make clear in this short overview that the Dutch archaeological wetland resource needs to be managed properly, for the benefit of future generations.

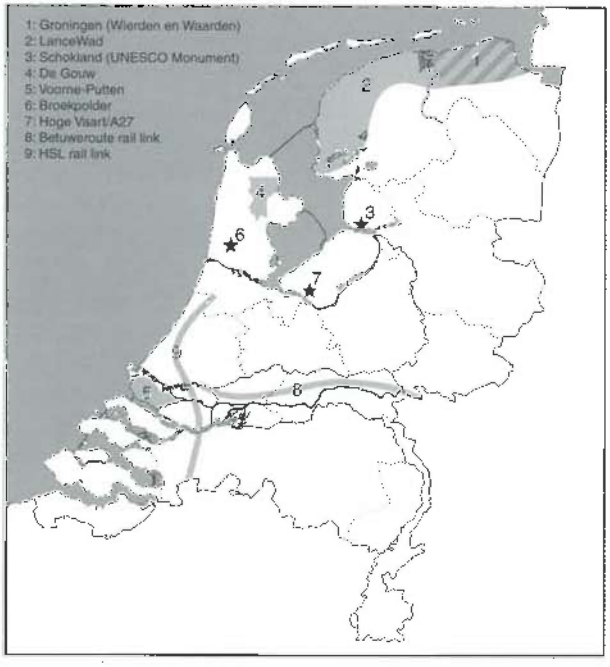

Fig.5.1: Map of the Netherlands showing the location of the projects mentioned in the text.

From prehistoric times to man-made coastal zone

The landscape

In the tenth century AD much of the Netherlands consisted of wetlands where there was little or no cultivation (Pons 1992, fig.2b; Zagwijn 1986). In the northern Netherlands, the higher land that was formed in the last ice age was surrounded by belts of peat and salt marsh, which gradually turned into tidal flats to the north. Even further north, along the coast, was a series of constantly shifting

islands. From the Iron Age dwelling mounds, or *terps*, situated at higher spots in this highly dynamic area had been occupied. In the west, between the uplands and the series of dunes that had been occupied since the Neolithic, were extensive areas of peat bog that had barely been brought under cultivation. The Scheldt, Maas and Rhine rivers intersect these bogs. Levees along these rivers formed the only connection over land between the coast and the dry hinterland. In the central Netherlands lay an area of deposits from the Maas and Rhine. The higher parts of this area were formed by channelbelts, (a chain of fluvial sandy deposits), with a long history of occupation. The lower areas were flooded by the Maas and Rhine every year.

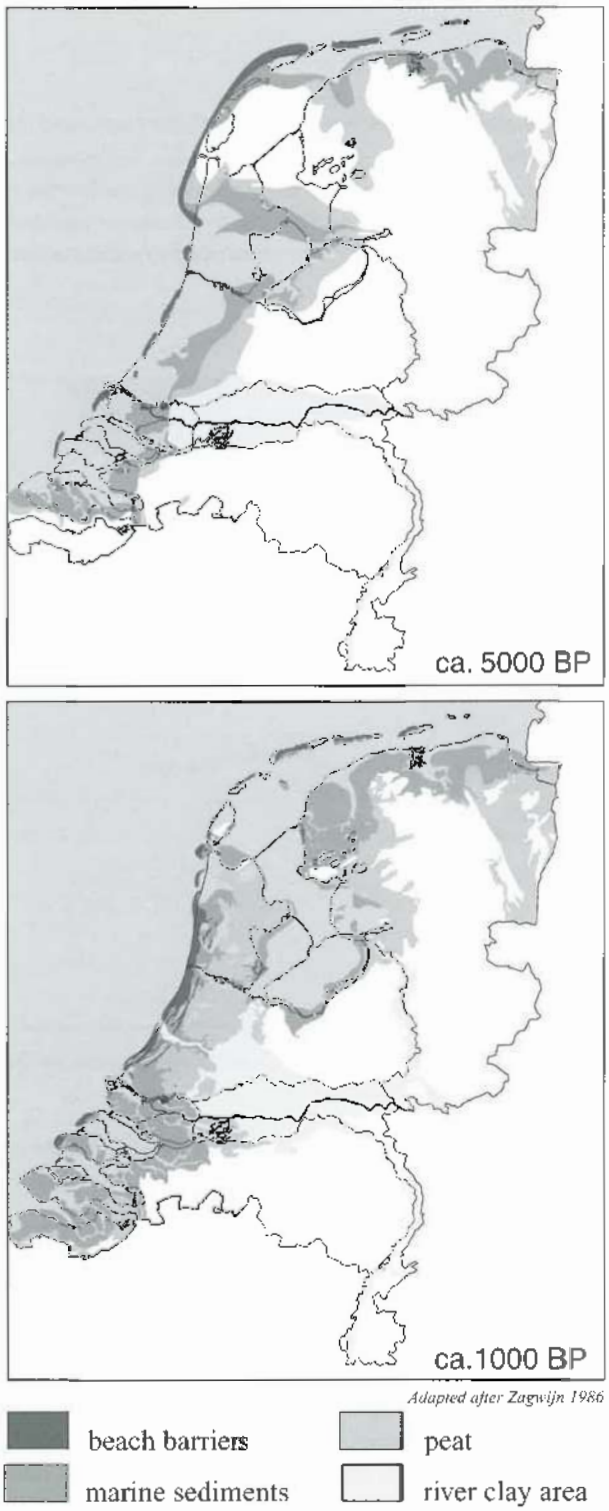

Fig.5.2: Palaeogeographical maps of the low-lying (Holocene) deposits in the Netherlands: a. ca. 5000 BP, b. ca. 1000 BP. Adapted after Zagwijn 1986.

This landscape has since been altered radically by human hand (Borger 1992; Lambert 1985; Van de Ven 1993). The peat areas were entirely reclaimed, the salt marshes were diked in and the construction of dikes also allowed the lower-lying parts of the river area to be cultivated. As the peat dried out and oxidised, the ground level fell. Large-scale peat cutting and *zelnering* (salt production) made the land more vulnerable to incursion by the sea. The history since the tenth century is therefore characterised by repeated incursions of the sea, followed by dike building, loss of land and reclamation of land. Technological innovation gave man more and more control over natural processes. The Dutch have been draining lakes since the seventeenth century, and in the last century entire estuaries were dammed. As a result, the surface of much of the western Netherlands now lies below sea level, several metres in some places. The current landscape in our wetlands is therefore entirely man-made. Without major effort to protect the wetlands, they, again, would disappear virtually entirely below the water.

There was major change prior to the tenth century, too (Berendsen & Stouthamer, fig.1 & 2 in press; Vos & Van Heeringen 1997; Zagwijn 1986). These changes were virtually all caused by natural landscape-forming processes. The main factor was the rise in sea level (Van der Plassche 1982). We can roughly distinguish two periods of change, the period prior to approx. 5000 BP, (3000BC) which saw rapid sea level rise, and the period after that, when the pace of sea level rise reduced sharply. At first the landscape that had been shaped in the Late Pleistocene was swallowed up by sea level rise, finally resulting in a succession of palaeo-landscapes.

Occupation

In this dynamic landscape there were many opportunities for occupation. From an economic perspective the deciding factors were whether the occupants would be able to keep their feet dry and engage in economic subsistence activity. In the west the higher-lying elements were largely (former) gullies in the (former) salt marshes that had silted up to quite a high level, as well as dunes and hills in the Pleistocene landscape that protruded above the peat and the marine and fluvial deposits (Deeben *et al.* in press; Hallewas 1981; Louwe Kooijmans 1993; 1998). The Pleistocene hills and river dunes contain traces of occupation since the Late Mesolithic. These hills were surrounded more and more by peat and clay areas. Some were covered, but others still lie at the surface. In both the salt marsh area and the dune area, the oldest occupation

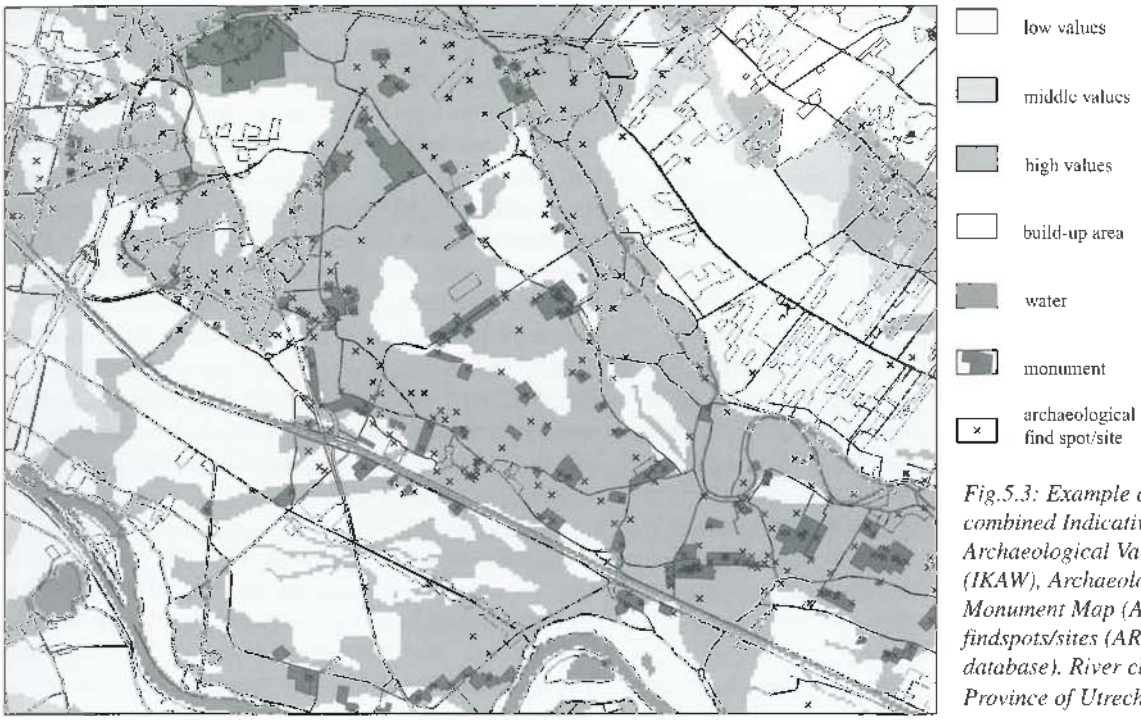

Fig.5.3: Example of the combined Indicative Map of Archaeological Values (IKAW), Archaeological Monument Map (AMK) and findspots/sites (ARCHIS database). River clay area Province of Utrecht.

dates from the Middle Neolithic. With its huge variety of food sources and ecological gradients, the western coastal area was highly suited to a way of life based on hunting and gathering. This was the dominant way of life in this area into the Late Neolithic. There was no large-scale agricultural exploitation of the salt marsh areas until the Middle/Late Bronze Age (IJzereef 1981). In the Iron Age and the Roman period the drier peripheral areas of the peat marshes were occupied.

In the north the higher lying marsh bars were the basis for long strings of terps deposited from the Iron Age onwards (Waterbolk 1979). Regular flooding meant that settlement sites had to be raised if permanent occupation was to be possible. Although evidence has recently been found suggesting dikes were constructed in the Roman period, regular flooding came to an end only when the area was surrounded by dikes in the Late Middle Ages.

Settlement remains dating from the Mesolithic onwards have been found in the river area, again on the higher Pleistocene hills (Louwe Kooijmans 1974). This landscape was also particularly attractive to hunter-gatherers. The oldest finds on the higher-lying meanderbelt deposits in the river area date from the Middle Neolithic. From the Late Neolithic, farming communities occupied the Channelbelts and crevasses, (sandy deposits in fluvial environments) (Willems 1981). The surface area of the isolated higher Pleistocene river dunes continued to decline. Since they were so small, they were more attractive to hunter-gatherers than to farmers.

Investigations of the Dutch wetlands have traditionally been a highly multidisciplinary affair. Archaeobotany and archaeozoology form an integral part of any research. Since the War, in particular, research has been characterised by attempts to establish links with the geological structure of the coastal area, geological processes (sea level rise) and palaeogeography (Jelgersma *et al.* 1970). The interaction of the development of the radiocarbon dating method and dendrochronology on the one hand and archaeological research on the other was significant (Lanting & Mook 1977).

Instruments for managing the archaeological heritage

The National Service for Archaeological Heritage (ROB) in Amersfoort implements the Monuments and Historic Buildings Act 1988 on behalf of the State Secretary for Culture. This Act, which defines monuments of national importance, is currently being amended in connection with the Valletta Convention.

In this context, it is important to state that preservation of the archaeological heritage can make an important contribution to the quality of the man-made landscape of the future, as stated in the government's Belvedere policy document (Belvedere 1999). Policy is based on co-operation between the different levels of administration and other stakeholders.

In order to satisfactorily perform this role, the ROB has developed a number of policy instruments:

- maps such as the Archaeological Monument Map (AMK) and the Indicative Map of Archaeological Values (IKAW); (fig.5.3)
- evaluation and selection techniques for the policy on sustainable conservation;
- new methods and techniques to support an active conservation policy (conservation, organisation and management, opening monuments to the public);

The first of these points will be illustrated in the following sections. The last two will be illustrated through the discussion of a series of examples in the final part of this article.

Maps (fig.5.3)
Since the first Dutch Monuments and Historic Buildings Act was passed in 1961, important archaeological sites in the coastal area and river area have enjoyed legal protection. Some time later, the possibility of according sites a significant degree of planning protection was also introduced. All sites that enjoy some form of protection are now shown on digital archaeological monument maps (AMKs). These maps have been drawn up jointly by the ROB and the provincial authorities. They provide an important basis for the policy on archaeological monuments, which is geared primarily towards preservation *in situ*. This policy is put into practice as the sites depicted on these maps are taken into account in land-use plans and planning processes.

The limitations of this policy gradually became clear. This kind of protection focuses almost entirely on preserving settlements in the strict sense of places where people lived. Other remains of occupation and land use are much less covered by this protection policy sometimes referred to as patchwork approach. In addition, the limitations of surveys to identify sites also became more and more apparent. The first systematic survey of a limited area such as central Delfland found some 80 find spots. A subsequent survey in the early 1980s raised this to around 200. Further surveys have seen the number rise to around 600. However, this kind of intensive survey is possible only in a few areas. From both points of view, it became clear that a map showing possible archaeological remains would be a useful supplement to the AMKs. It would also be in line with the growing desire to focus more on the preservation of archaeological landscapes, and move away from the patchwork approach. This also requires more information on the landscape context.

These developments gave rise to the Indicative Map of Archaeological Values (IKAW). This provides an insight into the location of areas that were suitable for occupation and agriculture, and classifies them on the basis of the chance of finding archaeological resources there (Deeben *et al.* 1997; Deeben *et al.* in press).

The production of the IKAW for the western coastal area and river area was based on the 'dry feet' principle. This means that landscape elements that were high enough for occupation and agricultural exploitation have been designated as areas *highly likely* to yield archaeological resources. Areas with both high areas and lower, wet parts have been classified as *fairly likely* to yield finds. Areas that were too wet, such as the majority of the peat areas, have been designated *unlikely* to yield archaeological remains. In classifying areas, a strict palaeogeographical approach was taken. In each case, it was established whether landscape elements met the criterion for the landscape of which they formed part. The values shown on the map therefore refer to all occupation periods and, in the case of elements that are below the current surface, no distinction has been made according to depth. Of course the information on the digital geological maps was a limiting factor. On the scale used (1:50,000) it was not, for example, possible to give an impression of the Pleistocene surface, which in some places lies deep below the current surface. After the map was developed, the picture produced was tested against knowledge about the distribution of find spots from different periods, using the ARCHIS national database of archaeological observations and monuments (Zoetbrood *et al.* 1997). The IKAW is continually adapted as new archaeological information comes to light.

Evaluation and selection
We must properly manage the archaeological heritage if we are to have a high quality man-made landscape in the future. Good management requires an integrated and systematic approach. The first step in this approach is to establish the present quality of archaeological monuments. In the Netherlands this is effected by applying a system of evaluation (Deeben *et al.* 1999). Variation in quality has to be determined, so that priorities can be set and choices made. After all, it is not possible to preserve everything in all circumstances. This concerns not only archaeological sites as such but also the current and past cultural landscape in which they are situated. Sites are selected not only by central government under the Monuments and Historic Buildings Act. Provincial and local authorities also have their own policies on the preservation of archaeological values. The evaluation system is therefore set up in such a way as to allow other authorities to use it.

Striving for sustainability

Wetland find spots are prey to severe and diverse risks resulting from the enormous pressure on space in the Netherlands, which in overall terms is unlike that in any other country in Europe. The three major threats are posed by urban development, intensive agriculture and infrastructural projects. Research into the impact of various urbanisation scenarios in the period 1995–2020 indicates that archaeological values are likely to decline rapidly. So much earth will have to be moved to create new urban areas that very few archaeological remains will be preserved. In areas with intensive agriculture, the long-term forecast is the same, although the impact is more indirect and insidious (*Verkenning Natuur en Verstedelijking* 1997). The Dutch system offers good prospects for protecting archaeological relics and incorporating them into land-use planning processes. However, this is often not enough to guarantee sustainable preservation.

As the policy on the sustainable preservation of valuable archaeological sites, preferably in their landscape

context, develops, it becomes more and more apparent that the instruments available are not entirely adequate and that we must explore new ways of rendering preservation sustainable. To ensure that archaeological monuments are preserved, physical measures are often needed and there has to be a guarantee that sites will be managed in an archaeologically-friendly way. Development and management are among the most difficult activities, as they generally require a tailor-made approach, which takes a great deal of detailed knowledge. Far too little is known about sustainability in the Netherlands. This problem is in fact greater in the former wetland areas than in the uplands. Sites in the wetlands are often extremely vulnerable because all kinds of organic remains are preserved there.

The current Monuments and Historic Buildings Act (1988) has a major shortcoming that causes particular problems for conservation in agricultural areas. Landowners face no restrictions as regards the normal use of the site at the time when it became protected. No license has to be obtained for normal agricultural use, only for unusual interventions or a change of function. But normal use often turns out to entail disastrous interventions in archaeological terms. Moreover licenses are rarely refused because landowners often maintain that doing so would prevent them going about their business. Experience has shown that erosion as a result of agricultural activity, while less obviously damaging than a new pig shed or grain silo, actually poses a much greater threat to the archaeological heritage. Incipient erosion as a result of, for example, water depletion, deeper and deeper ploughing and the effect of wind is slowly but surely eating away at occupation layers. It has been calculated that within just one generation an entire occupation layer can disappear, and a whole settlement can be regarded as lost. If the current policy of passive protection remains in force find spots that are protected on paper, particularly those in highly dynamic areas (ie agricultural and urban areas) will be lost forever. In the 1990s there were calls for archaeological sites to be protected as part of land-use planning, alongside the protection afforded under the Monuments and Historic Buildings Act. This would allow archaeological considerations to influence both policy plans, such as land-use plans and regional plans, and implementation plans such as land development plans. It is now clear that passive protection (through the Monuments and Historic Buildings Act and land-use planning) will not be enough without further physical protection, as the government's Belvedere policy document has pointed out.

Passive protection through the Monuments and Historic Buildings Act and development plans is rarely able to guarantee sustainable preservation in a highly dynamic context. This requires an approach that combines legal, planning and *physical* protection, and a new set of instruments, some designed to provide incentives. Fortunately, society is becoming more aware of the fact that we need to create good physical conditions for protection. However, in most cases, some further incentive, often financial, is needed. Such incentives have long been common in the case of nature conservation. But this is precisely what is lacking in the Dutch situation, due to a number of factors. No figures are available on the scale of the physical protection needed and the costs involved. Until recently, there was little support for this kind of protection. Ideas for tax incentives, for example, or payment for managing protected sites have thus far all run aground because the plans have been inadequately underpinned, and there has been insufficient consultation with users. Furthermore, in many cases it has not been possible to advance sound archaeological arguments. For instance, it is not clear what impact raising the water table would have on organic remains. It could change groundwater flows to such an extent that sustainable preservation would become impossible. Archaeologists would thus be doing their cause no good. The ROB has therefore proposed that in 2001 a study be carried out to establish the physical protection measures needed, the costs and know-how involved and the wishes of landowners. This national policy is based on a number of successful regional and national initiatives that have set the tone for this kind of work.

Striking examples and initiatives

The sustainable preservation of the archaeological heritage in the wetlands generally occurs on the basis of concrete projects in a specific regional context. These initiatives usually involve cooperation between several authorities and other organisations. In terms of the care and preservation of archaeological monuments, these activities can be categorised as either proactive or reactive.

- A project is proactive if it is initiated in order to preserve an archaeological monument ahead of a decision in a land-use planning process. The scale of such projects depends on the limits imposed by the landscape and the archaeological resource itself. They are focused purely on preservation *in situ* in the landscape context.

- A project is reactive if it is initiated in order to provide archaeological guidance in a land-use planning process, eg urban expansion or new infrastructure. The limitations of such projects are defined primarily by the activity that threatens the resource. Within those limitations, every effort is made to preserve the landscape context of the archaeological heritage, but excavations will be performed if necessary.

Examples of proactive projects

The value of Terps (*Wierden en waarden*)

The province of Groningen has been running a special terps project since 1997, with farmers as an essential partner (Groenendijk 1997, 252–3 in press). Those whose farmland includes *terps*, raised settlements in the coastal strip that was subject to periodic flooding, are encouraged

to consider the underground archaeological archive as they go about their work, and to cooperate on the preservation, repair and strengthening of the characteristic elements of the landscape.

The project, led by the provincial authority, involves many partners. It has already produced a number of important results. Support is growing, and more and more farmers are interested in participating. An experiment with 'eco-ploughing' for seed potato growing against the background of slower erosion on terp slopes, was a great success. Against all expectations, it was found that not ploughing so deeply and using lighter equipment after several years actually raised the yield per hectare in this area. There were also positive spin-offs for the environment, in terms of lower fuel consumption, a reduction in the amount of nitrogen leaching out of the topsoil and a sound bio-life in the topsoil.

Research has also been done into the impact of fluctuations in the water table for agricultural purposes. It was found that allowing a terp to grass over, as archaeologists often recommend, is not always in the interests of sustainable preservation. The water regime of terps in meadowland involves a great deal of run-off and evaporation. Allowing terps to be ploughed over is in fact better for the degree of humidity but at the same time goes hand in hand with severe erosion at the surface.

The Groningen project combines collaboration between several partners, particularly users, with the development of know-how that will benefit policy in the future. The results also lend themselves to combination with the provincial area-wide policy for the terp landscape in Middag and Humsterland. Here, Groningen provincial authority has developed a policy geared towards maintaining the main contours of the terp landscape, while allowing farmers to put it into practice in a way that suits the local situation. The provincial policy is in line with central government's protection policy and the area's tentative nomination for the UNESCO list.

UNESCO World Heritage Nomination: Schokland and surroundings

In 1995 'Schokland and surroundings' was included in the World Heritage List for its exceptional cultural values. These values include the archaeological archive in its subsoil (Van Dierendonck & Hogestijn 1994; Hagers & Hogestijn 1999). It is a perfect example of prehistoric and historic occupation of a wetland environment. The story of this occupation is perfectly preserved in its buried settlements, ruins, cemeteries, terps, dikes and parcelling systems. Comparable sites in the region have either been destroyed or have been completely built over. The fossilised island and its surroundings are thus the last cultural, historical and physical reminder of a typical Zuyderzee micro-society. Societies like these, once common, have disappeared due to reclamation and the closing of the Zuyderzee by the Afsluitdijk.

The island of Schokland was diked in to form part of the Noordoostpolder early in 1940. The bottom of the former inland sea lies approximately 3m below sea level. Almost all the peat on top of the Neolithic landscape (a morainic ice-pushed ridge from the Saale Ice Age with coversands and river dunes alongside) was eroded. The former island now rises 2m above the bottom of the shallow sea.

The vulnerable underground archive can clearly be seen from the air (fig.5.4). In the foreground lie medieval dike and terp relics. Peaty Neolithic occupation layers can also be seen. For the sake of arable farming the water level has been maintained at 1.4m below the surface since reclamation, so this already low-lying area is at risk of drying out. In some places the top layer of the Neolithic occupation layer is picked up in the ploughsoil. Trial excavations have yielded all the wetland goodies one can imagine: rope, bone, antler tools, burials, etc. An extensive management master plan is currently in preparation.

LanceWad

The landscape has always been in transformation. Nowadays, changes take place more rapidly because of current agricultural practices, urbanisation and industrialisation. The three Wadden Sea countries (Germany, Denmark and the Netherlands) have therefore agreed to give high priority to the landscape and cultural heritage of the Wadden Sea Region. But in order to protect and develop the heritage, one must know what it consists of. For this purpose the three countries have initiated a cross-border inventory and mapping project, called LanceWad (Landscape and cultural heritage of the Wadden Sea Region). In the Netherlands existing electronic data bases of the ROB, the National Service for Monuments and Historic Buildings (RDMZ), the Expertise Centrum of the Ministry of Agriculture, Nature Management and Fisheries (EC LNV) and of the provinces of Groningen, Fryslân and Noord-Holland are used. These data are completed by data from local and regional organisations, authorities and experts. The project is co-financed by the Interreg IIc North Sea Programme.

LanceWad aims at developing proposals for sustainable management and use of the heritage. In mapping the heritage, the project will focus on those elements and structures, which are considered to be of international importance. These are, for example, dwelling mounds, sluices, mills, dikes, lighthouses and embankments which are symbols of the interaction between man and nature. But towns, important buildings, historical sites and characteristic field systems etc will also be mapped to reflect other aspects of the common heritage.

The project attempts to develop methods for managing and using the heritage in the future. This will include proposals on how the heritage can be addressed in physical planning, and how cultural tourism can be developed. The

results of Lancewad will be presented to the Dutch-German-Danish Ministers' Conference to be held in Esbjerg, Denmark, in October 2001.

De Gouw and Voorne-Putten

Recently, the National Service for Archaeological Heritage launched the spearhead programme *Wetlands all the way down.* The programme aims to draw attention to settlements in the low-lying Netherlands, and the areas where they are situated, to allow the high-quality archaeological values to be preserved and ensure the archaeology remains an integral part of the landscape. The programme encompasses a series of projects which all aim to improve the quality of the conservation of archaeological monuments in the chosen pilot areas (Van Heeringen & Theunissen 1999; 2000; 2001). These areas can be described, as we have seen above, as a succession of wet delta landscapes. The value of these pre- and proto-historic wetlands is mainly determined by the good state of preservation of perishable material such as wooden artefacts, bones, seeds and fruits in a stratified context.

This is also the reason why archaeological sites in these areas have to be well managed; the low-lying parts of the Netherlands have not been marshes for over 1000 years, but form a modern man-made landscape in which dikes keep out the sea, the polder level has to be lowered periodically to ensure optimum conditions for farming and new housing estates are added to towns and villages. Ploughing, water level reduction and building are therefore the main threats to archaeological sites.

De Gouw

One of the projects in this programme is *Conservation of Neolithic sites in West-Friesland and De Kop van Noord-Holland.* Some 4,600 years ago, about 2600 BC, an extensive landscape of channels and creeks developed in this region (De Gouw and surroundings) under the influence of both the sea and the fresh water brought in by the rivers IJssel and Overijsselse Vecht. Archaeological investigation has shown that the higher-lying areas of this changeable salt marsh landscape provided the Neolithic inhabitants of this region (Single Grave Culture) with all kinds of possibilities for arable farming, stockbreeding, hunting and fishing.

Traces of this early human presence are certainly worth preserving, but are at the same time extremely fragile. Although thousands of years old, the traces left by the earliest inhabitants in the area are at present fairly close to the present surface (pl.5.1). They consist mainly of organic refuse, food remains such as seeds and fruit, animal bones and mussel shells, but pottery sherds, fragments of querns, broken stone axes, flint tools and sometimes even amber ornaments are also found. Under this layer of finds there is a level with traces of a buried soil.

Even though something has been preserved in the soil for thousands of years, it does not mean it will last forever. As things now stand there is a good chance of the Neolithic values in this area being lost forever in the not too distant future. As long as the occupation layers are waterlogged

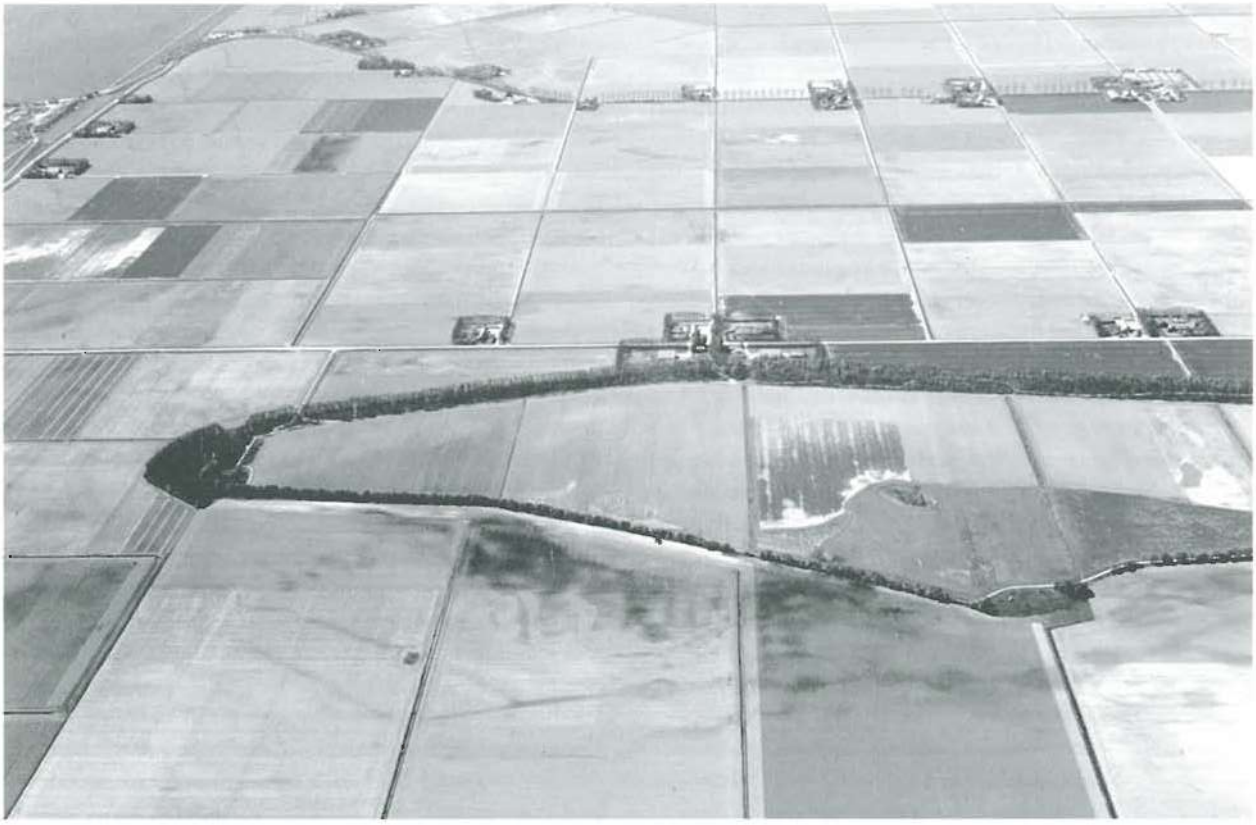

Fig.5.4: The former island of Schokland from the air. In the foreground medieval dike and terp relicts.

and sealed off from the air there is little to worry about, and the archaeological remains will easily resist the ravages of time. However, problems arise when the water level is lowered for agricultural reasons or when the soil is mechanically disturbed and the occupation layers come into contact with oxygen. This is precisely what is happening now. As a result of the lowering of the polder level, the groundwater level falls deeper and deeper. The effect of this is that the occupation layer dries out, enabling oxygen to penetrate deeper into the soil.

Mechanical disturbance usually occurs when the occupation layer is relatively high and close to the surface. Due to levelling and erosion a small section of the occupation level disappears every year during ploughing, and the organic material ploughed up is incorporated in the soil and quickly disappears due to oxidation, erosion or wind. This process repeats itself annually, so the occupation layer is subject to 'wear'. In one case it has been estimated that every year at least 1cm of the 18cm thick occupation layer is incorporated in the topsoil. This could mean that in the course of a single generation the entire occupation level can disappear and that the site may be regarded as lost to future generations.

As a first impetus to the permanent conservation of the sites, a report will be presented in mid-2001 containing all the information on the archaeologically valuable Neolithic settlement sites in this area. This should allow an effective policy aimed at the permanent conservation of these sites to be developed and implemented.

Voorne-Putten

The *Preserving the quality of the archaeological landscape of Voorne-Putten* project is part of the spearhead programme *Wetlands all the way down* mentioned above, as well as one of a series of area-wide projects being carried out in England, Belgium and France as part of the PLANARCH project (2000–2001). PLANARCH came about thanks to a grant from the European Regional Development Fund, under the North Western Metropolitan Area (Interreg IIc programme), and contributions from Rotterdam's Office for Archaeological Research (BOOR) and the Province of South Holland.

More than a million people live in the Rotterdam metropolitan area, near to a world-class port and industrial complex that extends over a distance of 35km. Relatively untouched archaeological landscapes created in prehistory exist both to the north (Midden-Delfland) and to the south (Voorne-Putten). The area lies at the heart of the Maas and Rhine delta, where for centuries periods of occupation have alternated with periods of flooding. Archaeological landscapes of different ages have thus built up one on top of the other, separated by layers of clay, sand and peat. This succession of buried archaeological landscapes provides a unique source of information about how the early inhabitants of the delta lived. The archaeological find spots in these landscapes are so valuable because perishable materials like wood and food remains have been preserved in the wet subsoil of the Maas and Rhine delta.

However, this underground archive is extremely vulnerable. Lowering of the water table and fragmentation of the landscape pose an insidious threat to this archaeological resource, and major earth works and house building can cause immediate and irreparable damage. The aim of the project is to contribute to the sound management of the remaining archaeological sites, including the landscape in which they are situated.

If we want to manage the current stock of monuments properly, we need to know about the physical state of the sites. Their present quality therefore needs to be established (baseline measurement). In 2000 and 2001, a sample of archaeological sites will therefore be selected in the five municipalities that make up Voorne-Putten. Most of them have been selected from the 101 monuments on the Archaeological Monument Map

Archaeological monuments are evaluated at several levels. The first is the level of the find spot itself. Sometimes it is important to preserve a highly valuable site, perhaps because it is a rare type of monument such as a Roman burial site or a valuable area containing several find spots in an undisturbed context (assembly value). The project aims to develop a system for prioritising valuable areas to allow archaeological interests to be presented more forcefully in land-use planning processes. The evaluation and selection process allows the relative value of both individual monuments and also entire areas to be established and more firmly underpinned. This also allows a well-founded decision to be taken as to which monuments and areas are eligible for extra protection and what instruments should be used. A wide range of instruments is possible, including planning permission, raising of the water table locally, provision of information to the landowner or user, grants for the cost of management, legal protection, use of a provincial monument ordinance, management by a nature conservation group or recreation authority, purchase etc.

Example of reactive projects

Broekpolder

Sustainable preservation often presents specific problems in existing and planned urban areas. Nevertheless, there have been some notable successes. In 1997 the 20 hectare 'Broekpolder' settlement site dating from the Iron Age/Roman period situated in the municipalities of Heemskerk and Beverwijk was nominated for legal protection. A large-scale new residential development had been planned for the area. The settlement is on a sandy bank in the Oer-IJ estuary. The site was chosen after a survey of some 150 hectares that had been designated for future residential building. Sustainable preservation of the proposed 20 hectares was justified purely on the basis of the likely

content of the archaeological resource there. In fact the 150 hectares surveyed contained the Late Iron Age, Roman period and medieval landscape. However, it was clear from the outset that even preserving just the 20 hectares that had been intensively occupied would be economically unfeasible. Consultations were held with the local authorities and the provincial authority to find a compromise acceptable to all. The main concern was that preservation *in situ* must be *sustainable*. It was eventually decided that 15 hectares and parts of the surrounding landscape would be excavated by the University of Amsterdam, which traditionally conducts a lot of research in that area. Five hectares, carefully selected to represent a cross-section of the occupation history, would be preserved for the future and surrounded by a ditch to guarantee as far as possible that no information would be lost. The information gathered during the survey, funded by central government, the provincial authority and the local authorities, would serve, among other things, as a source of inspiration for landscape architects working on the five hectares of preserved archaeological site, and for the urban planners developing plans for the excavated 15 hectares. It would also fill a gap in the knowledge about settlements in wetland areas. The legal protection of the remaining five hectares was finalised once guarantees were given that they would be sustainably managed.

Major infrastructural projects

As mentioned above, one of the threats to the archaeological resources in wetland areas comes from major infrastructural projects such as the development of railways and motorways. When a major infrastructural project threatens archaeological resources of national importance, an archaeological project will be organised by the ROB. Such projects are generally based on a formal agreement between the ROB and the organisation responsible for the realisation of the infrastructural facility. Under these agreements, the ROB takes responsibility for the management of the archaeological research and conservation activities. The costs of these activities are born by the organisation responsible for construction of the motorway or railway. In recent years such projects have increased the funding of archaeological research to unprecedented levels. In the Netherlands, such infrastructural facilities inevitably transect many landscapes that are classified as wetlands. As a result, these projects deliver valuable new insights in both the occupation history of our wetlands and the conservation of archaeological sites in these areas.

A recent example of an infrastructural project in a wetland environment is the development of the A27 motorway (fig.5.1). The route of the motorway, leading from Blaricum to Almere, crosses an area of reclaimed land, which currently lies at two metres below NAP. The area consists of Pleistocene coversand ridges that were covered by Holocene marine deposits as a result of sea level rise. The archaeological survey of the motorway route in 1993 resulted in the identification of five archaeological sites from the Early Neolithic and Mesolithic (Hogestijn & Peeters in press). For two of them no further measures were deemed necessary, as the motorway would only cut through the fringes of the site. It was possible to preserve the other two sites by adapting the construction techniques, leaving the Hoge Vaart site, in the centre of the motorway route, free for archaeological excavations from 1994 to 1996.

The Hoge Vaart site provides an excellent example of the conservation conditions that determine the archaeological value of wetland sites in the Netherlands. The inundation of the Pleistocene sands, resulting in a coverage of peat and marine clay deposits, provided conditions that proved very favourable for the conservation of organic materials, both zoological and botanical, and many features, including hearths and postholes containing wood residues. The excavation process was not confined to the coversand ridges, but also extended into the surrounding peaty environment. These research opportunities yielded finds, such as a fish trap, that could not have been made in a more site-based excavation strategy, thus enabling a more complete understanding of the livelihood of the Neolithic occupants of a drowning landscape. Major temporary structures are required for excavations at these depths. Under such conditions excavation is usually a very costly option and, if only for that reason, efforts have to be geared primarily towards conservation of these sites.

In addition to the increased understanding of the Mesolithic and Neolithic occupation of coastal zones, the Hoge Vaart project also provided important insights into to the assessment of buried paleolandscapes. A major problem is the archaeological prospection of such areas, where one is mainly dealing with Stone Age sites. The difficulty to detect such sites and the opportunity to study these sites in the context of a well-preserved paleolandscape illustrate the need for a regional approach of archaeological heritage management (Peeters *et al.* in press).

Due to their considerable depth, these sites suffer less from the effects of lowering water levels and surface erosion that were observed at the sites in West-Friesland and De Kop van Noord-Holland. However, there may exist serious problems related to seepage, which alters groundwater flows and results in an increase of chloride values in groundwater. These effects may cause a threat to the conservation of organic components such as bone. As yet, the chemical processes involved are not well understood. Further research is needed to evaluate the effects of these invisible destructive agents and to enable the development of measures to counteract such forms of degradation.

Other infrastructural projects that are currently associated with a similar form of archaeological project management are the Betuweroute and HSL rail links which both transect considerable areas that are classified

as wetlands (fig.5.1). Again, these projects combine new insights into the history of the early inhabitants with an increased understanding of the value of our heritage and the measures required to preserve the archaeological resources in our wetlands. For example, the Betuwe project improved our understanding of the importance of crevasses as potential settlement areas for the early inhabitants of the banks of the Rhine and Maas. As a result the importance of these areas has been upgraded in the IKAW, which will increase the chances of preserving the archaeological heritage in these areas.

In wetland areas especially, where excavations and prospecting are often expensive, these infrastructural projects provide unique opportunities for research and the development of instruments for the conservation of archaeological resources. Therefore, the ROB is determined to maintain a key role for archaeological heritage management in projects for the development of infrastructural features like railways and motorways.

Conclusions

Large parts of the Netherlands have long been wetlands. Since prehistory these areas formed part of a dynamic system in which natural processes shaped a succession of palaeo-landscapes. These landscapes constitute the underground archive of an occupation history that stretches back to the Mesolithic. Since 1000 AD dikes have been built and land reclaimed, a process which has produced a man-made coastal zone.

Large areas of the Dutch wetlands are very intensively used nowadays, and there is great pressure on the space there. The main threats to the archaeological heritage are:

- agriculture, including the controlled changes to the water level in the polders;
- urban expansion;
- major infrastructural projects.

Within this context, the Dutch government's policy is geared towards sustainable preservation of archaeological values *in situ*. The Dutch Monuments and Historic Buildings Act offers ample opportunity for the legal protection of archaeological monuments. However, recent studies have shown that this in itself has not been enough to halt the degradation of important archaeological monuments.

In view of the ROB's efforts to achieve permanent conservation of archaeological sites, the gradual disappearance of such an important part of the nation's archaeological heritage is an undesirable development. The ROB is taking steps to check this trend. But responsibility for the Dutch archaeological heritage is a shared responsibility. It is important to all of us that the generations to come know and experience what the landscape is telling us now about the earliest inhabitants of this country. Practical organisational measures such as the local raising of the water level, the covering of sites with soil, the transformation of arable land into pastureland, withdrawal of land from agriculture or purchase of land containing sites for nature conservation are measures which can only be taken and borne collectively by all the parties involved, such as municipalities, provinces, the government, water boards, agricultural organisations, land management authorities and land owners.

In summary, we can conclude that there is no financial incentive for the physical management of archaeological find spots comparable to those that exist for the protection of the environment. The existing instruments, such as the Monuments and Historic Buildings Act and development plans, could be strengthened by measures to ensure that protection really does work. This requires cooperation at various levels. As shown in this article, a number of projects have fortunately been initiated, they could serve as an example of how a more integrated approach to the management of the archaeological heritage might work.

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6: Scandinavia

Anders Fischer

Abstract: *Waterlogged sediments, so important to archaeology, are vanishing all over Scandinavia. Therefore management programmes for lasting preservation of archaeological values in wetlands are urgently needed here, as in many other parts of Europe. In the pursuit of this it is recommended to invest energy in the organising of a programme for the definition and protection of a selection of wetland areas of special importance to European cultural and environmental history. The paper gives a brief presentation of a selection of archaeological sites, which illustrate the variety of problems and potentials in archaeological heritage management in Scandinavian mires, focusing on sites in need of change in water table and/or agricultural management strategies. The core of the article deals with the largest wetland preservation project accomplished so far in Scandinavia, the Åmose.*

Introduction

Wetlands are the source of many of the highlights of Scandinavian archaeology (fig.6.1). This may be experienced, for example, by an inspection of the permanent exhibition on Prehistory in the Danish National Museum where artefacts from wetlands play a remarkable role, qualitatively as well as quantitatively.

Inland and coastal wetlands are widespread in the mountainous northern and middle Scandinavia as well as in lowland southern Scandinavia. The archaeological richness of these areas has primarily been exposed during periods when peat cutting was undertaken for fuel. In southern Scandinavia this industry had its climax in the 1940s and 1950s, when fuel from Danish bogs was humorously said to consist of 60% water, 40% profit and 20% prehistoric artefacts. Large-scale peat cutting for fuel and horticultural use still takes place in Scandinavia, especially in Sweden and Norway. Since it is now generally carried out with large and efficient machines the loss of artefacts and observations of potential archaeological interest are probably much greater than in the past, when much of the work was undertaken manually.

Peat cutting is perhaps the most easily recognised threat to the archaeological record of the wetlands. Other activities resulting in desiccation and diminishing water quality may, however, have an even worse effect on the survival of the cultural heritage of the wetlands.

For generations drainage has been a matter of principle, not just of profit, to Scandinavian farmers and foresters. Especially in densely populated southern Scandinavia where it has been conducted with inveterate intensity over a couple of centuries. Almost any mire and meadow here is influenced by drainage. Moreover, even in the most remote northern Swedish 'wilderness', foresters' drainage ditches have now scarred the landscape in numerous places. The resulting desiccation will, inevitably, result in the loss of objects and sediments of archaeological interest.

During the most recent decades the development of urban areas, industry and agriculture has resulted in a re-

Fig.6.1: The location of Scandinavian wetland sites mentioned in the text.

duction of water quality in wetlands all over Scandinavia, at the potential expense of waterlogged archaeological remains. Agricultural fertilisers are influencing the great majority of mires and meadows in southern Scandinavia, and air borne pollution is significant in even larger areas, including the most remote wetlands in the Swedish forests and Norwegian mountains. These phenomena may result in deterioration of buried artefacts of, for instance, iron and bone. The fertilisers will, if oxygen is present, speed up the biological decomposition of organic sediments, wood, etc. In response to these developments a growing concern for *in situ* preservation of wetland sites may now be observed among Scandinavian archaeologists.

No authoritative compilation of wetland heritage management activities in Scandinavia is presently available. For that reason important cases and approaches, particularly from Sweden and Norway, may be missing in this paper. The remarkably few examples where the preservation of the *status quo* is considered an adequate strategy for the lasting protection of specific wetland sites have been deliberately excluded. Successes as well as failures are mentioned, in that both types of experience provide valuable lessons.

Sweden and Norway

Over the years many spectacular archaeological artefacts and structures have surfaced from Swedish and Norwegian wetlands, including skis, arrows, hafted iron tools, braids of human hair, trackways, wooden settlement and fortification structures, etc. To the question: what archaeological heritage management programmes exist for the lasting protection of wetland sites? colleagues employed by the central government authorities of both countries surprisingly replied 'don't know'. They could, however, immediately refer to recently initiated registration programmes, which should sooner or later end up defining management projects for a number of wetland sites. In Norway, for instance, wooden trackways, maritime sites and medieval cultural layers under present towns are now being looked at from this perspective.

Fig.6.2: Excavation on the Alvastra site in the 1970s. Photo T. Bartholin.

One of the most famous wetland sites in Sweden is the Neolithic 'pile dwelling' of Alvastra (fig.6.2). Due to its excellent preservation of organic remains, such as food plants and timber structures, it is of central importance for the study of the Neolithic in Scandinavia (Bartholin 1978; Browall 1987; Göransson 1987). The site is situated in a spring bog, and was used for symbolic/ritual activities during summer seasons over a period of at least 42 years. Approximately 1000m^2 of the site was excavated at the beginning of the last century. The site's cultural layer was, at that time, situated approximately 1m below the surface.

In the 1970s the open trench of the old excavation was cleaned up, during which time it became evident that the preservation quality of the upper parts of the previously exposed wooden structures had deteriorated. The lower parts of the vertical piles, which were found below ground water level, were still in good condition. During this survey, 90m^2 of the previously unexposed parts of the site were excavated, demonstrating that the preservation of the remaining structures had clearly declined in the vicinity of the earlier excavation. It was also observed that the culture layer was now situated only 0.5m below the surface of the peat (H. Browall *pers. com.* 1999).

The excavation trenches and a drainage ditch through the area have now been infilled, and the local archaeological authorities periodically inspect the site to make sure that the present surface is not disturbed. There is, however, a suspicion that the remains of an old, subterranean drainage system may still be operational, implying that the local water table is not sufficiently high for the sustained preservation of the entire site. Furthermore, it is feared that water abstraction and proposed industrial peat cutting in the vicinity may negatively influence the ground water level at the site. Lasting *in situ* preservation of the Alvastra 'pile dwelling' should therefore not be taken for granted.

Communication with persons involved with various other well-known wetland sites in Sweden gave no better examples of accomplished management programmes aiming at *in situ* preservation. The situation in Norway appears only a little different. One of the most progressive approaches reported relates to a site at Leinsmyra near

Stiklestad in western Norway, a trackway in a mire. The site has been dated to the thirteenth century AD, and is presently threatened by destruction from a planned peat cutting programme. As a consequence the local county administration is preparing a wetland management programme for this site (I. Smedstad *pers. com.* 1999).

Numerous Mesolithic settlements have been identified along the rivers and lakes of the higher mountain areas of Norway. Unlike the situation further south in Europe, no such sites have been found within peat sediments. Recently it has been observed, however, that Mesolithic sites can be identified below peat formations. In these sediments of sand and gravel the only organic remains surviving are fragments and patches of charcoal. The peat cover has, however, provided very fine preservation conditions for inorganic structural elements such as lithic artefact distributions, hearth constructions and tent rings.

A hunting camp located by the shore of lake Myrvatn in south-west Norway, situated at an altitude of 610m, was the first identified example of such a Mesolithic site. Until recently the site was covered by a 2.5m thick layer of peat, which is now rapidly eroding due to the artificial raising of the water level within the lake to allow hydro-electric production. This situation made it possible for archaeologists to locate and excavate the site (Bang-Andersen 1990). Several charcoal samples from two fireplaces from the Myvatn site have been dated to approximately 8800 cal BC, which makes it an exceptionally early site within the North European Mesolithic.

A similar situation was seen in the summer of 1999 by the shore of lake Fløyrlivatnet in south-west Norway, at an altitude of 760m (S. Bang-Andersen *pers. com.* 1999). Here the erosion of the former peat layer exposed several very well preserved tent rings. Samples of charcoal found beneath the stones forming the tent rings have recently been dated to approximately 9000 BC.

There is no opportunity for *in situ* protection of the two peat covered lakeside settlements at Myrvatn and Fløyrlivatnet. The knowledge of their presence inevitably raises the problem of identifying and preserving other sites covered by peat, both here and elsewhere. Consequently, Norwegian archaeologists now consider the possibility of similar sites being hidden in those wetland areas which are included in plans for future construction projects. This approach is also applied in a mountainous area at Gråfjell covering 256km^2, which is intended to become victim to intrusive military activities (J. Vaage *pers. com.* 1999).

Denmark

As in some other European countries, ancient wooden roadways are a common phenomenon in Danish wetland areas. A small number of such structures have been listed as protected monuments. One of these, Speghøje, in western Denmark, is a good example of the problems associated with a lasting preservation of this kind of monument. The site represents a 96m long stretch of a Bronze Age trackway in a former raised bog (Schou Jørgensen 1982). Peat extraction has been allowed as close as 3m to the structure, which is now lying 1–2m above the surrounding well-drained peat cuts. The timbers are obviously left in such dry conditions that all of the structure will undoubtedly completely decay.

The site in the meadows of Ravning in western Denmark, dendrochronologically dated to *c.*AD980, is a roadway and bridge almost a kilometre long which spans both a river and the adjacent marshy ground of the river valley. The bridge was identified in the middle of the last century, when drainage caused a gradual collapse of the marshy sediments, and as a consequence vertical poles of solid oak came to light. Archaeological excavations revealed an impressive construction consisting of several thousand vertical poles and a layer of branches, which had served as a working platform for the bridge builders (Schou Jørgensen 1997).

A 10m wide stretch of land including the full length of the Ravning structure was declared a protected monument in 1978; however, ploughing and drainage at and around the protected area still continued, as did a fish farm, parts of which cut down into the Ravning structure. This situation in time would obviously have led to the gradual destruction of the whole wooden structure. In the 1990s the National Forest and Nature Agency started to gradually buy up the land containing the Ravning bridge. The fish farm has now been removed and a small museum and public picnic place have been opened close by, and a full-scale reconstruction of a section of the monument has been created to attract and inform the public. To further protect the structure the surrounding water table has been raised and a slightly sloping dam has been constructed on top of the exposed bridge timbers (pl.6.1). The weight of this additional soil cover may have caused partial deformation of the bridge builders' working platform. More importantly, a recently initiated monitoring programme gives reason to believe that a lasting protection of the timbers has actually been achieved (Poul Jensen, Mogens Schou Jørgensen & Leif Madsen *pers. com.* 1999).

Deliberate deposition of Iron Age military equipment is a distinct and important category among the many Danish wetland sites. Nydam is one of the best known examples (Engelhardt 1865; Rieck *et al.* 1999). In the Iron Age Nydam was a shallow lake approximately 100m by 500m. Between AD200 and 500 the lake was used for an extraordinary series of sacrificial depositions of boats and weapons. Major archaeological excavations in the mire took place in the 1860s. In the 1970s it was established that much more archaeological material was still preserved in the peat and in 1993 the whole bog was protected in *status quo* ie wet pasture. Nonetheless, large-scale archaeological research excavations took place there

Fig.6.3: Measuring environmental parameters (oxygen and corrosion rate) relevant to the in situ preservation of buried items of wood, iron, etc. at the Iron Age votive site of Nydam. Photo National Museum of Denmark.

until 1999, which provided evidence that some of the spectacular waterlogged remains were deteriorating. Some of the iron weapons had corroded, possibly as a consequence of reduced water quality, and many of the wooden objects were being penetrated by Horse Tail (*Equisetum*) roots. This small plant did not pose a threat to the site when a small trench was excavated in the 1970s, but 20 years later it was flourishing over most of the area, sending its roots into the cultural deposits. A wooden shield, for instance, has been observed penetrated by no less than 936 roots from this plant (F. Rieck *pers. com.* 1999).

A research project dealing with the potential of *in situ* protection of the site was then initiated (Aaby *et al.*1999). The water quality is presently being tested (fig.6.3), and an experiment has been conducted to stop the growth of Horse Tail by covering the ground with water permeable synthetic textiles. This experiment proved to be successful, and will be expanded to a much larger part of the site along with a general raising of the water table in the whole mire. There may be expressions of scepticism as to the effectiveness of this plan. In general the archaeologists, conservators and geologists involved in the project feel relatively satisfied that a lasting protection of major parts of this site is within reach.

The Åmose

For 60 years the Åmose has been known as an internationally outstanding archaeological treasury due to its unusually rich and well preserved Stone Age remains. The exceptional chemical and hydrological conditions, which have preserved the organic remains in the Åmose, are now threatened by drainage, ploughing and the use of fertilisers. The Danish Forest and Nature Agency in co-operation with the County of West-Zealand is engaged in re-establishing a high water table and introducing a system of landscape management that combines the lasting preservation of the prehistoric remains with the re-vitalisation of the unusual wildlife of the mire (Fischer 1985; 1999).

The philosophy behind the project is that a share of the presently available research potential should be handed down to future generations of cultural and environmental historians, who may ask other questions and possess better analytical techniques than we have at present. For this reason the selected fragments of the past which are already stored in museum boxes should be supplemented by entire sites and landscapes preserved *in situ* in their full multiplicity of details.

Åmose means 'river bog' in Danish and the area was originally a series of lakes along a stream. During the Stone Age these lakes were gradually filled up with organic sediments of gyttja and peat (Noe-Nygaard 1995). The present chain of peat basins covers an area of about 40km^2.

For 7,000 years of the Mesolithic and Neolithic the

Åmose appears to have been highly attractive to humans. During the warmer half of the year people lived here, exploiting the area for fishing, hunting and gathering, with their dwellings located at the water's edge. In the autumn the activity sites were generally abandoned, due to the seasonal increase in the water level of the lake. Chalk rich mud and swamp vegetation soon covered and preserved the sites, and in this way hundreds or possibly thousands of Stone Age settlements, and an impressive variety of fishing sites, votive sites, etc were preserved in alkaline water-saturated gyttja and peat (Mathiassen 1943; Andersen 1983; Koch 1998).

The moist and well-preserved sediments around and in between the cultural remains are important in their own right. Here a wealth of information on 13000 years of environmental history, from the Ice Age to the present day, is available in well stratified sequences of pollen, seeds, tree trunks, molluscs, insects, fish, bird and mammal remains. The Åmose is thus considered an internationally important, integrated archive of cultural and environmental history.

In the 1960s the Åmose river was turned into a straight and deeply sunk drainage canal and most of the bog was converted into farmland. Since then the organic sediments, with their rich Stone Age material, have been deteriorating through gradual destruction from drainage and ploughing. Furthermore, the decomposition of organic remains due to microbiological activity has, no doubt, been accelerated by the use of fertilisers. As a consequence of these factors the surface of the fields has been observed to erode as much as 4cm a year. Thus, each year the farmers' ploughs have cut their way deeper down into the sediments. As a consequence, the cultivated area of the Åmose became an adventure land for amateur archaeologists. Some of them specialise in the collection of early Mesolithic barbed bone points, of which approximately half the total finds from European contexts has probably been found in the Åmose. Another amateur collector specialised in ornamented Stone Age items of bone and antler, a 'sport' that would simply have been impossible anywhere else in western Europe.

In the 1980s the National Forest and Nature Agency learned of this situation and established a project to determine the remaining archaeological potential of the area. The survey was able to demonstrate several hundred sites of archaeological and quaternary-zoological significance. A number of small-scale test excavations were then carried out, to ascertain the preservation condition of the Stone Age settlements and animal skeletons that were still buried in the sediments. They proved to be in very good condition. Only a couple of culture layers of excellent preservation were tested by geological coring. All these sites are highly relevant for future research in topics such as subsistence, dwelling construction, social organisation and ceremonial behaviour.

Several sites were classified, as being important parts of the European cultural heritage from the Stone Age, and it became obvious that a heritage management programme, which could secure *in situ* preservation, was essential. Lasting preservation, however, could not be obtained simply by protecting each of the individual sites. Even if complex irrigation systems were installed at every site, a chemically stable situation would most likely be out of reach. Thus, a general raising of the ground water level over large areas around the sites had to be the main objective.

The initial focus of the project was an area of the bog 2.3km², in which there was an especially high concentration of scientifically important and immediately threatened Stone Age sites. In 1991 this area of land was declared an archaeological reserve, where drainage, ploughing, use of fertilisers, peat cutting, etc. are prohibited. The National Forest and Nature Agency had to pay a considerable amount of money, and go through four years of legal wrangling before the formalities were complete and they could initiate the urgently required rise in ground water level. All the drains in the area were blocked and a number of dams were constructed across the ditches leading water out of this part of the bog. These works considerably raised the ground water table within the bog (fig.6.4 & fig.6.5). The water levels are now controlled in a way that allows future excavation of individual areas of the reserve. Lowering of the water for such purposes should preferably be done for short periods

Fig.6.4: Before: part of the Åmose at the end of the 'wet' season, May 1987. The white excavation tent in the background, at the left side of the drainage ditch, was erected for the testing of the Late Mesolithic/Early Neolithic settlement 'Spangkonge'. Photo A. Fischer.

during the autumn, since winter precipitation will then soon return the ground water level to an appropriate degree.

Parts of the former monotonous cornfields have been turned into shallow lakes where ducks and wading birds now breed. The whole area after the implementation of the heritage management programme derives its water solely from precipitation. No polluted river water and no drainage water with agricultural fertilisers or pesticides, feed into the reserve. When the chemicals from the former agricultural exploitation of the area have been fully washed away, the flooded areas in the Åmose will probably be some of the least polluted lakes in eastern Denmark.

In some parts of the Åmose Reserve grass is cut and fed to local organic dairy cattle for the production of organic milk. A local dairy farmers' co-operative called 'Åmose Organic' use their connection to the area in their advertising, informing the public about the importance of the Reserve and how to visit it. The local farmers are therefore using the special status of the Reserve Area for positive advertising. At the same time the farmers' cattle help to protect against the growth of trees, the roots of which might cause damage to the peat and the cultural remains below the surface.

A question which still remains to be answered is whether all the archaeologically interesting parts of the Reserve are wet enough to secure their lasting preservation. In an attempt to answer this a project measuring the hydrological, chemical and bacteriological conditions in the soil of the Åmose Reserve has been initiated. The preliminary results of the ongoing project indicate that stable anaerobic preservation conditions exist in the sediments below ground water (Tanja Alstrøm & Poul Jensen *pers. com.* 2000).

It must be stressed, though, that not all of the most significant sites in the reserve are permanently saturated. This is especially the case with the sites buried in a stretch of land along the artificially lowered Åmose River. In future it would, therefore, be advantageous to have the water level of the river raised. This operation will inevitably change the surrounding *c.*10km^2 of currently farmed peat bog into meadows, swamps and lakes. The cost in terms of compensation to farmers and landowners involved will be great. On the other hand such a re-creation of wetland will be beneficial to other interests including nature conservation, not just archaeology and environmental history.

The Åmose is still home to an astonishing diversity of endangered species of wild plants and animals. This applies especially to the areas of the bog which have been spared attacks from industrial peat cutting and intensive farming. In these 'oases', plant and animal species uncommon in the rest of eastern Denmark are still found, although they are severely threatened by desiccation. Moreover, the raising of the river and the creation of wetlands and lakes in the Åmose will add to the

Fig.6.5: After: the same area as in fig.6.4 at the peak of the dry season, but after the water table has been raised. The Spangkonge site is now permanently saturated under oxygen-free conditions. A. Fischer photo, August 1999.

recreational values of the area. Furthermore, it will be beneficial to the general water quality of the whole river system, downstream.

In the attempt to organise *in situ* preservation of major parts of the Åmose it is recommended by the present author that hunting and fishing as well as extensive cattle grazing are welcomed, as long as these activities do not conflict with the basic archaeological and biological aims. Such an approach may appear too pragmatic to the most radical of the supporters of nature conservation and archaeological heritage management. However, it will certainly minimise the costs of the project in terms of finances and local opposition, and it will most probably add to the durability of the reserve area in the face of possible future food supply shortages.

At present the County administration and the Forest and Nature Agency are negotiating with the landowners of the Åmose on raising of the ground water level in the peat basins. Surprisingly many of the landowners, representing the majority of the 40km^2, in principle support a change of management permitting the better preservation of cultural heritage and wild life. In general it is easy to agree a consensus on the importance of protecting the archaeological values in the sediments.

The major obstacle to the preservation attempts in the Åmose is economy. The production value of the land is relatively low, and much of the area is in practise taken out of production thanks to the waste land (set-aside) policy of the EU. Regrettably the waste land subsidies are given on the condition that the fields can promptly come into production again if needed, and for that reason the drainage systems must not be blocked. Other areas of considerable extent are used for the production of seeds, on the condition that the farmers receive a fixed amount of EU subsidy money per hectare no matter how little is harvested. Both situations have the paradoxical implication that the public interest in preservation in practise can only be made a reality by outdoing the agricultural subsidies made available by other parts of the public administration.

Conclusion

The wetland heritage management projects described in this paper are expressions of an approach that is relatively new among most archaeologists in Scandinavia. The approach has great potential for the future, since the wetlands of all Scandinavian countries are very rich in archaeological remains, and are presently threatened by a wide range of activities which sooner or later will result in their chemical deterioration, physical desiccation and/or mechanical destruction.

In democratic countries the establishing of large-scale wetland management programmes can only be successfully accomplished with explicit acceptance from public opinion and with the active support of the political decision makers at the relevant geographic level. In this respect a pan-European political perspective is especially important. The subsidies offered to land owners by national governments and the EU system imply that the creation of stable preservation through raising of the ground water level has to be done at an economic level of compensation far above the loss of production value of the areas in question. Apparently a major breakthrough for wetland heritage management could be attained by a technically rather simple re-definition of the regulations of EU agricultural subsidies.

In this respect the attention of archaeologists should be called to the approach applied by biologists aiming at related goals of environmental protection. The formal definition of Ramsar and EC bird-protection-areas, and EC Habitat Areas organised under the auspices of UNESCO and the Council of Europe and implemented successfully under the EC (now EU), could be more or less copied for the protection of archaeological resources. To the present author it appears most expedient at the moment to invest energy in organising a European programme for the definition and protection of a selection of wetland areas of special importance to European cultural and environmental history.

In the pursuit of such a goal we need to be able to canonise wetland heritage areas of international preservation interest and to organise dialogue with the Parliament and the Commission of the EU. The resources needed for the accomplishment of such missions should not be a deterrent compared with the costs of traditional archaeological tasks. The main obstacles to their effective completion may therefore be the mental constraints on what activities professional archaeologists and archaeological institutions should be dealing with. Generally some degree of mental re-orientation and internationalisation seems to be needed. Progress in these directions has already been made locally in the scholarly and administrative dimensions (Coles 1995; Cox *et al.* 1995). Hopefully, the EAC symposium, resulting in the present publication, will turn out to be the starting point for the establishment of an effective, pan-European politic of heritage management, not least including the protection and restoration of archaeologically important wetlands.

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7: Nordostdeutschland

Bernhard Gramsch

Abstrakt: *Ausgedehnte Flächen des nordostdeutschen Tieflands sind Feuchtbodengebiete. Archäologische überreste aus organischen Stoffen sind hier vorzüglich erhalten, und aus allen prähistorischen und historischen Perioden sind in diesen natürlichen Archiven archäologische Feuchtbodenplätze anzutreffen. Entwässerungen und kultivierungen in den 1970er und 1980er Jahren sowie Strassen- und Leitungsbaumassnahmen in den letzten zehn Jahren haben das archäologische Erbe in den Feuchtböden der Region erheblich gefährdet. Der Artikel beschreibt eine Anzahl ausgegrabener Feuchtbodenplätze. Zugleich behandelt er die Probleme, die mit dem Schutz dieses hochbedeutenden Quellenbestands verbunden sind, sowie die Notwendigkeit der Ermittlung und Identifizierung der Feuchtbodenplätze, ferner die Verantwortlichkeit für den Schutz und die Ausgrabung von Feuchtbodenfundstätten in oder nahe Bauflächen.*

Einleitung

In der Norddeutschen Tiefebene - wie in anderen Teilen Nordeuropas - sind während der Eiszeit und in der Nacheiszeit die oberflächennahen Sedimente abgelagert sowie die Landschaft und deren Morphologie geformt worden (Woldstedt 1955). Das Inlandeis der letzten Kaltzeit, des Weichsel-Glazials, hat nahezu die gesamte Fläche des heutigen Nordostdeutschlands - der föderalen deutschen Länder Mecklenburg - Vorpommern, Brandenburg und Berlin - bedeckt und hier seine Ablagerungen hinterlassen: Grundmoränen, Endmoränen, Blockpackungen, Kames, Oser, glazifluviale Sande und Kiese. Unter dem Eisschild wurden Becken ausgeräumt und von den Schmelzwässern Rinnen erodiert, vor dem Eisrand wurden die Schmelzwässer in breiten Tälern, den sogenannten 'Urstromtälern' abgeführt, bei gleichzeitiger Ablagerung von Schmelzwassersanden/Talsanden in diesen Tälern (Abb.7.1).

Nach dem Abschmelzen des Eises und in der Nacheiszeit füllten sich im ehemaligen Vereisungsgebiet alle Hohlformen und tiefliegenden Areale mit Wasser, und es bildeten sich zahlreiche Seen und Weiher; zugleich suchten sich Fließgewässer - Ströme wie Elbe und Oder sowie ein enges Netz von Flüssen und Bächen - ihr zumeist noch heute bestehendes Bett. Mit Beginn der holozänen Warmzeit setzte aber gleich auch die organische Produktion in Seen und Weihern, in Totarmen von Flüssen und in Depressionen der Flußebenen ein. Abhängig von der Wassertiefe setzten sich Mudden, Torfe und Sumpfbildungen ab (Wahnschaffe & Schucht 1921; Succow 1987). Diese Prozesse wurden beeinflußt von grossräumigen und lokalen Schwankungen des Wasser-/Grundwasserspiegels schon im älteren Holozän, aber dann besonders - großklimatisch bedingt - seit dem älteren Atlantikum. In den letzten drei Jahrtausenden B.P. sind die organischen Massen durch Verlandung und Versumpfung besonders stark gewachsen. Im und nach dem Mittelalter stiegen die Wasser-/ Grundwasserspiegel nochmals markant an, und zwar durch die Anlegung von zahlreichen Wehren für Wassermühlen an Fliessgewässern und durch andere stauende Wasserbauten, wodurch es auf großen flachgründig vernäßten Flächen zur Versumpfung kam (Herrmann 1959; Driescher 1986).

Die größeren Flüsse akkumulierten in ihren Betten in der Nacheiszeit Kiese, Sande und Schlicke. Auf diese Weise erhöhten sich allmählich ihre Betten, so daß sie

Abb.7.1: Karte der beschriebenen Forschungsschwerpünkte

immer höher auf ihren eigenen Sedimenten flossen (Beschoren 1935a; 1935b). Das hatte Rückwirkungen auf die Wasserstände ihrer Zuflüsse und auf die Grundwasserstände in den umgebenden Arealen, nicht zuletzt wieder auf die organische Produktion in den Rückstau- und Vernässungsgebieten.

Nach dem Abschmelzen des Inlandeises lebten Menschen in Nordostdeutschland: ab *ca.*13,000 B.P. Jäger-Fischer-Sammler-Populationen des Spätpaläolithikums und des Mesolithikums (Taute 1968; Gramsch 1973), seit *ca.*6000 Jahren dann bäuerliche Bevölkerungen des Neolithikums, der Bronzezeit und der Eisenzeit (Archäologie in der DDR 1989), danach ab der Zeitenwende germanische und slawische Stämme (Herrmann 1968). Seit der Steinzeit siedelten alle Bevölkerungen bevorzugt unmittelbar an oder in Nähe von Offengewässern: wegen der Wasserversorgung, wegen des Fischfangs, wegen des Wasserverkehrs mit Floß und Boot, nicht zuletzt wohl auch wegen der Nutzung des Wassers als absichtliche und unabsichtliche Deponie für Abfälle sowie für zu Versteckendes oder zu Opferndes. Letzteres ist eine der fundamentalen Voraussetzungen der Feuchtboden-Archäologie. Nordost-Deutschland ist überaus reich an ur-und früh-geschichtlichen Siedelplätzen sowie mittelalterlichen Objekten, die sich in wasserdurchtränkten mineralischen und organischen Sedimenten befinden oder in solche Sedimente hineinreichen. Das ist nicht verwunderlich, da über 50% der Gesamtfläche Nordost-Deutschlands unter 50m NN liegen und die größten Höhen 200m nicht überschreiten. An solchen Plätzen befinden sich hölzerne Bau- und andere Siedlungsstrukturen resp. deren Reste in Feuchtablagerungen; ausser Artefakten aus Flint, Stein, Keramik und manchmal Metallen sind auch Gegenstände erhalten, die aus Knochen, Geweih, Zahnbein, Holz, Baumrinde, Pflanzenfasern und Harz/Pech gemacht sind, abgesehen von Knochen von Nahrungstieren und von Resten vegetabilischer Nahrung. Damit dokumentieren archäologische Feuchtboden-Siedelplätze mit ihrem Fundinhalt am umfassendsten die Wohn-, Wirtschafts- und Lebensweise in der Urgeschichte und im Mittelalter.

Ursprünglich waren alle gegenwärtig oder subrezent wassersaturierten Wohnplätze und Deponiebereiche an die Wasserstandsniveaus und die entsprechenden Sedimente ihrer Nutzungs- bzw. Entstehungszeit gebunden. Die Wasser- und Grundwasserstände variierten jedoch in der Nacheiszeit nicht unbeträchtlich. Generell lässt sich für das nördliche Mitteleuropa folgende allgemeine Entwicklung skizzieren (Schulz 1968): Zu Beginn der Nacheiszeit, im Präboreal, waren die Wasserstände im Binnenland relativ hoch, zum Teil sogar höher als die gegenwärtigen. Im Boreal gingen die Wasserstände nicht unbeträchtlich zurück, um beginnend mit dem Atlantikum stetig wieder anzusteigen. Dabei wurden im Jungholozän die heutigen Grundwasserniveaus zum Teil überschritten, wobei sehr hohe Wasserstände schon vor der regulierenden Einflussnahme des Menschen höchstwahrscheinlich im Subatlantikum, auf jeden Fall vor dem Mittelalter, erreicht wurden. Beispielhaft sei ein Befund aus dem Fiener Bruch, dem westlichsten Abschnitt des Baruther Urstromtals, angeführt, wo auf einer von Moorniederung umgebenen Düne als Verfärbung eine Brunnenstruktur der Eisenzeit in 2.5m Höhe über dem heutigen Grundwasserstand angetroffen wurde (Kurzhals 1989, Abb.3, Grube 1). Im Niveau des ehemals auf den Brunnen orientierten Grundwasserstandes ist ein Oxydationshorizont im Boden (Go-Horizont) ausgebildet, der anzeigt, dass in seinem Niveau ehemals der höchste Wasser- bzw. Grundwasserspiegel in der Region gelegen hat.

Alle erwähnten Änderungen der holozänen Wasser-/ Grundwasserstände waren im Binnenland zunächst natürlich bedingt, spiegeln also Änderungen des Binnenwasserhaushalts im Gefolge großzyklisch wechselnder Niederschlagsmengen mit den Folgen für die Wasserabflussmengen in Fließgewässern, für Seespiegelstände und für das jeweilige Niveau des Grundwassers wider. Zu diesem natürlichen Faktoren-/ Ergebnisgefüge trat im hohen Mittelalter (13./14. Jahrhundert) der Mensch durch Anlegen von Gewässerstauen zum Betreiben von Wassermühlen und durch andere Wasserbaumaßnahmen bis hin zu späteren künstlichen Durchstichen zwischen verschiedenen Fluss- und Stillgewässersystemen und dem Bau von Kanälen (Beschoren 1935a; 1935b; Herrmann 1959; Driescher 1986). Das führte zu zusätzlichen Wasser-/ Grundwasseraufstauungen in der Größenordnung von 1–2m im Einzugsgebiet der Gewässer. Besonders entlang den Hauptflüssen, wie Havel, Spree, und ihren Zuflüssen haben sich dadurch beträchtliche Wirkungen hinsichtlich des hydrologischen Regimes und des nachfolgenden Wachstums organogener Bildungen, vor allem durch Versumpfung resp. Überstauung, ergeben. So sind bereits slawische Siedlungs- und Befestigungsstrukturen und Funde, also aus dem 8.-12. Jahrhundert, in Brandenburg entlang den Flussgebieten von Spree und Havel sowie deren Zuflüsse unter Wasser gesetzt bzw. von organogenen Ablagerungen überdeckt worden (Herrmann 1959).

Wenn schon im 13./14. Jahrhundert die Wasser- und Grundwasserstände künstlich erhöht waren, so wird von Driescher (1986) darauf hingewiesen, dass vom 15. bis 17. Jahrhundert während des 'Little Ice Age' im europäischen Binnenland besonders hohe Niederschlagswerte zu verzeichnen waren, wodurch sich die vorher schon hohen, natürlich und anthropogen bedingten Wasser-und Grundwasserstände sicher nochmals erhöhten. Möglicherweise resultierten dann daraus die im 17. Jahrhundert beginnenden und im 18./ 19. Jahrhundert fortgesetzten großflächigen Kultivierungen, verbunden mit rigorosen Absenkungen der Wasser- und Grundwasserspiegel, in Mecklenburg und Brandenburg.

Durch den Anstieg des Wasser- bzw. Grundwasserspiegels seit dem Atlantikum bis zum Mittelalter und zur Neuzeit gerieten zahlreiche ur- und frühgeschichtliche Siedlungen und Wohnplätze - von der Steinzeit bis hin zum Frühmittelalter - nach ihrer Aufgabe in und unter organogene Sedimente, die sich zeitgleich oder später bildeten. So konnten sich in den alten Siedlungen auch Baustrukturen und Gegenstände aus organischen Stoffen erhalten.

Seit dem 17. Jahrhundert wurden in vielen Niederungs- und Feuchtbodenlandschaften Nordostdeutschlands Kultivierungsarbeiten durchgeführt, unter anderem mit dem Ziel der Senkung der Wasser- bzw. Grundwasserstände. In davon betroffenen Moor- und Sumpfgebieten fielen in der Folge die organogenen Sedimente durch Humifizierung und Mineralisierung zusammen. Im Ergebnis ist in den Fundstationen eine unbekannte, aber sicher nicht geringe Anzahl von Objekten aus organischen Stoffen bisher schon zerstört oder beschädigt worden. Durch subrezent und gegenwärtig fortgesetzte und künftige Kultivierungen werden weitere archäologische Plätze und ihre Substanz von Schädigung und Zerstörung bedroht. Andererseits sind nicht wenige archäologische Plätze, die ursprünglich unter mächtigen organischen Ablagerungen verborgen waren, durch die kultivierungsbedingte Schrumpfung der organogenen Deckschichten näher an die neu entstandenen Oberfläche geraten und damit überhaupt erst als archäologische Denkmäler bekannt und archäologischen Forschungen zugänglich geworden.

Archäologie der Altertümerplätze in Feuchtböden

Seit Beginn des 20. Jahrhunderts haben auf nicht allzuvielen, aber auch auf nicht wenigen Feuchtboden-Stationen archäologische Ausgrabungen und Forschungen stattgefunden. Mehrheitlich handelte es sich um denkmalpflegerische Rettungsgrabungen, seltener um problemorientierte Forschungsgrabungen. Die bisherigen Grabungen bedeuteten allerdings nur einen 'drop in the ocean', verglichen mit den eigentlichen Erfordernissen zur Rettung akut von Austrocknung bedrohter Altertümer zumeist hohen und höchsten Ranges. Die Gründe liegen in den hohen Kosten für Grabungsforschungen auf Feuchtbodenstationen.

Die bisher durchgeführten Ausgrabungen betreffen wenige Steinzeitplätze und vor allem archäologische Stätten des frühen und hohen Mittelalters. Frühmittelalterliche Plätze sind besonders häufig untersucht worden, weil sie immer schon besser bekannt und zahlreicher waren und weil ihnen wegen der Bedeutung für die Territorialgeschichte ein höheres Forschungsinteresse entgegengebracht wurde. - Einige Ausgrabungen auf Feuchtbodenstationen und ihre Ergebnisse sollen im folgenden kurz behandelt werden.

Die Ausgrabungen auf der mesolithischen Feuchtbodenstation Friesack im Land Brandenburg in den 80er Jahren resultierten aus einem neuerlichen Kultivierungsprojekt für das Untere Rhin-Luch, des westlichsten und zugleich tiefliegendsten Abschnittes des Warschau-Berliner Urstromtals, *ca.*50km nordwestlich Berlins. Dieser Talabschnitt ist hier *ca.*4–6km breit und weitgehend mit organischen Ablagerungen ausgefüllt; es ist heute eine Wiesenlandschaft. Das gegenwärtige Oberflächenniveau der Wiesen von durchschnittlich 27m NN ist allerdings erst das Ergebnis einer durchgreifenden Kultivierung des Unteren Rhin-Luchs und der westlich und östlich angrenzenden Urstromtalabschnitte in der 2. Hälfte des 18. Jahrhunderts (Berghaus 1854–56), in deren Gefolge sich die Oberfläche der ehemals 'wilden Sumpflandschaft' durch Mineralisierung und Moorschwund um *ca.*2–2.5m absenkte. Dies ist belegt durch hölzerne Baustrukturen der mittelalterlichen Stadt Friesack, die auf später mineralisiertem Torf errichtet und erhalten sind; die Torflage in der Stadt befindet sich in einem Niveau von 2–2.5m über dem heutigen Niveau des Rhinluchs am Nordrand der Stadt.

Die Mesolithstation bei Friesack ist seit dem Anfang des 20. Jahrhunderts bekannt (Schneider 1932). Durch erste Grabungen von 1916–1925 (Schneider) und im Jahre 1940 (Reinerth) war klar, dass es sich durch die Erhaltung von Knochen-, Geweih- und Holzgegenständen - neben Silexartefakten - um eine hochrangige Fundstelle handelt. Als für die Zeit ab 1980 neue Kultivierungsarbeiten mit der Folge einer weiteren Grundwasserabsenkung um *ca.*70–80cm geplant waren, wurden archäologische Rettungsgrabungen für erforderlich erachtet und von 1977 bis 1989 durchgeführt (pl.7.1). Diese Grabungen führten zu bemerkenswerten Entdeckungen, sowohl hinsichtlich Strukturbefunden als auch bezüglich archäologischen Funden (Gramsch 1987; 1992).

In den an den ehemaligen mesolithischen Siedlungsplatz von Friesack grenzenden vielschichtigen Gewässerablagerungen - Mudden und Sanden - fanden sich überaus zahlreiche mesolithische Kulturreste, namentlich auch aus organischen Stoffen. 74 Radiokarbondaten bezeugen eine chronologische Abfolge der Besiedlung vom mittleren Präboreal bis zum mittleren Atlantikum, also von *ca.*8900 cal. BC bis *ca.*6000 cal. BC. In den Schichten sind ausser Feuerstein- und Steinartefakten zahlreiche Gegenstände aus organischen Stoffen erhalten, wie Knochenspitzen und andere Geräte aus Knochen und Geweih, hölzerne Gebrauchsgegenstände - hauptsächlich Speere und Pfeile- Objekte aus Baumrinde wie Behälter und Netzschwimmer sowie Fragmente von einzigartigen Schnüren, Netzen (pl.7.2) und Seilen aus Baumbast.

Die außerordentliche wissenschaftliche Bedeutung der Fundstation Friesack ist offensichtlich. Diese Station und ihre topographisch-archäologische Situation lassen annehmen, dass noch viele Plätze dieser Art und Erhaltung unter den organogenen Ablagerungen des Urstromtals

nordwestlich von Berlin vorhanden sind. Die Feuchtbodengebiete der Urstromtäler müssen als Schatzkammern für archäologische und ökologische Informationen über die Verhältnisse im jägerischen Spätpaläolithikum und Mesolithikum sowie im bäuerlichen Neolithium eingeschätzt werden. Alle bekannten und die zu vermutenden Stationen sind aber gefährdet, weil die durch die um 1980 durchgeführte Kultivierung eingeleitete Zerstörung der organischen Sedimente und des Kulturguts weiter fortschreitet. Im Moorgebiet um die Station Friesack wurde zum Beispiel zehn Jahre nach Beginn der Grundwasserabsenkung im Zuge der Kultivierung 1980 eine Sackung der Mooroberfläche von 10–15cm gemessen. Ausserdem sind weitere Kultivierungsarbeiten mit zwangsläufig nachfolgender Grundwasserabsenkung nicht ausgeschlossen. Das gilt übrigens auch für die meisten der Niederungsgebiete, die in der Nachkriegszeit in Mecklenburg-Vorpommern und Brandenburg erstmals oder erneut kultiviert/ melioriert worden sind.

Weitere Plätze mit vorzüglicher Erhaltung von Kulturresten des Mesolithikums befinden sich in Mecklenburg bei Hohen Viecheln am Schweriner See (Schuldt 1961) sowie bei Rothenklempenow, am Latzig-See 25km westlich von Stettin (Schacht 1993).

Eine Vielzahl von archäologischen Objekten mit Erhaltung von archäologischen Strukturen und Fundgegenständen im Feuchtmilieu gehört in das frühe Mittelalter, das in der nordostdeutschen Region durch die slawischen Stammesgruppen der Wilzen, Obotriten, Heveller und Lausitzer repräsentiert wird. Es handelt sich um die Zeit vom 7./8. bis zum 12. Jahrhundert. Die slawischen Stämme waren für ihren Siedlungsraum die Nachfolger abgewanderter germanischer Stämme, wie der Langobarden, Semnonen und Burgunder, die hier bis zum 5./6. Jahrhundert ansäßig waren. In vielen der von den Slawen in den Feuchtbodengebieten errichteten Siedlungen und Befestigungsanlagen haben sich im Untergrund Holzstrukturen und Artefakte aus organischen Stoffen erhalten. Dieses ist teilweise darauf zurückzuführen, dass zur Zeit der Besiedlung der Grundwasserstand niedriger war als schon einige Jahrhunderte später. Zum anderen, und zwar vor allem für die spätslawische Zeit von 1000 AD bis 1200 AD, folgten auf die Errichtung von Siedlungen und Befestigungsanlagen bald danach künstliche Wasserstandserhöhungen durch die Anlegung von Stauwehren für Wassermühlen, wodurch grosse Flächen in den Talauen und Tieflagen vernäßten und versumpften (Herrmann 1959). Erst die Kultivierungsmaßnahmen seit dem 17. Jahrhundert haben dann Teile der vorher vernäßten Flächen wieder begehbar und nutzbar gemacht, einschließlich der Schaffung von Möglichkeiten für archäologische Erforschungen. Dabei hat die Zeit zwischen der Vernässung von Siedlungen und hölzernen Wehranlagen einerseits und den subrezenten Kultivierungsarbeiten andererseits in der Regel glücklicherweise noch nicht ausgereicht, um die organischen Strukturen und Gegenstände zu zerstören. Bezogen auf die zeitgenössischen Wasser-/ Grundwasserstandsverhälnisse sind schliesslich auch nach dem 12. Jahrhundert im Gefolge der deutschen Eroberung der Slawenterritorien östlich von Elbe und Saale deutsche Burgen, Städte und Dörfer auf Feuchtböden angelegt worden. Erst die späteren, im 17. Jahrhundert und bis in die Gegenwart durchgeführten Kultivierungen und Grundwasserspiegelabsenkungen haben die alten Bauwerke bzw. ihre Fundamente luftexponiert, so dass dann neue Bebauungen erforderlich wurden. Ausserdem wurde in Städten wie Spandau, Potsdam, Brandenburg und Rathenow entlang dem Havel-Fluss die Bebauung auf das durch die Mühlen-Staue geschaffene hohe Grundwasserniveau eingestellt, das heisst die Gebäudefundamente wurden auf Holzpfähle gesetzt, welche verrotten und die auf ihnen errichteten Gebäude zum Einsturz bringen würden, wenn die heute gänzlich unnötig gewordenen Mühlenstaue beseitigt würden.

Im folgenden seien einige slawisch- und deutsch-mittelalterliche Feuchtbodenplätze vorgestellt. Im Zusammenhang mit einer neuen Kultivierungsmassnahme im Tal des Oder-Stromes mussten in den 70er Jahren des 20. Jahrhunderts Rettungsgrabungen auf einer slawischen befestigten Siedlung (Burgwall) des 8./9. Jahrhunderts A.D. bei dem Dorf Wiesenau südlich von Frankfurt/Oder durchgeführt werden (Buck & Geisler 1971). Die erhaltenen hölzernen Strukturen der Anlage waren in wasserdurchtränkten Schlick-Sedimenten und in Torfablagerungen von zwei ehemaligen Bächen entlang dem Platz eingebettet. Die den Burgwall umgebenden hölzernen Walleinbauten waren ausgezeichnet erhalten. Kaum ein Jahrzehnt später wären die Strukturen durch Austrocknung des Sediments zerstört gewesen. In den mineralischen und organischen Sedimenten wurden zahlreiche Artefakte aus Knochen, Geweihmaterial und Holz aufgefunden, die den Stand der Handwerkstechnik und der Wirtschaft im frühen Mittelalter bezeugen, zum Beispiel aus Holz ein Hakenpflug, viele Pflugschare, Gefäße, Pflanzstöcke und anderes.

Andere Beispiele von archäologischen Feuchtboden-Objekten des Mittelalters in Nordost-Deutschland stehen im Zusammenhang mit Torfwachstum in Seen und mit Versumpfung in der Nachbarschaft nach Anstieg des Wasser-/Grundwasserspiegels nur wenige Jahrhunderte nach Bestehen der Siedlungen. Die bis vor kurzem wasserdurchtränkten Altertümerstätten sind aber nunmehr durch jüngste Maßnahmen zur Grundwasserabsenkung gefährdet.

Als instruktives Beispiel einer frühstädtischen slawischen Burganlage mit einem Holz-Erde-Wall und Holzbauten sei der Vorläufer der Stadt Spandau des 8. bis 12. Jahrhunderts erwähnt, auf einer Insel im Havel-Fluss im heutigen Westteil Groß-Berlins gelegen (v. Müller u. v. & Müller-Muci 1983). Die unteren Holzlagen

der Wehrbauten und der Gebäude waren im Grundwasser bestens erhalten, ohne dass an der heutigen Oberfläche mit Familienhäusern und umgebenden Gärten irgendetwas von dem im Untergrund Vorhandenen zu erahnen oder gar zu sehen gewesen wäre. Die Ausgrabungen waren nur mit Grundwasserabsenkung möglich.

In Groß Raden in Mecklenburg, *ca.*30km östlich von Schwerin, befindet sich auf einer Halbinsel in einem See eine altbekannte slawische Burganlage des 9. bis 10. Jahrhunderts, deren untere Baustrukturen schon im Mittelalter unter Wasser/Grundwasser gerieten (Schuldt 1985). Die hölzernen Konstruktionen der Wallbefestigung, des Zugangsweges und einer Brücke, der Grundrisse und Pfosten von Häusern sowie - als besonders bemerkenswertes Objektes - eines Kultgebäudes waren ausgezeichnet erhalten, ebenso viele Artefakte aus Knochen, Geweih, Holz, Rinde und Leder.

Ebenfalls eine holzgebaute Kulthalle wurde ausgegraben in einer befestigten Feuchtbodensiedlung des 9./10. Jahrhunderts bei Parchim in Mecklenburg (Keiling 1982). Hier waren weiterhin Hölzer der Wallkonstruktion, der Toranlage, von Wegen und Gebäuden gut erhalten (Abb.7.2).

Ein anderer bedeutender Platz im Feuchtbodenkontext ist die slawische Burganlage von Teterow im Innern Mecklenburgs (Abb 7.3). Auf einer Insel im Teterower See bestanden vom 9. bis zum Anfang des 12. Jahrhunderts eine Haupt- und Vorburg, deren Wälle in Holz-Erde-Bauweise errichtet waren (Unverzagt & Schuldt 1963). Die Burg war mit dem Festland durch zwei hölzerne Brücken verbunden, die eine 750m lang, die andere 70m lang. Diese Brücken haben sich in nach mittelalterlichem Seespiegelanstieg gebildeten Torf- und Muddeschichten vorzüglich erhalten und zeugen von den grossen technischen Fertigkeiten der Erbauer.

In Behren-Lübchin, einer weiterer befestigten slawischen Inselsiedlung des 11. Jahrhunderts in Mecklenburg, war die Hauptburg auf der Insel mit der ebenfalls befestigten Vorburgsiedlung durch eine 320m lange Holzbrücke verbunden (Schuldt 1965). Bald nach der Aufgabe der Anlage stieg der Seespiegel, und der gesamte See verlandete. Die hölzerne Burgmauer und Untergrundbefestigung der Inselburg sowie die Brücke wurden in den organogenen Ablagerungen konserviert, ebenso zahlreiche Gebrauchsgegenstände aus Knochen und Holz. Die Konstruktionselemente des hölzernen Walles waren durch Versturz in schräge und horizontale Lage so gut erhalten, dass Teile der Befestigung mit originalem Bauelementen wieder aufgebaut werden konnten.

Am Südende des Tollense-Sees südlich

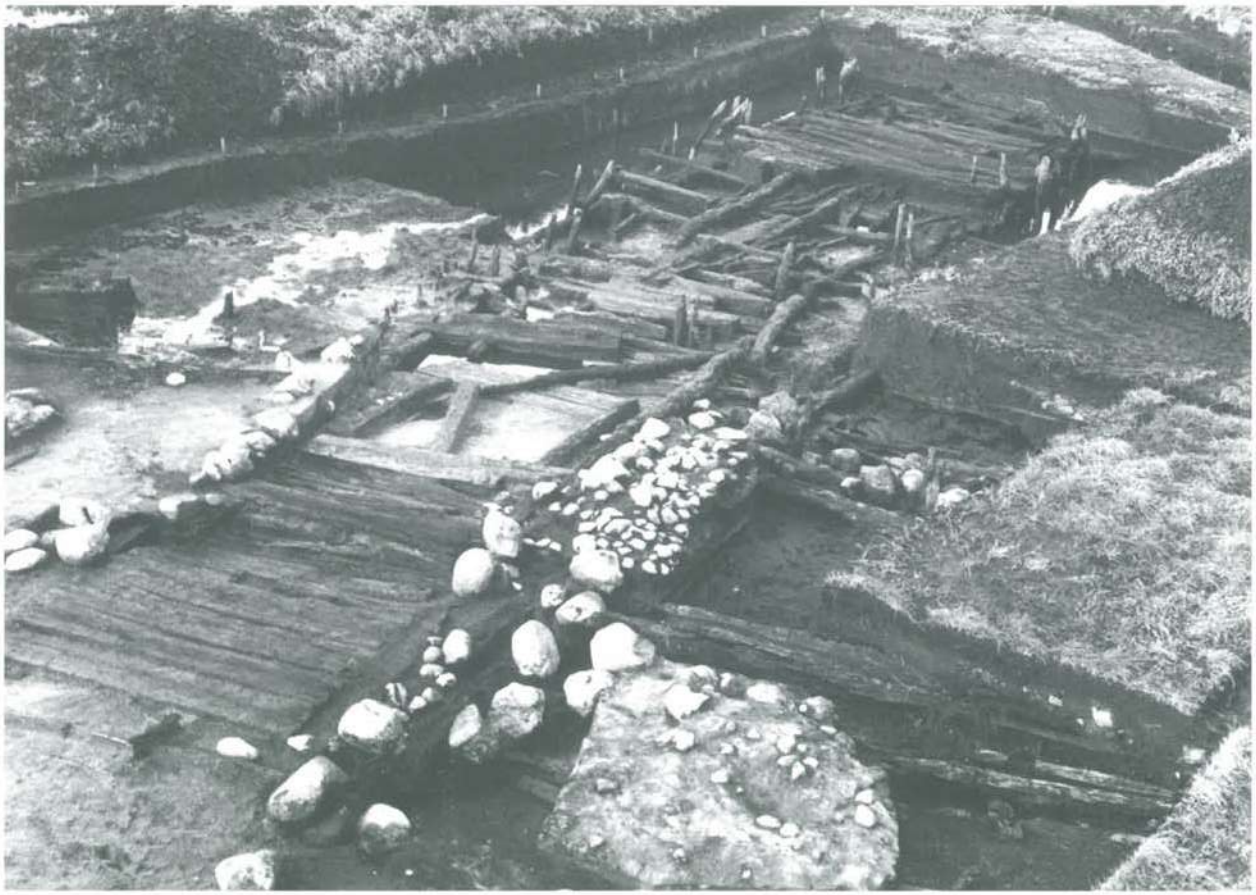

Abb.7.2: Parchim (Mecklenburg-Vorpommern). Bohlenweg und Brückenreste in einer jungslawischen Siedlung an einem Flussübergang.

Abb.7.3: Teterow (Mecklenburg-Vorpommern). Schnitt durch die Brücke zwischen der slawischen Inselburg und dem Festland; der Aufbau ca.3m breiten der Brücke aus Jochträgern, Jochbalken, Unterzügen und Bohlenbelag ist gut zu erkennen; Alter 9.- 11. Jahrhundert.

Neubrandenburg in Mecklenburg befindet sich eine ganze See-Region mit slawischen Burganlagen und Siedlungen, die in der Mehrzahl im Gefolge von späteren Wasserstandserhöhungen von insgesamt *ca.* 1.5m in organogene Ablagerungen eingebettet wurden (Schmidt 1984). Bei den Ausgrabungen auf der hier gelegenen Fischerinsel wurde in einem Siedlungsbereich mit slawischen Holzbauten unter anderem eine bisher einzigartige hölzerne doppelköpfische Kultfigur der Slawen des 11./12. Jahrhunderts gefunden (Abb.7.4).

Für das hohe Mittelalter sind in einigen Städten ab dem 13. Jahrhundert Quartiere bezeugt, deren hölzerne Gebäude und andere Strukturen, wie Straßen und Brunnen, auf basalem Torf in einem kritischen Kontakt zum Grundwasser angelegt worden sind. Die basalen Bereiche der Baustrukturen haben im Grundwassersaum überdauert, sofern sie nicht durch spätere Bauten zerstört worden sind. Spätere Grundwasserabsenkungen haben dann Schädigungen ausgelöst, aber nicht alles Holz zerstört.

In der Stadt Friesack sind bei archäologischen Untersuchungen in Verbindung mit Leitungsverlegungen und Straßenbaumassnahmen *ca.*2m über den oberflächigen organogenen Ablagerungen im angrenzenden Rhin-Luch mineralisierte Torfschichten festgestellt worden, auf denen im 13. Jahrhundert die frühesten Bauten und Strassen in Holzbautechnik errichtet worden sind (Jentgens 1997). Im 17. Jahrhundert ist dann die angrenzende Moorlandschaft des Unteren Rhinluchs kultiviert worden, mit dem Ergebnis der Absenkung der Niederungsoberfläche um *ca.*2m und der Mineralisierung/ Humifizierung der organogenen Bildungen, auf denen Teile der Stadt bestanden. So kamen die in den organogenen Fundschichten von Friesack eingebetteten Baustrukturen in eine für ihre weitere Erhaltung kritische Lage. Immerhin haben die Bauhölzer in der humifizierten Torfschicht seit der Kultivierung von *ca.*1770/80 nunmehr mehr als 200 Jahre überstanden, so dass sie wohl noch einige Jahre mehr erhalten bleiben werden.

Ein weiteres Beispiel für die Erhaltung von hölzernen Bauresten aus der Frühzeit einer Stadt ist das *ca.*40km südlich von Berlin gelegene Baruth am Südrand des Baruth-Glogauer Urstromtals. Bei Erdarbeiten ab 1987 wurde völlig überraschend festgestellt, dass im Untergrund der Stadt auf großer Fläche hölzerne Baustrukturen als Relikte von Häusern, Straßen und Wegen aus dem hohen Mittelalter erhalten sind (Grebe & Heine 1990). Zur Bauzeit der Häuser im 13./14. Jahrhundert liess der Grundwasserstand die Errichtung von Holzbauten offenbar ohne weiteres zu, erst danach gerieten die unteren hölzernen Baustrukturen unter den

Grundwasserspiegel und blieben so erhalten. In den Jahren nach 1970 kam es durch Kultivierungsarbeiten im Urstromtal zur Absenkung des Grundwassers, mit dem Ergebnis, dass schon bei der ersten Grabung im Jahre 1987 die Bauhölzer im geschädigten Zustand angetroffen wurden, weshalb jetzt innerhalb weniger Jahrzehnte die Zustörung der noch erhaltenen hölzernen Strukturen im Untergrund der Stadt Baruth abzusehen ist.

Die Zukunft der Feuchtboden-Altertümerplätze

Nach allem was wir heute an Altertümerstätten in Feuchböden kennen und nach der bisherigen Art und Weise der Gewinnung von Kenntnissen über solche Stätten muss es noch immer eine ausserordentlich große Anzahl archäologisch-historischer Stätten im Feuchtboden geben, die bisher unbekannt und somit gefährdet sind. Umso größer und noch besser erhalten muss aber die Zahl solcher Altertümerstätten vor den großen Kultivierungen des 17.-19. Jahrhunderts in ausgedehnten Niederungsgebieten Mecklenburg-Vorpommerns und Brandenburgs gewesen sein. Gerade die Flachlandgebiete Norddeutschlands müssen ehemals unerhört reiche Schatzkammern an Altertümerstätten mit Erhaltung von Baustrukturen und Gegenständen aus organischen Stoffen, insbesondere aus Holz, natürlich auch mit mineralischen Befunden und Funden, gewesen sein.

Der Schutz und die Erhaltung des noch erhaltenen Feuchtboden-Kulturguts sollte wegen des ausserordentlich hohen Quellen- und Denkmalwerts besonderen Rang haben. Die erste Frage wäre, wie man unmittelbar bedrohtes Feuchtboden-Kulturgut schützen könnte, nämlich jenes archäologische Kulturgut in Niederungsgebieten, die erst in den 70er und 80er Jahren des 20. Jahrhunderts erstmalig oder erneut kultiviert worden sind und wo die Grundwasserstände dabei abgesenkt worden sind. Hier wäre es am besten, die vorherigen Grundwasserstände wiederherzustellen. So unwahrscheinlich das zu sein scheint, die Chancen dafür und damit auch für die gefährdeten Altertümer sind teilweise garnicht so schlecht. Nach der Wiederherstellung der Einheit Deutschlands mit ihren wirtschaftlichen und sozialen Folgen sind insbesondere in der Landwirtschaft und Landnutzung die planwirtschaftlich übergreifenden Interessen der Grünland- und Wasserbewirtschaftung in den großen Niederungen durcheinandergeraten, mit dem Ergebnis, dass in einer Anzahl von Gebieten vormaligen Verhältnisse wiedereingetreten sind. Das nützt den Altertümern unter Flur, und man kann nur hoffen, recht lange.

Die Möglichkeiten des Denkmalschutzes für die noch vorhandenen bekannten und vor allem bisher unbekannten Altertümer in Feuchtböden heute und in Zukunft sind zunächst nach den Denkmalschutzgesetzen in Mecklenburg-Vorpommern, in Brandenburg und in Berlin einzuschätzen. Nach den Gesetzen ist alles klar: existente und durch irgendeine schädigende/zerstörende Maßnahme betroffene Bodendenkmale sind geschützt und müssen, wenn die Massnahme erlaubt wird, vor ihrer Schädigung/Zerstörung dokumentiert, also untersucht/ausgegraben werden, und zwar auf Kosten des Veranlassers der schädigenden/zerstörenden Massnahme. Es gilt also nach den Denkmalschutzgesetzen: mindestens Erhaltung in dokumentierter Form. Wenn aber zufällig oder durch gezielte Prospektionen Feuchtbodenfundstätten entdeckt werden, ohne direkt von einem Vorhaben betroffen zu sein und der Dokumentationspflicht des Investors zu unterliegen, bleibt nur die Verantwortung der zuständigen Denkmalbehörde.

Gegenwärtig und künftig erstrecken sich die Schutzmassnahmen, das heisst die Rettungsuntersuchungen für Altertümerstätten in den Feuchtböden, nur auf einen Bruchteil der betroffenen Feuchtbodenplätze. Diese Situation bestand schon früher und ändert sich auch nicht in einer Zeit, in der der Gesellschaft/den Ländern/dem Staat in Deutschland unvergleichlich größere finanzielle Mittel und

Abb.7.4: Neubrandenburg, Fischer-Insel im Tollense-See (Mecklenburg-Vorpommern). Slawische doppelköpfige Kultfigur des 11./12. Jahrhunderts; Höhe des Fragments 0.68m.

zahlreichere Fachleute zur Verfügung stehen als je zuvor.

Schließlich sei noch auf die Fragen eingegangen, deren Beantwortung durch die Herausgeber dieses Buches allen Autoren vorgegeben wurde, soweit nicht schon darauf eingegangen wurde.

1. Gegenwärtige Praxis des Erbe-Managements für Feuchtboden-Regionen in Nordostdeutschland. - Das Management, hier wohl richtig im Sinne von Behandlung bzw. Bewirtschaftung, des archäologischen Erbes in Feuchtböden ist nach den Denkmalschutzgesetzen der Länder Mecklenburg-Vorpommern, Brandenburg und Berlin (siehe Bibliographie) in die allgemeinen Vorschriften zur Behandlung der archäologischen Denkmale eingeschlossen; es gibt keine besonderen Vorschriften für Feuchtboden-Denkmäler. Generell ist es den Landesdenkmalämtern aus personellen und finanziellen Gründen aber nicht möglich, für die Ermittlung und Erhaltung des Erbes in Feuchtböden zu sorgen, solange es noch nicht durch eine Investitions- oder andere Wirtschaftsmassnahme gefährdet ist. Wie immer, bestätigen Ausnahmen die Regel: In wenigen Fällen wird präventiv nach Altertümern in Mooren gesucht, zum Beispiel wenn dort bereits bedeutende Objekte bekannt waren bzw. gefunden worden sind, um vorbeugenden Schutz sichern zu können, auch im Hinblick auf eventuelle künftige Investitionsmaßnahmen. Die Erforschung der ermittelten Objekte ist aber nur punktuell, ausnahmsweise möglich, wieder aus finanziellen Gründen.

   Maßnahmen zugunsten des Feuchtboden-Erbes werden erst ergriffen, wenn es durch Bau- und andere Vorhaben gefährdet wird, so wie bei archäologischen Denkmalen generell. Vor allem handelte es sich um Autobahn-, Strassen- und Leitungsbauten, durch die Feuchtboden-Altertümer betroffen waren. Schutz durch Nichterteilung der erforderlichen Erlaubnis für die geplante Baumaßnahme war nach meiner Kenntnis im Falle von Feuchtbodenvorhaben bisher überhaupt nicht möglich. Erreicht wurde aber stets die Untersuchung durch fachgerechte Ausgrabung und die Dokumentation, die von dem jeweiligen Träger des Bauvorhabens gewährleistet und auch bezahlt werden musste. Allerdings wurde in der Regel nur jeweils die unmittelbar von den Baumaßnahmen betroffene Fläche untersucht; die Auswirkungen auf die ausserhalb der Baufläche befindlichen Teilbereiche eines archäologischen Objekts konnten nur selten überprüft werden. Vor allem längerdauernde Grundwasserabsenkungen bei Baumaßnahmen und für vorbereitende Ausgrabungen haben ja bezüglich archäologischer Substanz schädliche Auswirkungen im unmittelbaren Umkreis.

2. Spezifische Probleme des Erbe-Managements in Verbindung mit den Feuchtboden-Ressourcen sowie Möglichkeiten zur Lösung. - Das Hauptproblem besteht für das archäologische Erbe im Feuchtland darin, dass es - eine Tautologie - vom Umgebungswasser im Boden abhängig ist. Der Wasserstand in Offengewässern und der Grundwasserstand unterliegen jedoch nur teilweise der Einflussnahme des Menschen; an erster Stelle wirkt der natürlich Wasserhaushalt, der vom Menschen nicht zu beeinflussen ist. Wie oben aber bereits ausgeführt, könnte die Erhaltung der derzeitigen Wasserstände und erst recht die Wiederherstellung der Wasserstände vor den grossen Kultivierungsmassnahmen der 70er und 80er Jahre nicht unwesentlich zur Erhaltung des archäologischen Erbes unter status-quo Bedingungen beitragen.

   Besondere Probleme bestehen im nordostdeutschen Raum - wie auch in anderen Teilen Norddeutschlands - durch die großen Flächen, in denen bei relativer Unzugänglichkeit wegen Wasser bzw. Grundwasser Altertümer in unbekannter Zahl im Feuchtland verborgen sein können. Der Schutz unbekannter Altertümer in Feuchtbodengebieten ist unter solcher Voraussetzung nur zu gewährleisten, wenn vor jeder Bau- und Kultivierungsmaßnahme in Verantwortung und auf Kosten des Investors Prospektionen reklamiert und durchgesetzt werden.

   Als größtes Problem bleibt, dass durch neue Kultivierungsmaßnahmen mit nachfolgender Grundwasserabsenkung bekannte und unbekannte archäologische Stätten und Funde gefährdet und von langsamer Zerstörung bedroht werden. Für solchen Fall gibt es bisher kein Beispiel, wie entsprechend den gesetzlichen Vorschriften die betroffenen Bodendenkmale geschützt bzw. dokumentiert werden können. Es findet ja kein Eingriff in den Boden und damit direkt in die Substanz von archäologischen Stätten statt, und trotzdem wird durch Luftzutritt organische Bodendenkmalsubstanz in den betroffenen Objekten abgebaut und damit zerstört. Es bliebe nur, ein Vorhaben mit der Folge der Absenkung des Grundwasserspiegels durch Versagen der denkmalrechtlichen Zustimmung abzulehnen. Ein solcher Fall wäre gegebenenfalls durch eine gerichtliche Entscheidung zu untersetzen.

   Abschliessend sei darauf hingewiesen, dass archäologische Stätten im Feuchtmilieu besonders schwer zu schützende Objekte sind. Auch die gegebenenfalls erforderliche Ausgrabung und Dokumentation ist sehr aufwendig und kostspielig. Am besten wäre, dass Eingriffe in das Feuchtmilieu unterbleiben. Schon die natürlich bedingten Milieuveränderungen sind für das betroffene archäologische Erbe folgenschwer genug, so dass künstliche Eingriffe die Probleme weiter vergrößern.

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Pl.1.1: A deep peat section, revealed through hand peat-cutting on the edge of a raised bog in central Ireland. The peat holds evidence for the development of the bog and the surrounding region.

Pl.1.2: Reconstructions of hair-styles based on the evidence from north-west European bog bodies, displayed in Silkeborg Museum, Denmark.

Pl.1.3: The Pfahlbauland island, a reconstructed Early Bronze Age village with approaching log boat, Zürich, Switzerland.

Pl.4.1: Goldcliff: excavation by Martin Bell and team of a late prehistoric structure revealed by storm erosion in the inter-tidal zone.

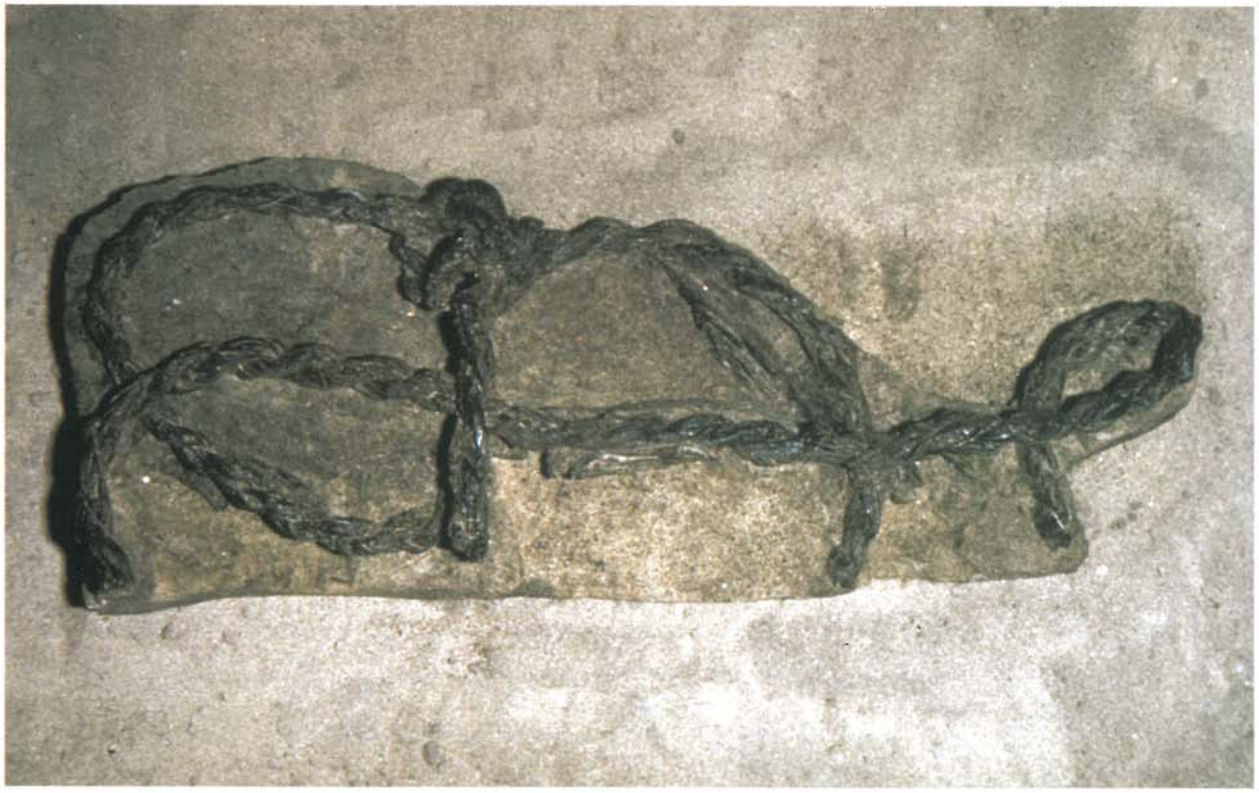
Pl.4.2: The Sweet Track, built in 3806 BC and here revealed by excavation in AD 1982. In the background on the right, peat-extraction is evident, and the trees beyond mark the southern boundary of the NNR where the Sweet Track is protected.

Pl.4.3: The Corlea 1 trackway, built in 148 BC and here revealed by excavation in AD 1986. The 2m scale shows the massive size of the oak timbers used to build this corduroy road.

Pl.5.1: Aerial photograph of De Gouw (Neolithic site Aartswoud) with channels and levees. Occupation levels near the surface are disturbed when ploughing takes place.

Pl.6.1: Covering the Viking Age bridge in the river valley of Ravning with additional soil. Through this operation and the prevention of drainage and ploughing, in situ preservation of this once very impressive and prestigious construction has been established (Photo Søren Andersen, National Museum of Denmark).

Pl.7.1: Friesack (Brandenburg). Ausgrabungsarbeit 1983 in den mesolithischen Schichten bei abgesenktem Grundwasser.



Pl.7.2: Friesack (Brandenburg). Fragment eines frühmesolithischen Seil aus Weidenbast; grösster Durchmesser ca. 475mm.

Pl.8.1: Reconstruction of the fortified settlement at Biskupin, with original vertical timbers visible in the water on the right (photo Studio AR).

Pl.11.1: Fiavé: view of the prehistoric settlement showing foundation grid and encircling posts; this phase dates from the end of the Middle Bronze Age, Fiavé 6 (Perini 1984).

Pl.11.2: A saw, 27.6cm long, with flint blades set in wood using gum, from the Middle Bronze Age deposits of the settlement at Fiavé, Fiavé 5 (Perini 1987).

Pl.11.3: A hat, 21.5cm in diameter, woven using branches from a number of different plants and shrubs, from waterlogged deposits at Fiavé, dating from the end of the Early Bronze Age, Fiavé 3 (Perini 1987).

8: Poland

Wojciech Brzeziński

Abstract: *Wetland archaeology in Poland has been an active discipline since the 1930s and the celebrated excavations at Biskupin. This paper illustrates the changing attitudes and functions of wetland heritage management in Poland and the effect on wetland archaeology of Poland's change from a state-run to a free market economy. Polish environmental and archaeological protective legislation and the system and strategies for the heritage management of wetland archaeological sites are highlighted with examples of the current methods of wetland protection. The paper also considers the social context of heritage management in Poland as well as describing a number of important Polish sites.*

Introduction

Archaeological efforts in Poland began to be better reflected in print from the 1960s until the late 1980s with the launch of the yearly bulletin *Informator Archeologiczny*. According to this source between 1967 and 1989 some 300 sites were excavated in Poland every year. Among them only several dozens were wetland in character; fig.8.1 shows the location of some of these. This is only an approximation, since quite often it is difficult to conclude on the basis of short entries whether a site was dryland or wetland. The names of many archaeological papers and other publications, especially all manner of preliminary reports and bulletins, do not include a reference to wetland archaeology, as understood in WARP publications. Moreover, an overwhelming majority of data obtained through these excavations has yet to be published (Brzeziński 1992). A recent estimate suggests that less than 20% of the excavations carried out in recent years have been fully published (Barford & Tabaczyński 1996, p.163). Therefore any general conclusions based on published materials must have a provisional character. An even worse situation is with materials excavated in the 1950s and 1960s, kept in the storerooms of many Polish museums.

In the years 1989 – 1990 great political changes took place in Poland. The totalitarian political system and state-run economy were abandoned in favour of multiparty-democracy and a free market economy. The country entered a new era of 'living in the fast lane'. Shortages of public money and the diminishing role of central government radically changed the position of archaeology. The possibilities of archaeological research depend now, in many cases, on funding provided by developers. Archaeologists are now forced to link their scientific interests with the need for rescue excavations on a scale never seen before, which affects the archaeology of wetlands. In the last few years the most important excavations of this type were the results of large research

Fig. 8.1: Map showing locations of the sites mentioned in the paper (after L. Kobylińska)

projects financed from various sources, including public money distributed by non-government bodies, or huge rescue excavations connected with the building of pipelines and highways. A good example of the former were the excavations, which took place at Swięty Gaj in Northern Poland (fig.8.2), as part of the huge project *Adalbertus*, devoted to the millennium of the martyrdom of Saint Wojciech (Adalbertus). Two long wooden trackways, 1230m and 640m long, going through marshy land were excavated during this project. They have been dated to the period between the first century AD and the third century AD (Sadowska-Topór 1988, p.81). The most difficult issue, which emerged after excavation, was the conservation of the huge amount of wooden construction material, only a small fragment of which can be properly conserved in the laboratories of the Central Maritime Museum in Tczew. It is noteworthy that these relics were on show with great success at the exhibition 'The Prussians — history and culture of the Baltic people'.

A very important discovery was made at Karczyn in the region of Kuiavia during an excavation conducted during the building of a transit pipeline. There was an open settlement dated to between the second and third century AD where very clear traces of the manufacture of textiles were discovered. A feature comprising equipment used in the initial stages of the preparation of linen and hemp was found situated within a shallow body of water. A series of large wooden vats had been dug into the ground, well below the water table with bundles of linen or hemp stacked inside them in layers. They were left there to soak for some time to separate the fibres from their tough stems. Thanks to the wet conditions archaeologists were able to record this initial phase of linen textile production (Bednarczyk 1998, pp.74–75).

Early medieval wetland sites are well represented by Janów Pomorski, which is identified with Truso, a well-known rich trade emporium on the south Baltic coast (fig.8.1). The settlement had been established on the eastern bank of the Vistula delta, or more accurately on the northern shore of the former Żuławska Bay, which survives to this day as Lake Drużno, largely transformed by man. The settlement covered low-lying partly depressed areas of flat fenland bordering Lake Drużno, as well as a large part of the so-called transitional zone sandwiched between the Żuławy Fens and the margin of the Elbląg Heights. Although only a small fragment of the settlement (1100m²) has been investigated so far, detailed surface survey, sundry trenches and geological drilling have shown that the settlement occupied an area

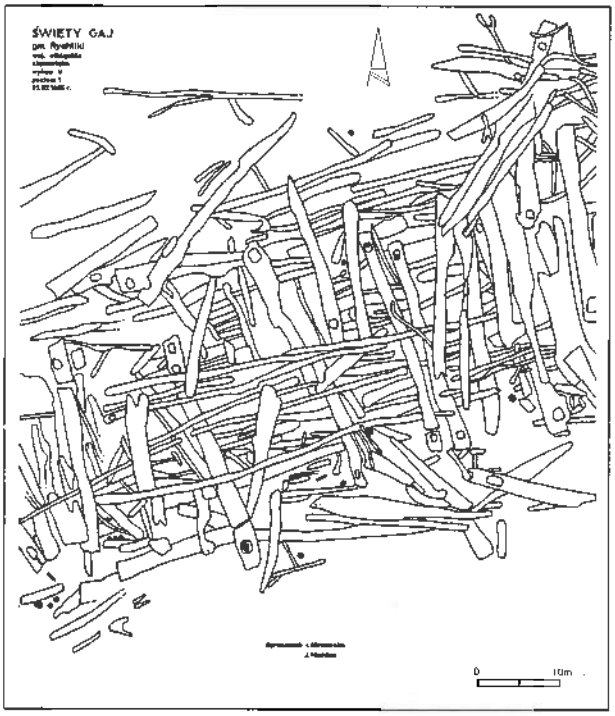


Fig.8.2: Fragment of the wooden trackway made after stereophotogrammetric image at Swięty Gaj (after Miałdun, 1998, fig.3)

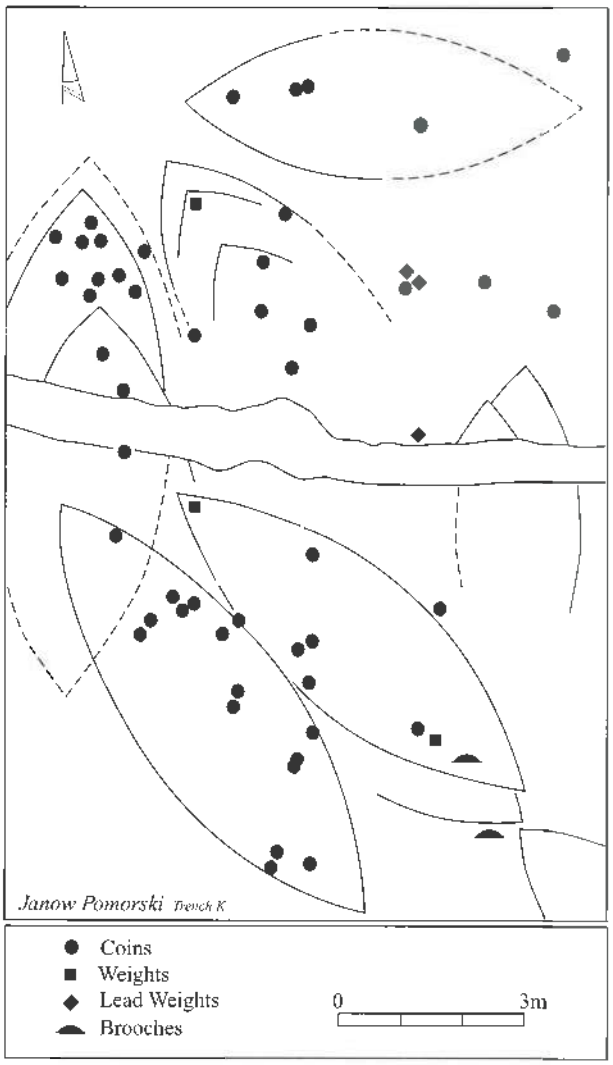


Fig.8.3: Janów Pomorski. Outline of boats and distribution of finds (after Jagodziński & Kasprzycka, 1991, fig.15)

of *c.*10 hectares. Trenches dug in the lowland zone of the settlement covering polders I and II produced the remains of a regular build-up and a fragment of an early medieval shoreline with relics of boats (fig.8.3) well preserved thanks to waterlogged layers (Jagodziński & Kasprzycka 1991).

As is suggested elsewhere the conservation of wooden structures on wetland sites in Poland is a continuing problem, including Biskupin where many attempts have been taking place for almost half a century. During excavations in the early 1930s, some of the waterlogged structures were covered with rush mats and moss in the winters. Various methods were applied after World War Two including permeating with salt, soaking in paraffin, and spraying with phenolon resins. These methods acted only superficially, slowing down the process of decay. The results of these efforts can be observed *in situ* at Biskupin just beside the reconstruction of the gate (pl.8.1). The best method of protecting original waterlogged wood is to keep it untouched under a protective layer of earth

and water (Piotrowski 1998). To conserve the whole of Biskupin's wood, original and reconstructed, a special Wood Conservation Laboratory has been created at the Biskupin Museum.

The key to the protection of waterlogged wood at Biskupin lies in the proper state of the neighbouring environment. The water table in the lake surrounding the site is kept high by an artificial barrier on the Gasąwka Rivulet which flows out of the lake, creating favourable conditions for the survival of the waterlogged structures of the settlement. A further important aspect of this project is the constant monitoring for water pollution in the lake (Piotrowski & Zajączkowski 1993).

Another problem is the conservation of large wooden waterlogged objects, wells, dugouts and coffins etc, which is a very complicated, time and money-consuming process, which can only be carried out at two laboratories in Poland. It is obvious that it can be applied only to selected objects, which can be used later as exhibits (Babiński 1999).

Threats to the archaeological heritage of wetlands

The archaeological heritage management of wetlands is, in my opinion, a function of the management of archaeological heritage as a whole. Without presenting the latter, a discussion of the archaeological management of wetlands has no proper context. According to Cleere (1989) the basis for all archaeological heritage management is the identification and recording of that heritage. Excavation must obviously continue to be a major source of archaeological data, but its role in heritage management is a somewhat ambivalent one. The second determining factor in relation to heritage management that does seem to have universal applicability is the need to be closely integrated with land-use planning. Another common factor is making the heritage accessible, both physically and intellectually.

It is evident that archaeological heritage everywhere, including Central-Eastern Europe, is threatened by destruction. This fact was emphasised strongly in the Convention signed in Malta by members of the Council of Europe in 1992. It is stated in the preamble that:

> the European archaeological heritage, which provides evidence of ancient history, is seriously threatened with deterioration because of the increasing numbers of major planning schemes, natural risks, clandestine or unscientific excavations and insufficient public awareness.

It seems that archaeologists in Europe do not fully realise these dangers and are not ready to appreciate the fact that the last decades have been a period of the greatest and most tragic destruction of archaeological monuments. There is a lack of consensus on methods of dealing with threats to the archaeological heritage in connection with the new socio-economic conditions that emerged at the end of the last century (Barford & Kobyliński 1998, p.461).

There are several factors threatening archaeological heritage, including of course, archaeological heritage of wetlands, in Poland. These can be divided (after Barford & Kobyliński 1998) into two groups:

A) Threats arising from natural causes: erosion of river banks, deflation of sand dunes, surface erosion and hill wash, intensive animal burrowing, floods etc.
B) Threats caused by human activities: this list is rather long and includes factors mainly of industrial and development dangers (Barford & Kobyliński 1998, pp.462–464). Some of them are especially disastrous to wetland archaeological heritage and can damage or destroy a site in the space a few hours or days:

1. Draining of wetlands and the regulation of rivers require the digging of ditches and construction of earthworks, leading to drying out of waterlogged soils and the destruction of any preserved organic remains they may contain. Water table changes may lead to the collapse of standing monuments, for example by the rotting of oak piles formerly in anaerobic conditions.
2. The construction of dams leads to flooding of areas of ancient settlement.
3. On a larger scale the exploitation of raw materials by open-cast mining lowers the water table in wetlands and can have serious effects on archaeological sites in the vicinity.
4. Uncontrolled and clandestine cutting of peat for gardening, very often without the knowledge of the landowner, can destroy both archaeological and palaeoenvironmental evidence.
5. Pollution of waters, which diminishes protection given to waterlogged wooden features etc.
6. Tourism, leading to the penetration of wetland areas, can to some extent lead to a threat to the sites (camping, digging holes etc.)

Legal base for protection of the archaeological heritage

The most important document for the protection of archaeological heritage in Poland is still the Act on the Protection of Cultural Property of 1962. The Act functioned quite well in previous years but its text is in many ways flawed, especially for what is the main means of protecting the archaeological heritage. Moreover, it does not provide concrete measures for protecting archaeological heritage. According to this law, archaeological artefacts are the property of the State and are stored on behalf of the State in museums, which in the 1960s were of course run by the government. While it

is clear that artefacts belong to the State, this does not apply to the question of who owns archaeological sites on private land. One may infer from the Act that the State is also the owner of archaeological evidence found in the ground, but to what extent? The issue is complicated by the lack of a clear definition in Polish archaeological literature of terms such as site and evidence. These are recognised by the Act as an integral part of cultural property. There is also a range of relatively severe penalties against those who commit crimes against cultural property, but for various reasons there are very few prosecutions. It should be pointed out that despite its imperfections, the Act gives the Monuments Inspectors more rights than, for example, the existing English laws (Barford & Kobyliński 1998, pp.468–469).

The most serious flaw in the legal system in Poland from the point of view of archaeological heritage protection is the lack of an executive act. One that has been in the making for the last four decades, is the decree of the Minister of Culture and Art concerning the procedure and manner of financing excavations in areas of development, which would explicitly formulate the principle that the *developer pays*. Successive drafts were each blocked either by the industrial lobby or by the Ministry of Finances. This is despite the ratification by Poland of the European Convention on the Protection of Archaeological Heritage, which requires signatory-states to guarantee funding of excavations in areas of development from state or private sources. Nevertheless, in practice some of the more determined Monuments Inspectors have been able to enforce the *developer pays* principle invoking regulations of the 1962 Act on the Protection of Cultural Property (Kobyliński 1998, p.262).

The system of archaeological heritage protection and management

In the post-war period, the system of monument protection in Poland, including the protection of the archaeological heritage, was subject to a radical transformation. It achieved its final uniform structure in 1990, in the form of the State Service for the Protection of Ancient Monuments headed by the Conservator-General. Within this framework inspection of archaeological monuments became obligatory in every voivodship (province). It was effected by archaeological Monument Inspectors who in most cases have the competence to issue independent administrative decisions. Unfortunately, this state of affairs did not last, and as early as 1995 a gradual dismantling of this uniform system began. The main cause was the growing conviction of the need for decentralising the state administration. In 1996 voivodship branches of the State Service for the Protection of Ancient Monuments and voivodship Monuments Inspectors, became subordinated to voivodship authorities (Kobyliński 1998, p.264). This meant that heritage management and protection, including protection of the wetland heritage, was liable to vary from one part of Poland to another.

The next change in the system of monuments protection, including archaeological monuments, came with the implementation of the administrative reform of the state (1st January 1999), which entailed far-reaching decentralisation and a severe reduction in the number of voivodships, from 49 to 16. At present the heads of voivodships as representatives of state administration still retain the right to appoint Monuments Inspectors, but only on a suggestion put forward by the Conservator-General or by his consent. The Conservator-General is a co-ordinating, supervisory and consultative body, as well as having the power of appeal from decisions taken by the voivodship Monument Inspectors. The Conservator-General also allocates central funding designated for monuments protection, initiates conservation projects on a national scale and formulates the principles of conservation policy. These functions are particularly important in a decentralised system of heritage protection and where most administrative power has been handed over to local authorities at different levels of the voivodship, district and commune.

Forms of protection

The main form of protection of monuments in Poland is by listing in the Register of Protected Sites. In the case of archaeological sites this is a complicated and time-consuming process. From the legal standpoint it calls for defining very accurately the extent of the archaeological site and convincingly motivating its need of protection. This makes it very difficult to schedule any of the archaeological sites identified for instance only on the basis of occurrence of finds in the topsoil. In addition, landowners have the right to appeal to the courts against the decision to schedule the site on their property, because having a listed monument on one's land curtails ownership rights. Wetland archaeological sites, which are often invisible or nearly so, are particularly difficult to identify and define for protection by listing in the Register.

In Poland the Register is administered at provincial level, with a central record in Warsaw, in the Centre for Documentation of Monuments. It includes only 7,000 archaeological sites out of *c.*350,000 known from systematic field walking surveys conducted in Poland for more than 20 years. The distribution of these 7,000 on Poland's territory is far from uniform and it tends to reflect more on the degree of activity of individual Monuments Inspectors rather than their actual density of distribution (Kobyliński 1998, p.266). There is an urgent need today to increase the number of protected sites by entering them in the Register. At the same time it would be impracticable to schedule all known archaeological sites. Many of them would not survive anyhow given that their destruction is permitted after their, hopefully, thorough and expert investigation. It is necessary therefore to schedule only the sites, which in view of their form, represent an element of the cultural landscape, as well as those in the case of wet sites (eg Biskupin, Janów Pomorski etc.) which are of national importance.

Another way in which archaeological heritage is protected in Poland is by accounting for archaeological sites in local planning by listing them as conservation zones. These plans are local laws in areas of a given local council and provided that the Monuments Inspector responsible has taken care to include archaeological sites in the planning, they represent an effective form of protection. A serious flaw in this system is that many of these local plans were established in a period when awareness of archaeological sites was low.

The location of sites in an evolving landscape is a major problem in the designing of programmes of conservation and protection. It calls for the creation of a sites and monuments record containing all known information about the position and nature of archaeological monuments in each region. Again, wetland sites will potentially be at a disadvantage here, due to their relative invisibility, especially to the untrained eye.

Social context of archaeological heritage management

Protection of archaeological heritage is difficult and even unfeasible without the support and awareness of the public, both on a local and national level. One of the aims of the conservation services at present must be to find quick and effective ways to raise public awareness of the need to protect archaeological heritage, on a par with the level achieved with regard to nature conservation values.

Public protection of heritage, stimulated already in relation to buildings of architectural importance, may be the key for the conservation of archaeological heritage, including wetland sites. In Poland only one archaeological wetland site is well known, Biskupin, where popularisation and propaganda has played an important role in its story. This popularity, resulting mainly from the idea that the settlement was part of Slav civilisation, is exploited to provide the public with information about prehistory in general (Piotrowski 1988, pp.99–100). The site receives much public attention, partly thanks to the archaeological festivals, which have been organised there every year since 1995. The Archaeological Museum at Biskupin has become a very important interpretation centre and the most visited archaeological museum in the country. The rich educational programme has made a great contribution to improving social knowledge regarding the protection of the wetland archaeological heritage. We hope that among the many thousands of young visitors are the future public custodians of wetlands and their heritage. They may be able to better preserve these elements of the cultural landscape than the archaeological Monument Inspector residing in the far off voivodship capital. Societies and regional history foundations and people involved in environmental protection are buying up archaeological sites from private hands, often at a small cost. This may ensure their continued protection better than an archaeologist who having carried out his excavation, returns to the seclusion of his office no longer interested in what will happen to the monument in question (Kobyliński 1998).

One of the main worries of the conservation service is the nature of the interest in prehistory and history that has been stirred up by popular publications and television presentations, which depict archaeologists as hunters of hidden treasure. Erazm Majewski, one of the founding fathers of Polish archaeology, cautioned nearly a century ago 'Thou shall not recover prehistoric finds for the beautification of your chambers'. The Indiana Jones syndrome, reinforced by irresponsible articles in the press and television programmes, has given rise in recent years to a mass and unrestrained movement of people who use metal detectors to identify and dig up archaeological sites (Brzeziński & Kobyliński 1999). To date, this problem has not seriously affected wetland archaeological sites, but one should not be complacent about future developments.

The stimulation of public awareness of the need for protecting archaeological heritage would be greatly assisted by a more widespread involvement of archaeologists themselves in organising educational and promotional action, as at Biskupin. If we wish to obtain wide scale public support for restricting ownership rights, needed for the protection of archaeological sites, we have to present to the public, in a skilled and attractive manner, the value of archaeological monuments, not only for research but also for tourism (Kobyliński 1998, pp.273–274). In many European countries action is at present in progress, designed to provide public access to archaeological sites, which should improve public perceptions of the values contained in them, without creating at the same time a threat to the substance of the monuments. In Poland intensive action is needed in this direction, and it is the wetland site of Biskupin which has demonstrated how successful such action can be.

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9: Finland

Jussi-Pekka Taavitsainen

Abstract: *This paper presents a short history of wetland archaeological studies in Finland, which has concentrated mainly on stray finds revealed by ditching and the cultivation of peatlands and marsh meadows. The largest group of finds represents fishing tackle and means of water and winter transport including dugouts, boats, skis, and sledges. Larger finds of bog cemeteries or offering sites, roadways and trackways, medieval defensive structures and ritual offerings have also been uncovered. The number of scientific wetland archaeological excavations undertaken in Finland has been limited and there has not been any official wetland heritage management policy in Finland. This paper recognises the need for areas surrounding previously identified find spots to be surveyed, perhaps leading to a new and richer picture of what wetlands have to offer archaeology in Finland. The list of references aims to provide a nearly complete bibliography of known Finnish wetland archaeology. However, articles dealing with dating evidence based on pollen analysis have been left out as many of these are out of date.*

Introduction

Finland is a country rich in peatland deposits with one third of its area, around 10.4 million hectares, identified as biological peatland, whose surface is covered with vegetation communities producing peat. The number of actual quaternary geological peat deposits, where the minimum thickness of peat is at least 1m, represents half of the biological peatlands, approximately 15.5% of the country's total area (Taipale & Saarnisto 1991, p.314). Finland is also a country with numerous lakes, with 10% of its total area covered by them. The latest total figure for the number of lakes, presented in 1987 was 187,888, assuming that lakes are bodies of water with a minimum area of 500m^2. At the same time, the numbers of rivers in Finland were also calculated totalling some 647 (Suomen Kuvalehti 24B/1987). In view of these considerations, Finland should be expected to provide a great deal of wetland archaeological material. The drainage and cultivation of peatlands, the lowering of the water tables of lakes to obtain more land for cultivation and peat harvesting have produced a considerable number of organic wetland finds for Finnish museum collections from lake sediments and inland peat.

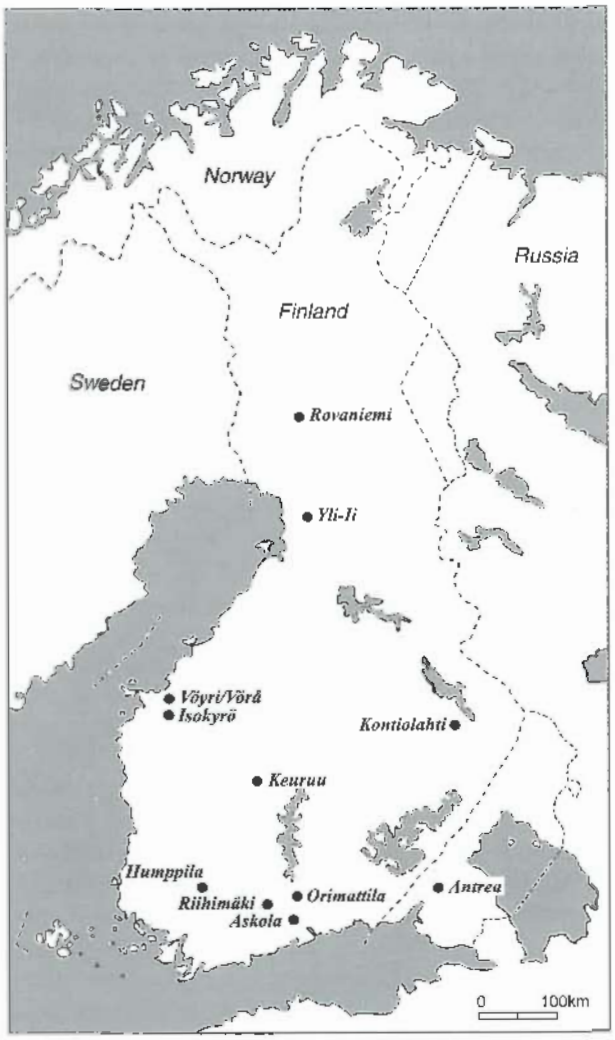

Fig.9.1: Sites mentioned in the text, with Finland's present borders and areas ceded to the Soviet Union after World War II.

A short history of research

The study of archaeology in Finland evolved from the foundations of national-romantic antiquarianism, leading to the founding of the so-called *national sciences* (Fi. *kansalliset tieteet*) and as a part of an overall process of a national revival. The national sciences consisted of Finno-Ugrian philology, folk poetry studies, ethnography, history and archaeology. These disciplines found common ground in an implicit paradigm, which saw the culture of present-day Finns and that of their linguistic relatives in the broad perspective of an assumed Finno-Ugrian past (Kokkonen

1985, p.4). The actual founder of Finno-Ugrian ethnology, U. T. Sirelius (1872–1929), also saw the aim of ethnology to throw light on the cultural development of those peoples who spoke the Finnic languages by a study of their *original home*. Sirelius was also an evolutionist, a branch study which is identical to that of Finno-Ugrian archaeology, centred on the study of material culture and its origins (Vuorela 1977, p.71).

Wetland finds have always aroused interest in museum people in Finland; fig.9.1 shows the location of some of the finds mentioned in this paper. Among the oldest finds kept in the collections of the National Museum of Finland are two dugouts found near Sotkuma, a village in the parish of Kontiojärvi in eastern Finland, on the alluvial sediments of Lake Höytiäinen after the lowering of the lake's water table in 1859 (Itkonen 1941, p.16). The oldest sledge runners were found in 1879 and six ski finds had been made by 1911 (Appelgren-Kivalo 1911).

The wetland find that has so far attracted most attention is the net found at Antrea, which at the time of discovery was the world's oldest net ever identified, which was found with a set of bone, antler and stone artefacts which were skilfully excavated and later published by Sakari Pälsi (Pälsi 1920; Kujala 1948; see also: Luho 1967, pp.24–33; Taavitsainen 1995). Probably due to this discovery and other organic stray finds coming steadily, but not in any large quantity, into museum collections wetland finds have frequently been mentioned in most Finnish archaeological field guides (Pälsi 1939, p.33–38; Siiriäinen 1973).

The publishing of a field guide on bog finds and their proper treatment written by an ethnologist and a geologist verifies the considerable interest in the subject. The National Board of Antiquities of Finland published the booklet, which may be among the oldest guidebooks on the subject, in 1947 (Nikkilä & Virkkala 1947, 2nd printing in 1952). Even the problems associated with the conservation of wetland finds were studied (Kenttämaa 1949). The interest of the majority of active wetland scholars at the time of the booklet was concentrated mainly in means of winter and water transport and scholars like U. T. Sirelius, Ilmari Manninen, T. I. Itkonen, Niilo Valonen, Auvo Hirsjärvi, Eino Nikkilä and Eero Naskali were ethnologists, not primarily archaeologists.

Due to the division of labour among the national sciences the study of the origin and development of means of transport fell to the ethnologists who co-operated with geologists in the dating of finds based on pollen analysis. However, it is probable that heavy artefacts have, over time, sunk into sediments or have been deliberately stored for re-use in alluvial soils or stuck into the sediments. In most cases when peat and pollen stratigraphically-dated skis or sledges have been scientifically dated, the ^{14}C dates have been considerably younger. The old method, in my opinion, now has to be discarded as unreliable or at least should be re-examined (see: Taavitsainen 1999, p.313, note 1 and the references therein). Ethnologists were also well acquainted with ethnographical material, which was used as comparative material in reconstructions. Ethnologists following their own agenda concentrated on artefacts and their history and origin. More systematic archaeological investigations with a few exceptions like archaeologists Ville Luho, Aarne Kopisto, Unto Salo, do not occur until a later date. Consequently most of the finds were catalogued in the ethnological not in the archaeological collections of the National Museum.

The stray finds

Many Finnish wetland archaeological finds are well known internationally, for example J. G. D. Clark was well acquainted with the material and used it in his influential book *Prehistoric Europe: The Economic Basis*, particularly the chapter on travel and transport (Clark 1952). A closer look at the material shows us that there are some larger groups of objects amongst the recorded finds, of which dugouts and boats form the largest group. By 1940 Itkonen (1941) had listed 600 ancient dugouts and related boats from Finnish wetland contexts. They are so common in fact that their discovery seldom causes any reaction from museum officials. Although the boat type is regarded as the simplest and the oldest form, the earliest ^{14}C dated finds are from the Middle Ages (on the research of dugouts see: Manninen 1927; Itkonen 1930b; 1934; 1941; Sauramo 1939; Luho *et al.* 1956; Salo & Valovirta 1964; Asplund 1993; Glückert 1997; Alopaeus 1999). Boats and especially typologically interesting sewn boats from the Late Iron Age and historical periods have attracted considerable interest (see: Sirelius 1913; Hirsjärvi 1937; Nikkilä 1947; Sarasmo 1965; Paulaharju 1966; Naskali 1980; Naskali 1986; 1989; Forssell 1981; 1982; 1983; 1984a; 1984b; 1985a; 1985b; 1986; 1995; Westerdahl 1987; Hiekkanen *et al.* 1988; Vilkuna 1998; 1993; Taavitsainen 1999). Paddles, the oldest of which date to the Stone Age, and oars also belong to this group of water transport equipment (see: Edgren 1981a; Vilkuna 1986b; 1987).

Objects associated with winter transport form another considerable group of finds (fig.9.2). The number of skis dating from the Stone Age to the Modern Age in different museum collections in Finland is approximately 200 (for research on skis see: Appelgren-Kivalo 1911; Sirelius 1928a; Itkonen 1928; 1930a; 1931a; 1931b; 1932; 1935; 1936; 1937; 1938; 1942a; 1947; 1949; Okkola 1926; 1928; 1937; 1945; Backman 1935; Hirviluoto 1957; Hirsjärvi 1961; Nikkilä 1966; Valonen 1970; 1972; 1980; 1982; 1984; Manker 1971; Vilkuna 1983; 1984; 1986a; 1990; 1993; 1995; 1997; Naskali 1998; 1995; 1999; Luoto 1991; Harjula 1996). Over 100 parts of sledges and toboggan of ahkio type are presently known (fig.9.3) (for research on sledge runners see: Sirelius 1918; 1928b; Itkonen 1931b; 1932; 1935; 1937; 1938; 1942b; 1945; 1947; 1949; L. I. Itkonen 1942b; Killinen 1934; Luho

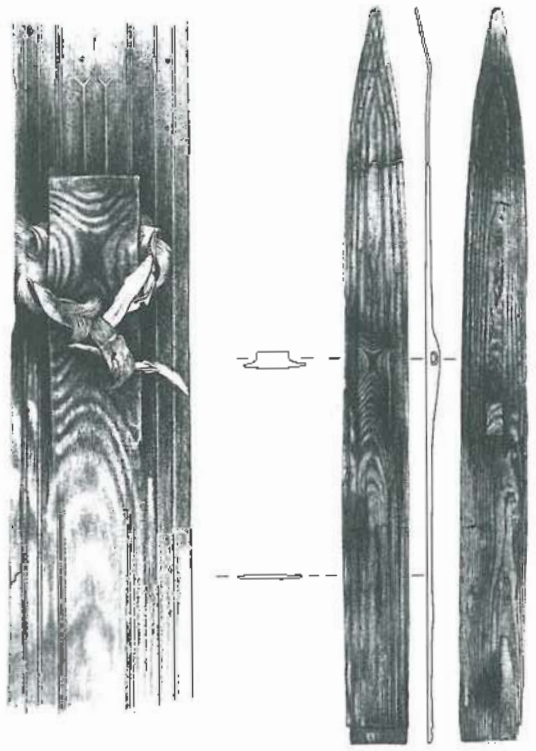

Fig.9.2: The Mänttä ski ^{14}C-dated to the 6th century cal AD. It is the only ski found with bindings in Finland. Drawing Eino Nokelainen/National Board of Antiquities (Vilkuna 1997).

1945; 1948; 1949; 1950; 1951; 1957; 1967; Okkola 1945; Erä-Esko 1958; Kopisto 1964; 1966; Salo 1965; 1967; Alhonen 1965; 1967; Aalto *et al.* 1981; Vilkuna 1986c; Autio 1987; Kuokkanen 1991; 2000). For the sake of comparison it may be interesting to know that 90 ski finds have occurred in Sweden and only 15 in Norway (Vorren 1995, p.11).

Minor find groups include different kinds of fishing tackle (Nikkilä & Virkkala 1947; Valonen 1952; Luho 1954; Kauhanen 1974; Minkkinen 2000), bone harpoons (Leppäaho *et al.* 1937b; Luho 1952; Minkkinen 2000) and other bone and antler artefacts (Salmo 1959; Luho 1967), wooden spoons (Ailio 1912; Europaeus 1930; Kivikoski 1935), artefacts made of birch-bark (Valonen 1952; Pälsi 1934), ceramics (Vuorela 1981), bows (Edgren 1981b; Vilkuna 1994; Pukkila 1991; Insulander 1999) and a wooden idol (Leppäaho 1937a) and even metal artefacts like copper kettles and a sword (Kivikoski 1934; Taavitsainen 1986; Salmo 1955).

Excavations

Some of the areas surrounding find spots have been investigated, but very few scientific excavations have been conducted at wetland sites and besides being badly reported, most of these excavations have not yet been published. The oldest scientific wetland excavations known to the author are those at Levänluhta in Isokyrö, Ostrobothia, a sacrificial place or cemetery, consisting of a well within which human bones and artefacts were identified in the seventeenth century. The first excavations were made in 1886, others were conducted in 1912 and again between 1982 and 1983. A similar site but this time without artefact finds was later identified in Käldamäki, in the neighbouring parish of Vöyri, located close to an area of known burial cairns. This site was excavated in 1937 and 1938 (Hällsten 1892; Hackman 1913; Pesonen 1943; Meinander 1950, pp.136–145; Blomquist 1968; Formisto 1993).

Suojoki in Keuruu, Central Finland, also received attention quite early. The first finds were made in 1930 during the conversion of peatland into agricultural land. In 1935 a small excavation was conducted at the site and in 1952 an area of c.1,000m^2 was investigated and further work was carried out at the site between 1989 and 1991 (fig.9.4). The area containing finds was very large, consisting of three smaller areas along the riverside with a distance of 170m between the outermost parts. The finds, dating to the turn of the thirteenth and fourteenth centuries AD, were mostly sections of boats including keel timbers, fores, staves, strakes, oars, paddles, oarlocks, poles, etc. Winter transport equipment including skis and parts of sledges or toboggans of the ahkio type were also identified at the site. In addition, a decorated birch-bark vessel and pieces of unidentified objects were found. So far no dwelling site has been identified in the surrounding area.

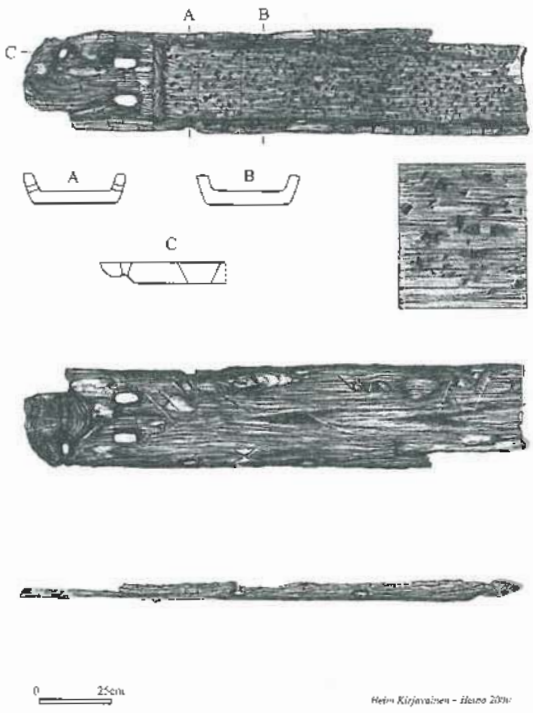

Fig.9.3: A sledge runner fragment found recently in Karhuräme in Lahdenpohja in Sysmä, Southern Finland. The fragment was ^{14}C dated to the fifth millennium cal BC. Drawing Heini Kirjavainen-Heino, University of Turku/Department of Archaeology.

Many questions about the site still remain unanswered. How and why did the finds get into the shore bog and become preserved? Was this due to religious or purely utilitarian practices? The working hypothesis is that the material was timber stored for re-use by a foraging population (Pälsi 1934; Hirsjärvi 1953; Forssell 1986; Taavitsainen 1992; Taavitsainen 1998; Vilkuna *et al.* 1993; see also: Greenhill 1995, p.126; Westerdahl 1996, p.76).

Small scale excavations have also been performed in Alestalo, Orimattila in Southern Finland in and around a sledge runner find site, which also produced comb ceramics in a *Trapa natans* layer (Vuorela 1981). In Ruoksmaa, Askola in Southern Finland, Bronze Age and Early Iron Age ceramics were excavated from a wetland environment (Meinander 1954, pp.165–167).

Fig.9.4: A side strake of a sewn boat with an oarlock, excavated in Suojoki in Keuruu, Central Finland. The site is dated to the turn of the thirteenth and fourteenth century AD. Photo J.-P. Taavitsainen 1991.

At the end of the 1990s extensive excavations and test pitting were carried out in a wetland area in Purkajasuo, Yli-Ii in Northern Finland close to an area containing a number of known Stone Age dwelling sites. Stone Age wooden constructions, remains of fishing gear and other artefacts were identified in an area of 11.5 hectares. The Kierikki project has been build around these excavations. The project will also construct an archaeological Kierikki Centre, a prehistoric walking route and the Stone Age village in Yli-Ii municipality. The centre aims to popularise prehistory and to provide visitors with an experience of Stone Age cultural life (*Arkeologia Suomessa* 1998, pp.158–160; *Arkeologia Suomessa* 2000, pp.111–112, 170–171; Kierikki n. d.).

Since 1997 excavations have been carried out in Silmäkeneva, Riihimäki, in Southern Finland. Finds from Mesolithic and Comb Ceramic periods have been identified in wetland contexts. Survey work was carried out in the area and several new sites were located in the bog on the shores of the ancient lake (Matiskainen & Zhilin 2000).

The structures and finds of Alestalo, Ruoksmaa, Purkajasuo and Silmäkeneva can so far be interpreted as fishing structures and the normal dispersal of cultural remains from the nearby dryland settlement sites. These do not seem to be proper *lake-dwellings*, as identified in other countries. Siiriäinen has however suggested, based on his excavations in Kierikkisaari, Yli-Ii (the same area as Purkajansuo) and in Kärräniemi, Rovaniemi in Lappland, that in Finland there are settlements constructed on piles and platforms or with palisades with similar features to sites in the East Baltic countries in wetland and flooded areas (Siiriäinen 1967; 1973; 1986). Siiriäinen has also excavated a Stone Age site in Järvensuo, Humppila in Southern Finland; small-scale excavations have revealed objects of wood (fig.9.5), pine-bark, birch-bark, pieces of pottery and a fragment of stone axe, between a field plateau and a moraine belt around a rocky hill. The site has been interpreted by Siiriäinen as a lake-dwelling on piles which was flooded by a transgression of the lake (Siiriäinen 1983; Aalto 1983; Edgren 1981a).

Survey work to identify submerged Stone Age dwelling sites in areas left inundated after the transgression of larger lakes has begun (Koivikko 2000). Excavations concerning Iron Age and historical bog roads and trackways should also be mentioned (Sipilä 1997; Masonen 1988; Salmi 1944; Äyräpää 1935) as well as the wooden defensive constructions around Finnish medieval castles (Alopaeus 1984; Uotila 1998).

Land use changes in Finland and their effects on wetland finds

The number of finds made in wetland contexts can be seen as a result of agricultural policies and development. Removing organic material from peatlands and wetlands to strengthen and fertilise the soil in areas under cultivation has been common practice in Finland for many centuries. This practice has been more intensive during periods of agricultural expansion, which may be reflected in the growth in wetland archaeological finds. If we for instance look at the 105 sledge finds made in Finland we find that 10 (9.5%) were found during the *c.*50 years between the 1870s and the 1920s. In the 1930s, 35 (33.3%) finds were

made, the next decade, mostly a time of war, produced 8 (7.6%) sledges and during the two following decades 24 (22.9%) and 12 (11.4%) sledge finds were made. The last three decades of the second millennium have brought to light 7, 6 and 3 sledges respectively (in thirty years 15.3%). The chronological distribution of ski finds has a very similar pattern.

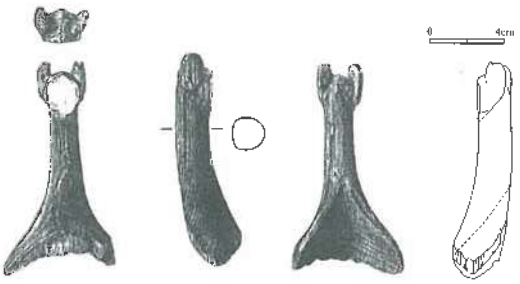

Fig.9.5: Pinewood handle of a ladle or spoon, found in Järvensuo in Humppila, Southern Finland. Scale 1:2 (Siiriäinen 1983 p.86, fig.5)

This pattern seems to reflect the development of more intensive agricultural practices and the clearance and creation of new farmland. The 1930s for example, saw a flourishing agricultural expansion intensifying and developing technically. A particular feature of this period was a growth in dairy farming requiring greater hay production and resulting in the clearing of shore meadows. After the Second World War Finland had lost 12% of its surface area and consequently 12% of its population had to be resettled, land also had to be provided for returning war veterans. The end of the 1950s saw the creation of *c.*150,000 farms. This need for agricultural land naturally lead to a period of clearance, which may explain the high number of wetland finds from this period. The 1960s and 1970s saw an increase in peatland drainage by extensive programmes of ditching for the purposes of silviculture.

The most recent major changes in agriculture have been due to Finland's membership of the European Union, which has resulted in an accelerated depopulation of rural communities. This has particularly affected agricultural areas on reclaimed and partly drained peatland. This decrease has been so noticeable that only 16.4% of the 700,000 hectares is still being agriculturally exploited. The rest has been left mostly as such or has been or is being afforested (on the land use of peatlands in Finland see: Selin 1999).

We can only predict the damage caused by agriculture and changes in land use in wetland and semi-reclaimed wetland environments. The present situation suggests that very few remaining wetland and peatland areas are being reclaimed, which leaves potential archaeological remains in these areas with some level of natural protection. There is also a current trend towards the restoration of ditched and drained peatlands back to their natural state by blocking ditches and reducing tree numbers to their natural level. This process has so far resulted in the restoration of c.4,200 hectares of wetland habitats, possibly contributing to the preservation of remaining archaeological remains.

Most Finnish Ramsar sites are located on the coast, which means that they were under water very recently. The speed of land uplift for example at the Bothnian Gulf is approximately 1cm a year. This means that there are no known ancient monuments to be anticipated in these areas other than possible stray finds and shipwreck sites. As far as the author is aware no archaeological sites have been identified on any of Finland's inland Ramsar sites, which is more a reflection of the level of archaeological survey and the land use of these areas, rather than the scarcity of surviving archaeological deposits.

The future of Finnish wetland archaeology

In Finland the majority of organic finds have been interpreted mainly as stray finds. Due to the lack of proper wetland sites there has not been any official policy concerning the management of wetland archaeology in Finland. We can only guess at the problems caused by drainage and cultivation of peatlands, the lowering of lake water levels to increase agricultural cultivation, peat harvesting and drying of peatlands for silviculture, and the problems caused by afforestation of peatland fields and marsh meadows, changes in agricultural practice and the depopulation of the country-side.

Siiriäinen's statement when discussing sites like Kierikkisaari and Kärräniemi 'systematic search in connection with an archaeological inventory is unnecessary' is illustrative of the understandable attitudes and problems concerning the wetland sites (Siiriäinen 1973, p.194). The fact remains that searching for sites is very difficult, time consuming and expensive. Areas surrounding all stray finds should, however be surveyed taking into consideration the knowledge from wetland excavations and inventories of the past two decades. There lies an immense research potential in the areas surrounding previously known find spots. As many finds seem to indicate settlements on dryland, the results would probably be new dwelling sites in new kinds of environments, perhaps including lake-dwellings and many sites with different functions, for example storage places, ritual sites and places where the property of the dead was deposited, etc.

One problem which the present author has encountered with his excavations in Suojoki, Keuruu, is that due to the lack of conservation resources only a few organic finds have been conserved, mainly for exhibition purposes while the rest are left in situ after documentation. Their fate is probably one of destruction caused by ditching, drainage and damage by overgrowing bushes and trees. The future of Finnish wetland archaeology, with all its related problems, needs to be faced before long.

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10: European Russia

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Abstract: *Wetland archaeological sites in European Russia are predominantly prehistoric habitation sites, Neolithic fishing structures and medieval towns. The excavation and study of some of which are described in this paper including Nizhneyé Veretye a Mesolithic habitation site, Marmugino where Neolithic fishing structures were identified and the medieval town of Novgorod. In Russia, governmental institutions such as the Academy of Sciences and the Academical Institute of Archaeology and a public society are responsible for archaeological heritage management. The present structure and function of these bodies and the present management and protection of wetland sites in European Russia, including the current archaeological site legislation with particular reference to wetland areas, are discussed. This paper also gives examples of the management of a number of excavated wetland sites and three possible strategies to benefit the heritage management of wetland archaeology in European Russia.*

Introduction

European Russia occupies the main portion of the Eastern European plain and stretches from the Baltic, White and Barents seas to that of Azov and the Caspian Sea. The predominant part of this territory consists of forest and forest-steppe zones; in the extreme North there is a tundra belt, in the South the steppe zone exists and in the Northern Caspian region a desert and a semi-desert are situated. Practically all known wetland sites in European Russia are located in the forest zones. In this survey we consider more than 30 sites reflected in scientific works (fig.10.1). In fact previously discovered peat bog settlements are more numerous. No true archaeological wetland sites are known within Ramsar designated wetlands up to 1995. Of course, not all sites in wetlands may be called real wetland sites. The latter have cultural layers with organic materials, wooden and bone artefacts etc, while dry sites submerged during building reservoirs do not differ in principle from their state before being flooded.

Fig.10.1: Location of the sites .
1. Korpilahti; 2. Lake Onego; 3. Staraya Ladoga;
4. Novgorod; 5. Dubokray; 6. Usvyaty IV;
7. Dyazditsa; 8. Naumovo; 9 & 10. Serteya I & II;
11. Repishche; 12. Beloozero; 13. Modlona;
14. Nozhnee Veretye; 15. (Nizhneyé) Veretye I;
16. Kuznechikha; 17. Marmugino;
18. Yazykovo I; 19. Zamostye II; 20–22. Ivanovskoe II, III & VII; 23. Sakhtysh I; 24 & 25. Karash I & II;
26–28. Berendeevo I, IIa & III;
29. Zarechnoe II; 30. Plekhanov Bor; 31. Podzorovo;
32 & 33. Vis I & II.

Review of wetland sites

The water-saturated sites of European Russia are divided into prehistoric habitation sites, Neolithic fishing structures and medieval towns. The former are the most common and form five territorial groups: 1) Ladoga and Valdai 2) Eastern Onego 3) Northern Dvina 4) Volga - Oka 5) Pskov and Smolensk.

Ladoga and Valdai group

A geologist, Alexander Inostrantsev (1882), published a monograph, which became the first considerable work about wetland sites in Russia. In the late 1870s new canals along the south eastern coast of Lake Ladoga, parallel to the old Syas and Svir canals, were dug. During these works Neolithic habitation sites and burials were destroyed. Inostrantsev could not stop building work but

did his best before the damage was too great to gather a considerable collection of finds mainly from alluvial peat including stone and bone objects, ceramics, animal remains, anthropological materials and a portion of a wooden dugout (Inostrantsev 1882, pp.13, pl.II). He examined and detailed the collection, yielding the aforementioned monograph preserving its scientific value till today.

In 1913 a Mesolithic net with floats and sinkers was recorded during digging in a peat bog near the village of Korpilahti and the town of Antrea, now called Kamennogorsk, on the northern part of the Karelian isthmus. The site was excavated in 1914 by Sakari Pälsi (1920).

The third site, Repishche, is situated in the Valdai basin of the Msta river. The northern dry part of the site was excavated by Maya P. Zimina (1981a) in 1964–1972, while in 1981 she investigated the southern, peat bog (Zimina 1981b). In the middle peat horizon of the cultural layer, piles, fragments of wooden vessels, scoops with a figured handle were found and below this bone arrowheads and harpoon heads came to light.

Eastern Onego sites

In 1929 Mariya Foss (1934) discovered the Mesolithic site of Veretye, 0.5km from the mouth of the river Kinema where it falls in Lake Lacha. Her excavation in 1929–1934 revealed two cultural layers. Foss named the earlier of these the Nizhneyé or Lower Veretye, and the late layer the Verkhnee or Upper Veretye. This site is mainly in a wetland but also occupies a small hillock, about 1.5m high, thanks to which the site has been revealed. Under a layer of turf 0.1–0.2m thick there is decomposed peat representing the upper cultural layer, which is 0.15–0.40m thick, and under it a peat horizon corresponding to the Mesolithic period 0.3–0.6m thick. The latter was water-saturated and the upper layer of sand stretching under it yielded objects of bone and antler including barbed points, harpoon and arrow heads, fishing hooks, drilled pick, axe, awls, scrapers, decorations (Foss 1952, fig.10, pp.22–26) as well as wooden artefacts including arrowheads, a bow, fish beater, hoop, paddle and a ski (Burov 1990, fig.6). During the excavations it was necessary to dig drainage canals and to pump out water from the trenches.

While seeking the place where Foss excavated, Svetlana Oshibkina, in 1978 discovered a new and more ancient Mesolithic site known as Nizhneyé Veretye I (Burov 1990, pp.340–342). This site is situated some tens of metres nearer to the lake and has only one cultural layer (Oshibkina 1983, pp.75–166; 1997). A rich bone and antler inventory from the site includes barbed points, arrowheads, knives and daggers, angler's hooks, scrapers and drilled picks. Among the wooden objects (fig.10.2) in the collection there are arrow points, arrows, bows, barbed points, axe and adze shafts, spatulas, mallets, arched scrapers, fish beaters and a birch bark boxes. The excavations were conducted at first with the help of a drainage ditch, linked by a trench to the river, and channels along the sides of the excavated area. But later Oshibkina (1997, pp.13–14) dried the site completely with five ditches so that even the thickness of the peat bog was considerably reduced. Unfortunately, she does not inform the reader if the level of subsoil waters was raised back after the excavations in order to keep the cultural layer of the site wet and prevent the organic artefacts within the unexplored portion of Veretye I from destruction.

In the same region, in 1918, Markov had discovered a site where the river Perechnaya falls into the river Modlona. In 1937 Alexander Bryusov (1951) noted that the site had two cultural layers and in 1938–1940 and 1945–1956 he excavated there. In 1969–1970 the stratigraphy of the site was observed in more detail by Oshibkina (1978, pp.111–118). Under the turf a dark unit of clayey sand (0.4m thick) was recorded as the upper Neolithic–Bronze Age cultural layer. Below this unit there is a yellow clayey layer 0.25–0.50m thick covering peat 0.4–0.8m thick. The upper horizon of this peat forms the lower cultural layer of the site where some pile dwellings existed. This unit is completely water-saturated, and objects of organic materials were found including a horn mattock or axe, bone composite angler's hooks, awls, wooden scoops with sculptural handle, paddles, spatula, and a sledge runner (Burov 1997, p.48, fig.1:3). During the excavations discharge wells were used and remains of buildings were watered in order to preserve them *in situ*. One long strip after another of the lower cultural layer was excavated (Bryusov 1951, pp.13–15). There were difficulties at the Modlona site during its excavations, as the land at the confluence of the two rivers gets rid of its water only in August and not every year. At the same time in dry seasons, for example in 1975, a part of the habitation site is temporarily above the water level and the exposed piles become open to rotting and other processes which can destroy wooden structures.

Northern Dvina and the Vychegda group

In the late 1930s V. I. Smirnov (1940; 1941) investigated the water-saturated cultural layer of a Neo-Eneolithic habitation site on the river Kuznechikha, in the city of Arkhangelsk. The site, destroyed by building foundations, yielded some objects of bone including an awl, chisel, and a painted board, probably used as a paddle. It may be supposed that exactly the same site, destroyed by floodwater, was researched in the 1960s and 1970s by Kuratov and Martynov (1977). Although the site seems to be partly wet their finds lists do not include organic materials, probably because they did not explore below the subsoil saturated levels.

In the late 1950s the present author started researching peat bog habitation sites in the Northern Dvina basin, hoping to find sites situated on river hillocks and terraces with associated oxbow deposits with cultural remains

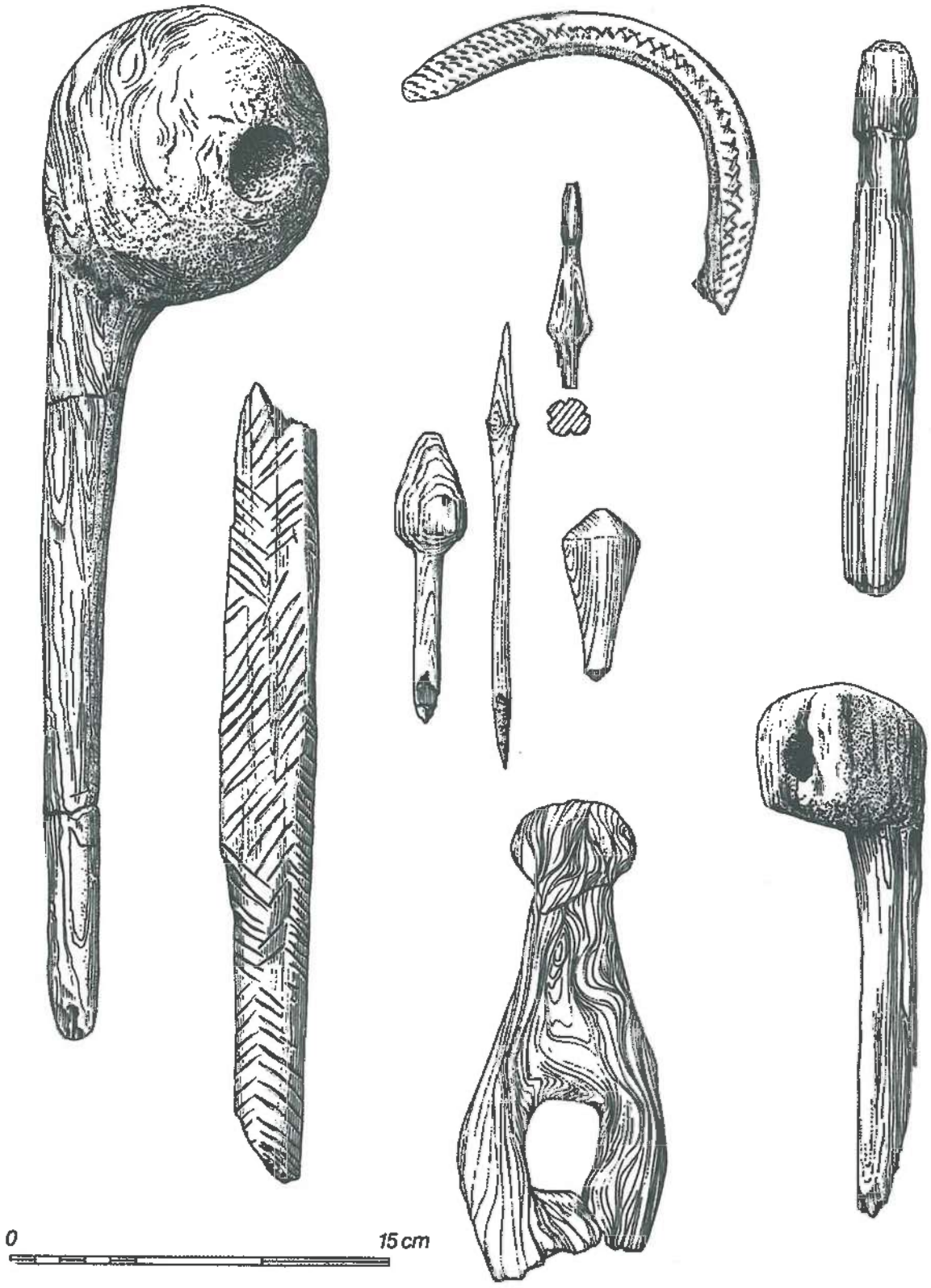

Fig. 10.2: Wooden artefacts from Nizhneyé Veretye. Top left and bottom right, hafts for axes and smaller blade tools: top centre and lower left, decorated pieces; top right, end of a bow; centre, various types of arrowhead including two bird bolts and one head grooved for flint inserts; lower centre, handle for a small chopper (Coles & Coles 1989).

within their waterlogged zones. During these works a special method was used (Burov 1989, pp.391–392). The research yielded the discovery of Vis I, in the village of Sindor, with Mesolithic oxbow peat bog deposits, and Vis II with oxbow deposits from the fifth century AD, (Burov 1967) and Marmugino fishing structures sited on the bank of the river Yug. At Vis I, between 1960–1967, 575m^2 of peat bog were excavated yielding 168 unusual objects of wood, bark and grass dating from 8,300–7,000 BP (Burov 1990). Among the finds there are diverse bows, arrows, spears, throwing clubs, arched scraper, sledge runners and skis, piles, a birch bark box and fishing gear including a net, float, fish beater, fish trap, hoops and side prongs of leisters. Bone finds did not survive.

Discovered in 1962, the peat bog of Vis II is similar to that of Vis I. Excavated by the author till 1966, over 200 wooden and bark objects were revealed not counting hundreds of birch bark sheets and remains of fishing structures built on piles and young trees (Burov 1996). The inventory includes hunting bows and arrows, a combined wood and iron dagger, a net-maker's measuring stick, net loops, fish beater, angler's hooks, mattocks, paddles, parts of sledges, axe and adze handles, a mallet, drilling bows, T-shaped pins, scrapers, combs to treat sinews, a plank for softening straps, whorls, a stamp for decorating ceramics, potter's spatula, window fittings, a ball, a statuette and birch bark vessels. Some bone and antler objects including arrowheads, awls, a burnisher and the crosspiece of a sword, were also collected. The value of this site consists, in particular, in the fact that only a twentieth of its area, containing numerous organic cultural remains, was excavated.

The oxbow peat bog of Vis I was buried under a clayey unit of lake deposits 1.2m thick while the peat bog of Vis II is a living peat bog, but the cultural deposits appear only at a depth of about 1m. The deepest of them lie in the Vis I oxbow peat bogs at a depth of 3.5m. The organic artefacts in both cases are well below subsoil water levels. These circumstances hampered the excavations, but enable the natural conservation of the organic objects at Vis I and II. It was possible to excavate the peat bog of Vis I only by separate small areas 2.0 x 1.7m, because the clayey walls of the trench were destroyed by water and collapsed in a few hours. At Vis II we used trenches, but water from discharge wells needed intensive pumping out in the morning and periodically during the working day.

Volga–Oka sites

The Upper Volga region is an area rich in wetland sites, situated in the north western portion of the area between the Volga and Oka, an area of marshes and peat. The first traces of wet sites were recorded here in the 1920s and 1930s by peat workers, but did not result in discoveries of cultural layers (Bryusov 1951, pp.7–8). Dmitri Kraynov's research in the 1950s and later was crowned with success, with investigations of such multi-period settlements of the Mesolithic to the Bronze Age as Yazykovo I, Ivanovskoe II, III, and VII, Berendeevo I, IIa, and III, Karash I and II, Sakhtysh I. At these sites bone and wooden objects were found, and screens for fishing structures were discovered at Ivanovskoe, at Berendeevo IIa, and Karash I. Some archaeologists suggest the screens were kept rolled up close to Neolithic dwellings, and used as conical fish traps, however this in my opinion is incorrect (Burov 1988, pp.155–156). Paddles were also discovered at Karash I and Ivanovskoe VII (Kraynov 1991, pp.149–150). At Berendeevo I in 1965 a burial place was excavated in peat near to a prehistoric living platform; the dead, in clothes made of plant fibres, were laid in a contracted position on their left sides, tied with strings and wrapped in birch bark (Nikitin 1965). At Karash remains of wooden structures, including a platform or trackway, and a wooden leister with bone prongs came to light. At Karash II a ski was recovered (Kraynov 1955), while Ivanovskoe II yielded a supposed sledge runner. The Karash sites were revealed during the digging of drainage ditches in peatlands.

At Sakhtysh I, Kraynov (1984) excavated at intervals from 1962 until 1982. A low hillock surrounded by a peat field, where in the cultural layer lies, forms the centre of this multi-period Neolithic and Bronze Age site. In the western portion of Sakhtysh I a long dwelling with preserved posts and logs, which had been split in two, was excavated. In particular, wattle panels to build fishing structures were found in the dwelling, as well as birch bark artefacts and wooden objects including paddles, bows, arrowheads, a spear, scoops and spoons, mallets, and halves of special tongs to get water nuts from fires. Sakhtysh I, unlike many other wet sites of Russia, has been touched by industrial activity, the western edge of the site having been damaged by peat extraction, the southern and eastern edges by ploughing, and the north eastern edge burnt away during a fire in 1972.

An interesting multi-period site with a Mesolithic layer, Zamostye II, was discovered by Vladimir Lozovski near Moscow and excavated by him in 1989. Here bone and antler objects were collected, as well as arrow and harpoon heads, knives and daggers, awls, scrapers, tools pointed at an angle of 45°, axes and adzes (Lozovski 1999b). Also remains of a wattle-work fishing structure came to light (Lozovski 1999a, p.144).

Pskov and Smolensk group

In 1962 Alexander Miklyaev started investigating in the Pskov district. In 1963 he discovered the multi-period wetland site of Usvyaty IV on the shore of Lake Zhizhitskoe and in 1969 the site of Naumovo on the shore of Lake Zhizhitskoe. The first site was excavated in 1964 while the second was explored from 1970. The collection from Usvyaty IV, where pile dwellings were recovered,

consisted of bone objects, harpoon and arrowheads, awls, decorated pieces, and wooden axe and adze handles, mattocks with figured handle, arrowheads, mallets, sinkers of birch bark with sand and a wooden ring with a stone (Miklyaev 1969; 1971). Naumovo is similar to Usvyaty IV (Miklyaev 1977) and dates from the fifth to the fourth millennia BP.

In 1972 an excavator driver digging a drainage canal in the Smolensk district cut through cultural layers containing logs and piles. Thanks to this incident the pile dwellings of Serteya I and II were discovered (Miklyaev & Bespalova 1981, p.7, fig. 4). Using Bryusov's (1963) recommendations to search for peat bog sites where there are small hillocks in marshes, Miklyaev used bore-hole survey techniques and discovered in 1974 the site of Dyazditsa, near Usvyaty IV (Miklyaev & Bespalova 1981). In 1976 the wetland site of Dubokray V was identified on the left bank of the river Lovat, and then investigated by underwater excavations; among the finds were unique ornamented bone flutes (Miklyaev 1983).

Neolithic fishing structures

As long ago as 1878 zoologist Ivan Polyakov discovered, in the area of the Neo-Eneolithic site of Plekhanov Bor, in the Oka river oxbow deposits, a portion of a fishing structure made of laths or poles stuck vertically into the river bottom in the shape of a semicircle. He also found a mallet and a part of a dug-out (Fedorov 1937; 1953, pp.305–307; Burov 1988, pp.145, 157). In 1965 Vseolod Levenok (1969, p.84) uncovered a fallen panel of a fishing structure in an oxbow peat bog, part of the Neolithic site of Podzorovo in the Don basin. Within a year, panel fish-weirs of the same period were recorded by the present author in the floodplain bank of the river Yug, at the modern village of Marmugino, in the basin of the Northern Dvina. Thus, information accumulated about the shape and structure of wattle-work fish weirs of the period 5,000–4,500 BP (Burov 1988). Much of this evidence has come from oxbow deposits, ie from palaeochannels where waterlogged organic sediments have accumulated.

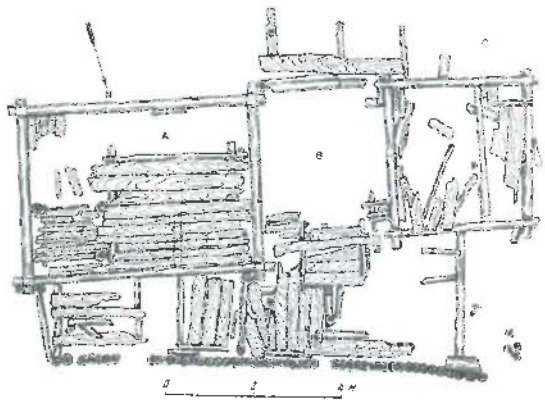

Fig.10.3: A three-unit building from medieval Novgorod (Thompson 1967).

Medieval towns with water-saturated cultural layers

At the same time as the investigation of prehistoric peat bog sites, excavations of wetland Old Russian towns took place. In the 1880s excavations began at Staraya Ladoga, near Lake Ladoga, mattocks, axe and adze shafts, skis, parts of sledges, oars, portions of canoes and many other objects from the eighth – tenth centuries, were found (Orlov 1954). But in this territory of Russia, Novgorod of the tenth–fifteenth centuries AD yielded the richest collection of wooden artefacts. This town upon the river Volkhov was in tenth - fifteenth centuries the second most important centre of Kiev Old Russia and between 1136 to 1478 it was the capital of the Novgorod republic and later a city of Moscow (Russian) state. Novgorod was situated on both banks of the river with its citadel in the centre on the western side. A high water-table resulted in splendid preservation of wood, bark, textiles, skins, bone and other organic materials (Zasurtsev 1967; Kolchin & Yanin 1965; Thompson 1967). The thickness of the cultural layer often exceeds 6m in places; however only the lower horizons

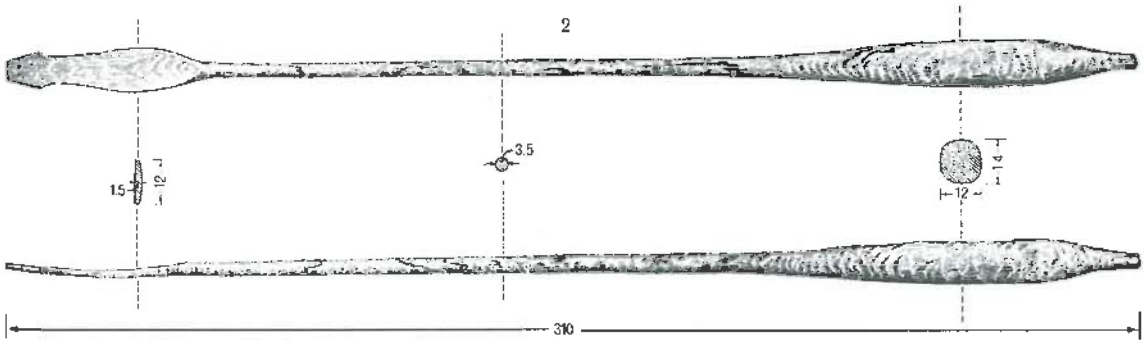

Fig.10.4: An oar from wet deposits from medieval Novgorod (Thompson 1967).

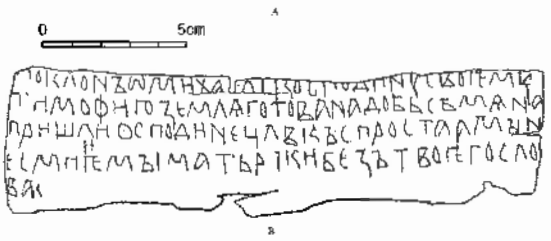

Fig.10.5: Document 17, from Novgorod, written on birch bark (Thompson 1967).

dating back to the time before the annexation of the town to Moscow, are water-saturated.

Excavations were conducted at Novgorod episodically from the 1870s, with regular large-scale works started only in 1932 by Artemi Artsykhovski and continued by G.A. Avdusina, V.L. Yanin and others. Artsykhovski's excavations at the north western end of Nerevski, where conditions for the preservation of organic artefacts are most favourable, were of special importance for wetland archaeology.

During excavations at Novgorod hundreds of frame dwellings and workshops (fig.10.3), roadways, drainage structures and fences were discovered. Finds of wooden objects including carvings, were calculated in tens of thousands. Agricultural tools and craftsmen's instruments, diverse vessels, skis, details of sledges, wheeled vehicles and water transport (fig.10.4), domestic objects, furniture, musical instruments and birch bark vessels were recorded (Kolchin 1968; 1971). Also hundreds of birch bark deeds (fig.10.5) and other documents (fig.10.6) came to light the first of which was revealed in 1951 (Yanin 1965). Excavations at Novgorod needed water to be pumped out from the trenches and discharge wells 3–5m deep, and channels along the sides of the trenches were used to draw off water into the town sewerage system.

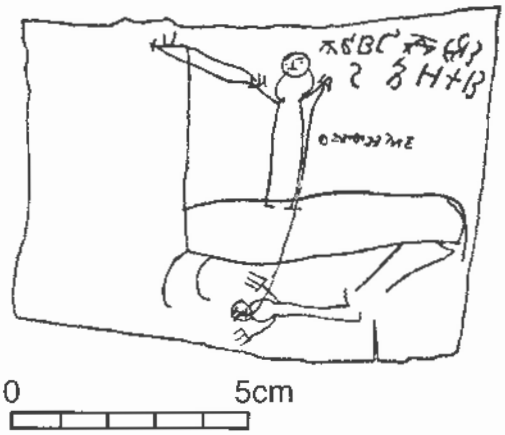

Fig.10.6: A drawing, from Novgorod, written on birch bark, of a mounted man, inscribed 'Onfim' and with the beginning of the Russian alphabet (Thompson 1967).

Beloozero, situated on the right bank of the river Sheksna and dating from the tenth - fourteenth centuries AD, is the third Russian medieval town with interesting wetland archaeology. It was explored by Lina A. Golubeva's excavations of 1949–1965 (1973, pp.57–205). Numerous framed domestic buildings and workshops as well as roadways were recovered. The collection of wooden objects consisted of diverse vessels including stave-built vessels, sledges and horse collars, paddles and undefined objects. A sinker in the shape of a wooden ring with a stone, birch bark boxes, plenty of bone and antler objects and remains of shoes form part of the collection. The organic materials were preserved well in the northern portion of the town where there is a high water-table. Beloozero is situated away from the modern settlements, and only its upper dry horizon has suffered from ploughing.

Legislation affecting archaeological sites in Russia

In order to understand why Russian archaeologists have been using particular strategies in site management, it is necessary to consider Russian archaeological site regulations established in the Soviet period (1917–1991), which exist almost in the same form today. In 1948 the Council of Ministers of the USSR issued the decree about 'measures for improvement of cultural monuments protection', and in 1976 the law about 'protection and use of historical and cultural monuments' was promulgated. The responsibility for protection was placed on the governmental institutions of Russia and its autonomous republics, the Academy of Sciences and the public organisation created in 1966 'All Russian Society of Historical and Cultural Monuments Protection'. A certificate indicating the protected area is issued for every known site while a special sign is put up at the site itself. However, this work is sometimes of a formal nature.

In the Soviet totalitarian period the main rivers of European Russia, starting with the Volga and Kama, were turned into chains of storage lakes that submerged the best land of the country and the areas where the majority of archaeological sites are situated. In important cases, legislation makes provision that if an industrial organisation is forced to destroy an archaeological site it must finance its investigation. The costs of investigation and excavations are included in the building estimate. The 'great buildings of communism' gave millions of roubles for archaeological research, but although archaeologists were sent to new developments, portions of sites, probably the main ones, below the level of the reservoirs went without preliminary excavations. Those situated on the shores of the artificial 'seas' were destined mainly to be destroyed by wave erosion although the archaeologists raised questions about grants for the

excavation of them at the time (O pamyatnikakh...1967). Many thousands of habitation and burial sites in Russia are, therefore, now on the bottom of the storage lakes or on their steep shores.

The Russian Academy of Sciences, formerly the Academy of Sciences of the USSR, was involved in archaeological site management. Its Institute of Archaeology gives permissions, called *open sheets*, for conducting excavations. An archaeologist receiving permission must within a certain period before any new excavation, offer to the Fieldwork Department of the Institute a complete scientific report of previous excavations with all necessary plans, photographs and figures as well as presenting any finds or ancient objects to a museum or scientific institute. Delivery of a new permission for the next season depends upon the quality of the fieldwork and the report. The archaeologist also has to take care of the preservation of the investigated sites.

In 1984 the Institute published new instructions for open sheets (Shelov 1986). Two important aspects have a bearing in relation to the management of archaeological sites. Recognising that it is necessary to increase the practice of converting excavated sites into museums and cultural reserves, but admitting that it is 'a difficult business which needs funds, people and technical base', the Institute recommends that in cases where turning a site into a museum is unsuitable or impossible and where a site has not been completely excavated, the archaeologist should be responsible for the preservation of the site (Shelov 1984, pp.9–10). Projects must preserve trenches, for example by burying them, which may also solve the question of the restoration of a natural landscape.

The second basic rule is that the excavator of a site has 'to prefer excavations of the areas to which danger at most threatens to be damaged or destroyed as result of natural processes or industrial activity of people' (Shelov 1986, p.12). Excavations can be permitted only at sites whose existence or integrity is called into question (rescue excavations) with an exception for sites 'investigation of which is absolutely necessary for solution of considerable scientific problems' (Shelov 1986, p.10).

Management of wetland sites: oxbow peat bogs with wooden artefacts and medieval Novgorod as examples

The chief of the Fieldwork Department frequently noted the tendency for Soviet archaeologists to excavate the maximum area of sites, with too little attention to their preservation (Shelov 1984, p.10; 1986, p.12). Unfortunately, we seldom find information in publications concerning the conservation and protection of sites. But we can show how these problems were solved at the Vis and Marmugino sites and at medieval Novgorod (Kolchin & Yanin 1982, pp.3–4, 60, 67–68, 129–130).

On the author's initiative, Vis I and Vis II were included in a protection list of archaeological sites of All-Union importance (Spisok... 1967, pp.15). During eight excavation seasons, the local agricultural chiefs were informed about the scientific importance of the Vis sites, and the threat of any destructive activity such as peat extraction seems unlikely. As to our trenches, they were filled every summer immediately upon the end of excavation, restoring the landscape.

The Marmugino fishing structures were discovered in September 1966 on a floodplain edge in the oxbow deposits of the river Yug, at a depth of about 3.5m. The fishing structures turned out to be partly cut by river erosion during spring floods and drifting ice. We understood that the structures needed immediate rescue, because they would not survive till the next field season. The works were conducted in September and October when temperatures repeatedly went below zero and it snowed. Small parts of the structures were cut out together with peat for laboratory investigation, while we covered the remaining laths with peat.

Medieval Novgorod as a wetland site differs from other such sites in Russia not only by its grandiosity, but also by an unfavourable circumstance. Modern city blocks cover it, which limits the possibilities for archaeological investigation, which is why excavations at the site were especially fruitful at the end of the Second World War when the city had been almost completely ruined. In 1951 when water and sewerage mains were laid, Boris Kolchin excavated all the trenches revealing a section of a medieval street with wooden roadways. The Novgorod City administration decided to give the area to the archaeologists. Under these circumstances the excavations were planned and started at the Nerevski end of the ancient town.

At the Novgorod site, an enactment of the Novgorod administration was issued, about the 'protection of the cultural layer', corresponding to the law of 1976. Upon this enactment no building organisation has the right to disturb the cultural layer of Novgorod without remission while the central portion of the town has the status of a reservation. Outside the reservation zone any area where the cultural layer is to be destroyed by building works must first be investigated. This rule forces archaeologists to conduct rescue where a building is planned, although they refuse to excavate at or around the citadel, in the area of the market and Prince Yaroslav's palace. Of course, the works in these places could help to solve many important problems of Novgorod's history. But the scholars do not hurry as the area is protected by the reservation status. On the other hand, this order makes the excavations at Novgorod mobile, occurring throughout the medieval town. Using this strategy, the archaeologists foresee the preservation of some areas of the cultural layers outside the reserved territory for future investigation, when

techniques of excavation are more developed and financial conditions are favourable for turning discovered structures into a museum.

Apparently, the main conservation method for the wooden structures at Novgorod is watering and covering them with polyethylene sheeting during the excavations, and afterwards filling them up with soil, previously removed from the excavated area with the help of trolleys. As to the wooden objects, they were first kept in an aquarium but later specialists of the Byelorusiian Technological Institute began to conserve them using a composite method of stabilisation (Kolchin & Yanin 1982, pp.67–68).

Management of Russian wetland sites: three strategies

The sites described here have different management needs and may be divided into three main groups. The sites with water-saturated cultural layers conserved by nature itself and not involved in industrial activity belong to the first group, Vis I and II, Nizhneyé Veretye and Veretye I, Usvyaty IV, Dyazditsa and others. It is enough for these sites to safeguard them against earthworks and peat extraction while in the case of excavations it is necessary to fill trenches conserving recovered structures.

Sites being cut through by rivers or destroyed in another way but not touched by human activity form the second group, for example Marmugino and Modlona. It is often not possible or very difficult and expensive to stop these processes even in the economic conditions of Western Europe (Gilman 1998, p.285). Consequently, the only way to save such a site for science is its immediate excavation with emphasis on areas being destroyed.

The sites of Serteya I and II, Karash I and II, and Sakhtysh I at which peat cutting took place, Novgorod with its modern buildings and Beloozero with ploughed upper horizon of the cultural layer form the third group, harmed not by natural phenomena, but industrial activity. There are two possible outcomes. The first is to stop the destructive works, which would ruin the sites, and to raise the water and grant a reservation status, which is the best solution to the problem. However, rescue excavation of threatened sites is the more likely outcome

Conclusion

Post-Soviet Russia is still in an economic crisis and the scantness of funding for archaeological research and site management is caused by this fact. Overcoming of this crisis will benefit the protection and management of the numerous wetland sites in Russia.

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11: Mediterranean Europe

Franco Marzatico

Abstract: *In the countries which face onto the Mediterranean basin the attention reserved for the rich cultural and natural heritage found within wetlands is a far more restricted phenomenon compared to the rest of Europe. One reason for this lack of continuity is the variation between the north and south in terms of the impact of these fragile ecosystems. The greatest density of archaeologically interesting wetlands is in northern Italy where there is a long tradition of research, conservation and exploitation of these resources more so than in other areas of the Mediterranean basin, where the concentration of wetlands is smaller. The gap in experience between the north and the south also results from other factors, as well as the profound morphological and climatic-environmental differences and hence the number of sites. As far as these are concerned, motivations which are in part historical, such as the diversity of the archaeological heritage, the conditions of socio-economic development and a differing availability of resources, can be cited for the different approaches taken.*

Introduction

In those countries that face onto the Mediterranean basin, the attention reserved for the rich cultural and natural heritage represented by wetlands is restricted, compared to the situation in the rest of Europe. The reason for this lack of continuity is the extreme variability existing between the north and south in terms of the academic impact of these fragile ecosystems.

As may well be appreciated, in the south and especially along the coasts, water resources are generally considered scarcer than in the north. The northern part of Mediterranean Europe, from Italy to Greece, is dominated by mountainous terrain, eg the Alps, generously provided with the lakes and watercourses that supply the network of river systems which create the alluvial Plains. It is in these areas of northern Italy that the greatest density of wetlands of proven archaeological interest is found. It follows, therefore, that there is a greater widespread tradition of research, conservation and exploitation of wetlands in these areas than any other areas of the Mediterranean basin (fig.11.1), where the concentration of wetland habitats is smaller (Guidi & Bellintani 1996;

Fig.11.1: Map showing the location of sites mentioned in this paper.

Bernabò Brea *et al.* 1997). Perhaps the most important factor, which has led to the gap in experience between north and south, must be the profound morphological and climate-environmental differences, which influence the number of sites. However, several contributory factors are in part historical, such as the diversity and extent of the archaeological heritage, the state of socio-economic development and the differing availability of resources. The exceptional wealth of archaeological sites in the south is a predominantly dryland resource. This heritage is often more striking in the eyes of local communities because of the economic opportunities within the context of cultural tourism, a market which continues to expand. Indeed, these communities, in the light of the revenue generated by the most famous monumental parks and archaeological museums, are naturally inclined to see this resource as a secure investment, which has already been put to the test. Even these sites however, may lack an in-depth evaluation of their effective capacity for attraction and exploitation (Francovich & Parenti 1988; Scichilone 1988; Francovich & Zifferero 1997; Santoro 1999).

By contrast, there is still a tendency, apart from those areas where there is an established environmental conscience, to consider wetlands as depressed areas of little worth, and hence suitable to be subjected to reclamation in order to obtain their more immediate productive use and application. On the other hand, it is perfectly clear that the presence of humidity and water on archaeological sites, though permitting the preservation of organic remains (Coles 1984), in economic and organisational terms represents an additional burden, for example the need for irregular intervention, specialist training and techniques and instruments of investigation, recovery and conservation up to and including the later exploitation of these sites. In areas which are disadvantaged from the point of view of water availability, which often corresponds with those with less socio-economic development and where environmental integrity is easily subordinate to employment demand, it appears inevitable that, except for rare cases, priority resources are destined for the more obvious archaeological heritage on dryland. It is equally clear how in these circumstances, over and beyond the scientific-cultural and landscape interest, the crude relationship between cost and benefit is bound to see dry sites favoured in comparison to wetland sites, which are without doubt considered less economically productive.

It is not entirely coincidental that the archaeology of wetland sites is more developed in those areas which benefit from greater water resources and a correspondingly greater familiarity with wetlands, where prosperity is more widespread, and with a more impoverished archaeological heritage compared to that of the south. The adequate availability of resources, or their shrewd use, is a determining factor in guaranteeing the systematic control or ownership of important wetland areas to allow where necessary prompt action in safeguarding the natural and archaeological environment. The last of these is a *conditio sine qua non* for the conservation of archaeological sites, and even more important in the case of wetlands, where modification of the humidity level alone, due to widespread reclamation, channelling and draining, may lead to irreparable damage (Coles 1984).

Archaeological heritage protection legislation

It should be underlined that, to date in the Italian context, the conservation of wetlands of archaeological importance has been complicated by the jurisdictional overlap between the different government bodies responsible for the protection of archaeological remains and those responsible for the natural environment. These bodies have traditionally operated according to separate legislation and obligations. The approval of the Consolidation Act concerning cultural and environmental heritage on 22 October 1999 (*Decreto Legislativo 29 ottobre 1999, n. 490*) represents a step forward, but it remains insufficient, particularly from the perspective of precautionary protection.

In the relationship between the protection of the natural environment and that of archaeology, a further difficulty should not be underestimated. Once conservation has moved beyond simple maintenance, itself fairly static, the priorities of natural-environmental and archaeological or tourist management may be divergent, or even conflicting (Francovich & Zifferero 1997; Pétrequin & Pétrequin 1999). This has proven to be the case on several occasions in protected areas of northern Italy, where investigative excavation methods, more aggressive than comparative naturalistic methods as regards the land, have encountered a degree of hostility. Thus a sort of ideological confrontation has been created, as to which is the pre-eminent interest, environmental or archaeological. For archaeological heritage management, however, although the accommodation of visitors may lead to certain environmental modifications, the exploitation of resources is desired and encouraged, in so far as the carrying capacity is not exceeded, and the resource itself endangered (Francovich & Zifferero 1997; Scichilone 1988). According to the environmental approach, however, sustainable development must first of all preserve the natural habitat, in that the concept of public enjoyment may not necessarily coincide with the most direct human use. It may be that in the future reserves will be created that integrate both aspects, but from personal experience the absence of mediation will lead to management difficulties.

In Italian law, the legislation protecting archaeological features dates back to 1939 and a legislative overhaul is long overdue. Some forms of environmental protection were anticipated, particularly area rather than site based measures; these have been subject to frequent legal disputes, primarily over the extent of protected areas. The major flaw has been the legislation's application, its terms

being as wide as those implied by the conservation of surrounding environmental conditions, on which the very existence of deposits in a wetland environment depend. Furthermore, if the site appears important from an archaeological perspective, but of little value from an environmental point of view, perhaps because it lies within an environment which has already been altered, for example exploited for agriculture, artisan activities, light industry etc, protective measures are site rather than area specific. This is undoubtedly inadequate as regards the survival of wetland archaeological evidence, which is destined to deteriorate rapidly in the absence of humidity. Measures to consider the special and extremely close relationship between archaeological assets and the natural environment would be very useful. Co-ordinated action of a permanent nature between the relevant ministries should be encouraged and precautionary safeguards should involve those bodies which deal with public works, agriculture and, in particular, planning (Coles 1986; 1987; Fozzati 1999).

At a European level there is ample space for intervention to help raise awareness of the extreme delicacy of wetland environments, and to bring about more positive moves to improve the knowledge, protection and enhancement of these areas. In the last few years, within the context of the Mediterranean basin, there has been a discernible shift of opinion. Together with the protection of the environment, an awareness of the archaeological importance of wetlands has strengthened, or has been renewed, involving new areas. Two recent systematic research projects, although with profoundly different methodological approaches, illustrates this point. In the Ljubljana peat bog, in Slovenia (Cûfar *et al.* 1999; Parzinger & Dular 1997), with a well-known wetland site never previously explored extensively, dendro-chronological work has been carried out in advance of proper excavation. In Greece, thanks in part to European funding, at a wetland site, to the north of Salonika close to the Albanian border in Disipilio, Kastoria, systematic excavation has been carried out by the University of Thessaloniki, under the direction of George Hourmouziadis (1996). This excavation has been linked with a project enhancing and exploiting the site as an archaeological park, where the main attraction consists of hut reconstructions, inspired by Alpine models (pl.12.2. Marangou, this volume).

The issue of reconstruction, together with problems concerning research, publication and the enhancement of lakeside sites, has already been the subject of a stimulating discussion organised by the Greek researchers, in which experts from different European countries took part. Setting aside the existence of different views, regarding the degree of arbitrariness inherent in archaeological reconstruction, the need for a more frequent exchange of experience and opinion compared to that permitted by the traditional means emerged from the discussion. One has only to consider the time lag between the conclusion of research and the actual date of its publication, which may then suffer from limited circulation.

Italian wetland archaeological study

Compared to the countries cited, the tradition of Italian wetland management has without doubt taken on a more significant role, due to the greater concentration of these environments and to the evidence of their successive use, which is worthy of mention. It should be noted that there are three main concentrations of ancient human evidence preserved by wetlands, the Alpine region, the pre-Alpine band and the Po valley, where numerous wetlands are largely connected to settlement areas (*Palafitte mito e realtà* 1982; Aspes *et al.* 1995; Guidi & Bellintani 1996; Bernabò Brea *et al.* 1997). These settlements cover a period of time from the Neolithic to the end of the late Bronze Age, from the fifth millennium to the twelfth century BC. The literature is dominated by the Bronze Age, a period when the historic process of population first profoundly modified the landscape, a notable impact if we consider the extensive use of wood for building purposes, necessary for lake-dwellings and subsistence. Substantial demographic growth is recorded in the Early Bronze Age, between 2200–1600 BC, coinciding with the development of lake-dwellings to the north of the Po, particularly around Lake Garda (Aspes 1997; de Marinis 1997). This phenomenon is closely connected with the development of the so-called Polada culture, from the name of a peat-bog near Lake Garda. This culture, according to the ceramic distribution, covered a wide area, from Lake Pusiano in Lombardy up to, more or less, the territory of the Berici mountains and Euganei hills, and some Alpine areas represented not only in lakeside settlements, but also on dryland, in variable topographical-environmental situations (de Marinis 1997). In the Alpine area and environs, there is a clear relationship between settlement and lakeside location, with settlement on reclaimed banks increasing at the expense of the specific lake-dwelling model during the Middle Bronze Age. A corresponding relationship with watercourses is rarer (Aspes *et al.* 1995). The banks of the lake basins of glacial origin, such as Lake Garda, saw the development of a genuine galaxy of settlements from the end of the Early Bronze Age (Aspes 1997). The sites of Ledro (Rageth 1974) and the peat-bog of Fiavé, which has become particularly well known due to the exceptional degree of preservation, produced a great deal of artefactual evidence, and imposing wooden structures (Perini 1984; 1987; 1994). During the same period the banks of the lesser morainic lake basins were intensely exploited for residential use. Limiting ourselves to some of the most representative sites for the history of these studies we must mention Lavagnone, near Desenzano, which has given us the most complete sequence of ceramic materials from the Early Bronze Age, as well as the famous plough with yoke (fig.11.2 & fig.11.3) (Perini 1980; de Marinis *et al.* 1999), Polada (Barich 1971) and Castellaro Lagusello in the province of Mantova, where the

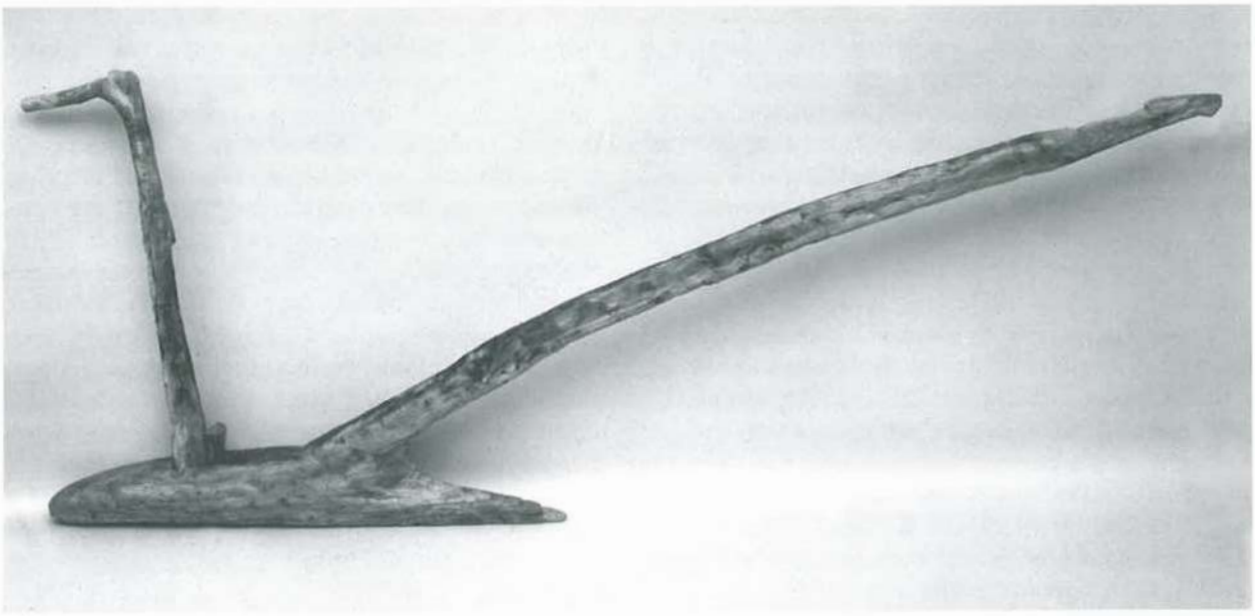

Fig.11.2: Wooden plough, 2.2m long from the Early Bronze Age settlement at Lavagnone (Perini 1987).

excavations conducted by Leone Fasani in 1999 have given us the complete floor of a lakeside dwelling.

During the course of the Middle and Late Bronze Ages, between 1600 and 1200 BC, major population expansion first affected the central Po valley, with systematic colonisation of high environmental impact. The capacity for planning and the exploitation of the area's resources is borne out by the extensive deforestation detailed in the pollen record (de Marinis 1997). This sequence of events is marked macroscopically by the development of the terramare settlements (fig.11.4), which are composed mainly of quadrangular dwellings, rising up on a mound close to a watercourse, surrounded by an embankment or wet ditch (Bernabò Brea *et al.* 1997). Construction was sometimes marked by a floor at ground level, an elevated floor system on dryland, as in the case of S. Rosa di Poviglio in Emilia Romagna (Bernabò Brea *et al.* 1997), or by elevated dwellings in areas subject to flooding at times of high precipitation, as at Castellaro del Vhò di Piadena in the Cremona area of Lombardy, to cite the most recent and extensive research projects of an interdisciplinary nature (Frontini 1997).

Interest in wetland sites developed during the second half of the nineteenth century, stimulated by successful trans-Alpine research, and the lake-dwelling settlements of northern Italy gained recognition. The meeting of Italian and 'trans-Alpine' researchers extended the late Romantic myth of the lake-dwelling into the peninsula (*Palafitte mito e realtà* 1982). In the 1960s, a fertile season of research into the so-called terramare dwellings began (Mutti 1993; Peroni & Magnani 1996; Bernabò Brea *et al.* 1997). An historic relationship between the terramare sites and the lake-dwellings is glimpsed, on structural grounds there is some correlation concerning piling, which first emerged from the terramare dwellings at Castione dei Marchesi (Bernabò Brea *et al.* 1997). Due to the environmental changes that have occurred, the terramares appear to us as dryland sites, though, for instance, the terramare of Cà de Cessi in the Mantova area was originally closely associated with an ancient riverbed (de Marinis *et al.* 1994).

The naturalistic-environmental training of most of the protagonists of nineteenth century research led to significant awareness of the importance of the integration

Fig.11.3: Part of a wooden yoke, 68cm long, from the Early Bronze Age settlement at Lavagnone (Perini 1987).

of environmental and archaeological analysis (Mutti 1993; Peroni & Magnani 1996; Bernabò Brea *et al.* 1997). The sudden flowering of prehistoric studies in the second half of the nineteenth century has been explored by Renato Peroni (1992). Among the factors he identifies is the consolidation of positivist concepts which expressed 'the cult of science as synonymous with progress, as an ethical value' and a 'dispute with the classicist humanism, [which was] seen as culturally backward-looking'. Also, Romanticism, to which we owe the recovery of the 'barbarous and primitive world', as a rediscovery of the historical roots and identity of peoples, often not unconnected with the growth of nationalist ideologies. Peroni (1992) highlights how the nineteenth century theories of Luigi Pigorini concerning lake-dwellings of the Bronze Age were functional in terms of the policy of Italian unification during the Risorgimento by Piedmont, and of Italian adherence to the Austro-Prussian coalition which sanctioned the creation of the Triple Alliance (Peroni 1992; Peroni & Magnani 1996). In fact this theory was based on the assumption of the immigration from central Europe of the Italics who, in successive waves, were assumed to have introduced the Alpine lake-dwelling model, starting from Piedmont. After founding the terramares, the Italics were then assumed to have occupied the whole peninsula, giving rise to the Villanova and Latin civilisations. This strained historical reconstruction, which recognised the pile-dwellers and terramare-dwellers as the forefathers of the Romans, and the terramare structure as the forerunner of the grid layout of Roman towns and *castrum*, for a long time led to the stagnation of both research and debate, which was only relaunched in the 1980s (Peroni 1992; Mutti 1993; Peroni & Magnani 1996).

Research is now marked by the more modern approach of interdisciplinary analysis, directed towards the exhaustive examination of old data and museum collections, and to the acquiring of new information, not only of an archaeological nature, but also geomorphological and palaeo-environmental. This is thanks in particular, to the commitment of Maria Bernabò Brea, Andrea Cardarelli and Mauro Cremaschi, to whom we owe the sample excavation of S.Rosa di Poviglio, near Reggio Emilia. We finally have a large quantity of data that allows, among other things, the partial re-evaluation of the nineteenth century interpretation, for a long time misunderstood (Bernabò Brea *et al.* 1997). A full synthesis of the current state of knowledge was offered to the public on the occasion of a large exhibition opened in Modena in 1997 (Bernabò Brea *et al.* 1997). Its title, 'The terramare, the most ancient civilisation in the Po valley', rings like an implicit didactic explanation of the spread in northern Italy of aspirations for autonomy, propounded by a political force which appeals for a Celtic identity for the Po valley.

This exhibition, evidence of the considerable sensibility towards the popularisation and social role of scientific analysis, crowns an extraordinary period of research of an exemplary nature. The voluminous catalogue places the terramare in relation to contemporary situations in Italy and over the Alps. The presence of embanked villages in the wetland environment of the central Po valley is defined, and the terramare area, up to the plain of Friuli and across the lower part of the Veneto region, is explored in its entirety. Here the researchers have experimented with geomorphological analysis and aerial and satellite photogrammetric surveys, within the context of specific research projects (de Guio *et al.* 1996). This interdisciplinary approach, within the context of research on lake-dwelling sites, established itself during the seventies, when the rate of discovery, particularly in the north-east, intensified.

In this context, the results obtained from the excavations conducted at Trentino by Renato Perini of the Fiavé pile-dwellings stimulated further research (Perini 1984; 1987; 1994). At Fiavé, seven phases of occupation were identified, with some settlement drift and variant construction techniques (pl.11.1). These researches began in 1969, and took on a paradigmatic value in relation to trends that have progressively asserted themselves within the context of Italian wetland research. This has, without doubt, been inspired by the more mature and consolidated methodology practised in Switzerland, Germany and France. Indeed, from this point of view we have passed from an initial phase, with attention directed principally at the evidence emerging from excavations, into a phase of more complex analysis of the natural environment in which the evidence of ancient settlement is preserved (pl.11.2 & pl.11.3). From the very beginning of the Fiavé excavations, specialists from many different European countries were consulted (Perini 1984; 1987; 1994). In 1981, and on the initiative of the Archaeological Heritage Office of the Provincia Autonoma di Trento, the ongoing phase of interdisciplinary research got underway. This was directed both towards a deeper understanding of the interrelationship between man and the environment, and towards the effective protection of the site. Italian, English, Swiss and German experts all participated in these investigations. Coring, boring and laboratory analysis have permitted the history of the lake basin to be defined with much greater precision, identified new anthropic areas to be protected, and highlighted new avenues of research (Brochier *et al.* 1991; 1993). The materials and methods of data collection that were developed have subsequently been adopted at other sites, such as the riverside and river site of Palù di Livenza (Marzatico & Vitri 1991).

As far as Lake Bracciano is concerned, the Neolithic settlement of 'La Marmotta', identified in 1989 following earth-moving work carried out on the bed of the lake, takes on considerable importance due to the exemplary procedure followed during the different phases of conservation, study and enhancement (Fugazzola Delpino 1996). Current research, on the basis of both the

Fig.11.4: View of the wooden structures of the Bronze Age settlement (terramare) at Parma under excavation in 1907 (Bernabò Brea et al. 1997).

radiocarbon dating and the material culture, suggests that it may be considered to be the most ancient lakeshore settlement of the Neolithic period in Western Europe, as specified by Maria Antonietta Fugazzola Delpino, of the Soprintendenza Speciale al Museo Nazionale Preistorico Etnografico Luigi Pigorini, which has since 1976 conducted survey and research into the lakes of Lazio (Fugazzola Delpino 1996).

The exchange of opinions during some of the conferences dedicated to the prominent handling of wetlands, such as those held at Cavriana in 1983 and Acquasparta in 1985, and the presence of the same personnel from private firms excavating in different regions, has without doubt accelerated the circulation of scientific information (*Atti del II convegno internazionale sulle palafitte* 1983–1984; Carancini 1986; Bernabò Brea *et al.* 1997). Thus an informal community has arisen, in which the members, though obviously competing among themselves, gain positive benefits from the spirit of emulation which leads to a relatively homogeneous methodology. This is true not only as regards excavation techniques and the objectives of multidisciplinary investigations, but also for the presentation of data in publications. However, it should be emphasised that such a widespread level of profound knowledge has not yet been reached for individual wetland settlements, when compared to the results of research in the trans-Alpine area. Indeed, despite the wealth of evidence, there are relatively few settlements for which we have information that is sufficiently detailed to determine the exact chronological, cultural, topographical and structural developments in relation to the evolution of the landscape and climate. This limitation is clearly reflected in the inability to construct a satisfactory model of wetland settlement or climatic-environmental evolution, despite the enormous progress made in the understanding of population processes these last twenty years, thanks above all to work done in the wetland sites mentioned above. Interpretation of the phasing of wetland settlement, the fluctuation in lake levels, the progress of glaciers, and of atmospheric radiocarbon levels, is only just beginning, and cannot be compared to, for example, the very advanced work conducted in the French Alps, Switzerland and southern Germany (*Die ersten Bauern* 1990; Arbogast *et al.* 1996; Schlichtherle 1997; Pétrequin *et al.* 1998; Ruoff 1998).

Reconstructing wetland archaeology

It is clear that the continuation of excavation necessarily implies a search for the most appropriate solutions to one of the most crucial problems of wetland management: the restoration of structural remains and moveable organic materials. From this point of view, and in the light of the various solutions adopted at a regional level and the uncertainty concerning their effectiveness over time, the European community may play an important and driving role. In particular, a comparison of the results of the

restoration work undertaken to date is to be hoped for, so that generations to come may appreciate the extraordinary heritage handed back to us by wetlands.

A considerable difference in interest and experience is also evident as regards the involvement of the public, through editorial initiatives, educational proposals and reconstructions. This difference in the Italian scenario is partly due to the different functions and competency of those managing the research eg museums, universities and public offices. Considerable disparity exists as regards the exploitation of the sites and the exhibition of artefacts. Apart from some temporary exhibitions, such as that held in the 1980s entitled 'Lake-dwellings: myth and reality' and the terramare exhibition (*Palafitte mito e realtà* 1982; Bernabò Brea *et al.* 1997), from the point of view of the communication of information, it does not appear to have reached levels worthy of special note.

Recently, and clearly later than has happened north of the Alps, the reconstruction of villages for educational purposes is being undertaken or planned, such as that at Disipilio in Greece (see also Marangou this vol.), Boario Terme in Valcamonica (Lombardy) and at Fiavé in Trentino (Foppa 1999; Priuli 1999; Marzatico 1994). At this last site, in order to avoid giving the public a composite reconstruction, like that constructed in the 1970s at Lake Ledro in Trentino, which receives 40,000 visitors a year, the aim is to build a reconstruction of a precisely defined phase in the life of a village, based as closely as possible on the excavation data (Schlichtherle 1997; Marzatico 1994). In the Po valley, the construction of a terramare is foreseen thanks to funds in a part from the European Community's Raffaello program (Cardarelli & Merlo 1997; Cardarelli *et al.* 1998).

All these reconstructions, together with the intensification of promotional activities linked to the original sites, will represent new opportunities for raising awareness of the need to respect wetland areas as treasure troves of our combined past. The educational function of these new parks, which I believe will saturate that already widespread at a European level, will be all the more effective the more the distinction between theory and reality is highlighted. However, it will be necessary to make radical improvements as regards the capacity for mass scientific popularisation, which in the sector in question is still greatly lacking in Italy, if we exclude the large temporary exhibitions already mentioned. From this point of view, archaeologists have an important responsibility to communicate beyond the restricted circle of experts. As regards this aspect, and the issue of environmental protection, the European Community may play an important role. However, given that knowledge is the point of departure for all forms of management, the production by a European editorial team of a series of maps of wetland sites of archaeological interest, for which a need is felt, both for comparative purposes and for safeguarding the natural heritage, would be a great achievement (Fozzati 1999). Perhaps it would be possible, starting from this volume, to form a working group, which would give rise to such a series of thematic maps, and a bulletin of the *NewsWARP* type.

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12: Greece

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Abstract: *Greek wetlands belong to a variety of types and are of different dimensions and importance. They are not preserved to the same degree, nor do they confront the same difficulties. Prehistoric to last century remains have been found in relationship to wetlands. As there is no overall system for their management as yet, the paper describes representative situations in a variety of wetland types under dissimilar regimes, confronting different problems. Monuments of several archaeological periods, categories and areas were selected. The choice of examples was guided by the availability of information on sites and the existence of serious attempts at management, as, sometimes, there may be scarcely any management, or monuments may remain unidentified. Attitudes to deal with challenges reflect a diversity of concepts and possibilities.*

Introduction

During the last two generations, Greece has drained two thirds of its wetlands, mostly for combating malaria and for land acquisition. Of the 378 Greek wetlands, which cover 200,000 hectares, half the area and 70% of the number are inland wetlands (fig.12.1) (Gerakis & Koutrakis 1996, pp.70–72; Katsadorakis 1999, p.67; for details: EKBY 1995). Wetlands are still threatened: general development policy and measures for its application aim at a maximum economic benefit in the shortest time from the exploitation of natural resources (Gerakis 1990, p.590; Gerakis & Koutrakis 1996, p.69).

Wetlands and water are often mentioned in Greek mythology (Papayiannis 1990, pp.159–161; Soueref 2000b). River-gods had their territory and local cult. Nymphs lived in reed-beds, lakes and sources and protected them. Hercules' labours are connected to wetlands. Ancient writers mention them, including Herodotus who referred to a lake settlement. A temple in Sparta was dedicated to Lacustrine Artemis and lake Stymphalia belonged to her. A sanctuary or oracle of the dead was built by the river Acheron on the bank of lake Acherousia, believed to be the gate to the World of the Dead. Interventions on wetlands were attempted already in antiquity, in order to resolve problems such as flooding, malaria, and irrigation.

Remains from prehistoric to post-medieval periods are preserved in Greek wetlands, as well as traditional constructions and activities, and intangible heritage, such as legends and tales (Papayiannis 1990, appendix I, pp.172–174, 164–165; Soueref 2000a; Peri Ydaton 2000).

Legislative framework

Article 24, paragraphs 1 and 6 of the Greek Constitution (1975/86) stipulates that the protection of the natural and cultural environment constitutes a duty of the State, which is bound to adopt special preventive or repressive measures for the preservation of the environment. Monuments and historical sites shall be protected by the State. Act 5351/1932 on antiquities, for the protection of pre-1830 monuments, stipulates that pre-1453

Fig.12.1: Map of Greek wetlands showing archaeological sites or areas mentioned in the paper (Adapted from Gerakis and Koutrakis 1996 with kind permission of the Hellenic Biotope/ Wetland Centre).

monuments are to be surrounded by a protection zone within which all construction and alteration work are prohibited unless specially authorised by the Ministry of Culture (YPPO). Act 1469/1950 concern sites of exceptional value, historic sites and post-1830 monuments.

The UNESCO recommendation (1972) concerning the protection of the cultural and natural heritage was ratified by Greek Law 1126/81 (Konsola 1995, pp.74, 211, annex II), and the Granada Convention by Act 2039/92 (ICOMOS 1995).

Act 1650/86 on the protection of the environment is the law implementing article 24.1 (Trova 1992, pp.122–123). Act 996/1971 concerns national parks, 'aesthetic' forests and monuments of nature, and Act 998/1979 forests. Act 191/1974 ratifies the Ramsar Convention (review of Greek environmental legislation: OCDE 2000, pp.223–227). All designated Greek Ramsar sites have now been delineated (M. Anagnostopoulou, *pers. com.*)

Even with a protective legislation, there is a clear continuous effort to circumvent the restrictions, on grounds of the 'promotion' of development (Konsola 1990, pp.100–101). International conventions and directives, or national law for the protection of the environment, are not always satisfactorily applied, as conflict of interests and lack of political will may hinder application of protection measures (Jerrentrup & Lösing 1987; Koutrakis & Koutrakis 1995; Gerakis & Koutrakis 1996, p.69). Menoudakos (1998, p.133) recommends the establishment of a special management regime for protected areas and the creation of management bodies with executive power, locally based.

The responsibility for protection of the cultural environment and heritage belongs to the YPPO. The Ministry of Environment, Planning and Public Works (YPEHODE) is responsible for the protection of environment. In 1997 YPEHODE created information centres in Ramsar wetlands, working on planning contracts with local authorities (OTA) and development agencies (Blionis & Yannakon 2000). These contracts were established by Act 1416/84 on decentralisation and local administration (Konsola 1990, p.81). OTA, municipalities and the development agencies of prefectures play a subsidiary role that could be reinforced (Tahos 1998, pp.171, 200–201). Since archaeological and historic sites are part of the cultural identity of the region, regional and cultural politics should be combined. Cultural associations and local press contribute to saving and promoting the cultural identity of regions; this is the dynamic form of 'development from below' in decentralisation (Konsola 1990, pp.33–34, 101, 107–8).

It must be noted that a revision of the Greek Constitution will be discussed in the Parliament. Among others, articles 24 and 95, the latter stipulating the responsibilities of the Greek Council of State (GCS), will be modified (Venizelos 2000, pp.122–123, 172–173). Besides, a new Archaeology Act is in preparation (Tiverios 2000).

A number of cases, each with its problems and methods, are discussed below in more detail, in order to illustrate the situation of archaeological heritage management in Greek wetlands.

Restoration of lost wetlands: The case of former Lake Karla (Thessaly) (fig.12.2 & 12.3)

Had Lake Karla (Voiviis) existed today, it would have been one of the five most important of Greek wetlands from the ecological point of view (Babatzimopoulos & Antonopoulos 1990, p.465). It is an important area for birds, situated in the south-eastern part of the Thessalian plain, and its abundant fish saved and nourished Northern and Central Greece during German occupation (Exarchopoulos 1999, pp.47, 63).

Karla was relatively shallow (4–6m) (Exarchopoulos 1999, p.45). Its extent varied from 4,500 to 18,000 hectares depending on rainfall and floods from the river Peneios. Floods, malaria and the need for agricultural lands resulted in its draining towards the Pagasetikos Gulf in 1962. There was neither a study of environmental impacts nor any objection. An initially planned reservoir was not completed (Koutseris 1990, p.544; Exarchopoulos 1999, p.85–86). The negative results accumulated: soil salinity, floods, sea pollution, change of the microclimate, lowering of the aquifer, subsidence, and also social consequences, such as migration of fishermen, who did not obtain land (Exarchopoulos 1999, pp.1, 15–17, 89, 118; Valaoras 1998, pp.774, 776).

Lake Karla is rich in mythology and ancient history. In the earlier Holocene it may have had 20m depth and must have been larger, reaching to the Peneios, as is shown by the distribution of Neolithic settlements identified during surveys (Grundmann 1937, pl.37; Gallis 1992, maps 1 & 3; Palikaridou 1998, p.53), which show dense occupation around its shores. Ground water was possibly at 4–9m below the surface, one more reason to attract settlement (Exarchopoulos 1999, p.35). Grundmann (1937) and other archaeologists have confirmed that the level varied considerably, resulting in significant shifts of the shoreline (Palikaridou 1998, pp.52, 112). Diachronic changes of hydrology have been studied by Helly *et al.* (2000).

In the Neolithic, the hills of Petra (with impressive Mycenean walls), Hatzimissiotiki Magoula and Sifritzali were islets in the lake (Exarchopoulos 1999, p.59). Hatzimissiotiki (Grundmann 1937) was an island till 1962, used by fishermen as a station (cf. Palikaridou, 1998, pp.60, 68, 71). In the classical period, the lake waters had retreated; large extents of land were available for

Fig.12.2: Former lake Karla (south-eastern Thessaly) in 1952. On the foreground, Hadzimissiotiki, an island then, as in the Neolithic, used as a fishing station. Part of a Neolithic site was excavated here in the 1930s. (Takis Tloupas, exclusive copyright).

cultivation in the Hellenistic and Roman periods (Helly *et al.* 2000, p.22). There is also an amazing ethnographic/cultural wealth related to the lake. Nine months a year, Karla fishermen lived in reed-and-straw huts (Exarchopoulos 1999, pp.70–71), part of their fishing weirs (EKBY 1999, p.87).

The exact impact of the draining of Lake Karla on archaeological evidence is unknown, not least because exhaustive survey was not carried out prior to the drainage. As around the Federsee in North Germany, or Fiavé in northern Italy, little of Lake Karla's archaeological and palaeoenvironmental heritage would be known from surface features alone. When it was drained, and the shoreline receded, buried waterlogged deposits will have been desiccated and degraded. Perhaps the most important question now is whether or not anything of significance remains in the deeper levels.

The acute problems after draining created an unprecedented consensus to 'restore Karla', that is, to create a 3,800 hectares reservoir (YPEHODE 1999, p.19) with ditches, and water pumping stations (Valaoras 1998, p.775). It seems impossible to restore fully wetland habitats, because of the relative depth and the big yearly variation in the level of the reservoir (EKBY 1999, p.88). According to Valaoras (1998, pp.775, 779), the case presents challenges, due to the severely deteriorated

Fig.12.3: Former lake Karla (south-eastern Thessaly) after draining in 1962. The boats are of a particular local type. (Takis Tloupas, exclusive copyright).

ecological conditions, the multiplicity of objectives, and the need for integrated management planning of the entire Karla catchment. The restoration may halt the degradation of waterlogged deposits to some extent, but it cannot put back the original richness of evidence. However, to preserve and promote the cultural and historical heritage, some of the former habitats, huts and boats will be reconstructed in a 30 hectares wetland near the reservoir (EKBY 1999, pp.88–89).

The creation of an anthropological and ethnographic eco-museum, promoted, among others, by the Centre of Research of the Culture of Lake Karla (Exarchopoulos 1999, p.143), also intends to help eco-tourism in this area, rich in monuments, traditional settlements and cultural values (Exarchopoulos 1999, pp.128, 131, 146). An information centre, tourism infrastructure, access roads, recreation areas and activities are planned (YPEHODE 2000).

A list of identified sites of all periods in the area of the works has been prepared by the YPPO. Local Ephorates will supervise the restoration works; the enterprises will fund possible excavations and study of finds (Exarchopoulos 1999, p.157). The museum should be constructed according to YPPO's suggestions and possibly receive archaeological finds (YPEHODE 1999, pp.16–18). The awareness of archaeology and its incorporation into the planned 'development' is a contrast to the 1960s drainage.

The Acheloos river diversion (Aitoloakarnania - Thessaly) (pl.12.1)

The sources (Epirus) of the second longest Greek river, the Acheloos, are included in the Natura 2000 network and its Delta area, which is within the Mesolonghi wetlands (Aitoloakarnania), is a Ramsar wetland and a Special Protected Area (directive 79/409/EEC) (Vasilakis 1999).

The Acheloos was dammed at the start of the systematic development of hydroelectric energy production in Greece. Four units already function along its course, the construction of two others being in progress. The diversion of the river would cause it to flow, instead of westwards to the Ionian Sea, eastwards through Thessaly and to the Aegean. This has been on DEH's (Public Electricity Enterprise) agenda since 1983 (Leontaritis 1999). This may be one of the most discussed and complex and largest technical works ever to be done in Greece. Its negative results for the lagoons, habitats, and wet meadows of the Delta and the biotopes of the upper river area have often been stressed (Vasilakis 1999), as has the submergence of archaeological monuments and villages due to the construction of dams.

A smaller diversion (50% of the Acheloos water), as decided later, would damage DEH's interests, but the organisation still hopes to persuade the state to contribute to the construction of two more hydroelectric stations (Kakoulidou 1999). Acheloos would help irrigate Thessaly, prevent falling ground water and preserve the Peneios ecosystem. It has been pointed out that nowadays Acheloos 'does not have a natural behaviour' at its delta, since there are already three reservoirs and dams on its course (Leontaritis 1999). Artificial lakes have already submerged the temple of Panayia Preventza and the Episkopi of Euritania (thirteenth century); their frescoes had previously been removed (Paliouras 1999).

The wetlands of the Acheloos delta region are likely to hold a complete archaeological and palaeo-environmental record, which will however have little surface expression to attract the attention of those involved in planning the river diversion. The record in the upper reaches may be less diverse but still of significance, comparable for example to those from the upper Seine in France or the Po in northern Italy. Already, the hydroelectric works on the river will have affected wetland deposits, and destabilised them wherever the former hydrological regime has been altered. Further works will aggravate the situation, with diversion of the river having serious adverse effects.

In addition to loss of wetland archaeology, the 'development' of the river will affect historic buildings and bridges associated with its past. One of the monuments to be submerged, the Monastery of St George of Myrofyllo (Paliouras 1999) is under repair by the programme LEADER (Euthymiopoulos *et al.* 1999, pp.115, 117). Also threatened are old stone bridges, such as at Petroto and Mesokhora (Tasios 1999), the network of traditional hostels (khania), and partly preserved stone-paved paths along the river (Provopoulos 1999). Other as yet unknown monuments, sites and towns will remain unknown in the absence of systematic survey in this enormous area (Euthymiopoulos *et al.* 1999, pp.115, 117).

YPPO has asked for documentation and inventories of all the monuments that will be submerged (Euthymiopoulos *et al.* 1999, p.115; Tasios 1999) and suggested removing parts of the Monastery. YPEHODE proposed videotapes, scale models and transfer of frescoes (responsible YPEHODE department, *pers. com.*). A proposition to 'encapsulate' the monument has been made (Myrofyllo 1997, p.41). Local associations asked to have it transformed into a Museum. Hatziangelakis (1999) proposed to create a museum of the movable finds in one of the ancient castles or settlements on the Thessalian side of the river; these could constitute an archaeological network and cultural itinerary in combination with the works of the diversion. None of this, however, preserves the integrity of the river's heritage, nor will it advance the management of any remaining waterlogged deposits.

Damming a river to retain water for hydroelectricity schemes also threatens archaeological remains by erosion. This is illustrated by the situation in another Greek river,

on the middle course of the Aliakmon in Western Macedonia. The Polyfytos lake created by a dam for the construction of a hydroelectric station (1975) is in constant extension with more and more sites from the Neolithic onwards destroyed, or in danger of erosion and looting of thus uncovered finds (Chondrogianni-Metoki 1996). In anticipation of the construction of a new dam, there was systematic survey and selective salvage excavation covering an area 30km x 2km, which revealed about a hundred settlements and cemeteries of various periods (Chondrogianni-Metoki 1998; 1999). Artificial lakes along the Acheloos will have similar damaging effects.

To return to the Acheloos, in 1994 and 1995, appeals by NGOs against its diversion resulted in decisions by the GCS invalidating the decisions in favour of the works, since no environmental impact study had been prepared. This was subsequently done very quickly, and the diversion works have continued since, as the diversion itself was never called into question (responsible YPEHODE department, *pers. com.*), although a second appeal was tabled in 1996. The GCS decision on this appeal, published in November 2000, invalidated the approvals of the works as violations of the Granada Convention (Th. Nantsou, *pers. com.*).

According to an ICOMOS: Hellenic (2000) conference, studies for the protection of environment and heritage and evaluation of monuments and historic sites were done very fast and included no estimate of the loss of ethnographic, social and anthropological elements. The rich fauna and flora of the area will disappear under the yearly fluctuation of the lake surface. The revival of discussion around the theme of protection was considered to be an immediate objective.

At the time of writing, the November 2000 decision of the GCS, together with the outcome of the ICOMOS: Hellenic conference, suggest a greater realisation of the consequences of diverting the Acheloos. The impact on standing buildings has now been made apparent and it is to be hoped that the activities of the European Archaeology Council will draw attention to the equally significant buried heritage of the wetlands of the Acheloos valley and delta.

Western Macedonian lakes

The Dispilio (Kastoria) lakeside settlement reconstruction and eco-museum (pl.12.2)

Lake Oresteiada in the Kastoria basin at 620m above sea level has a surface of approximately 28km^2. Its level can be regulated artificially (average depth 4.5m), and ground water fluctuates periodically (Vafeiadis 1983, pp.46, 115–116, 119). The lake, included in the Natura 2000 network, is an Important Bird Area, and a place of special aesthetic beauty.

Systematic excavations started at Dispilio, on the southern bank, in 1992, under the direction of George Hourmouziadis (1996), revealing a sixth to fourth millennium BC settlement. A reconstruction of a prehistoric lakeside settlement was realised in an area of 2 hectares, including reception and recreation areas (Makednon Municipality 1999). A museum, an information and promotion centre and workshops for the finds will be incorporated. The work was carried out through a contract between the Municipality of Dispilio, the Ministry of Macedonia and Thrace, Aristotle University of Thessaloniki and the Development Agency of Kastoria (ANKAS 1999, pp.3, 8, 11).

Eight 'thematic' wooden huts of various dimensions were constructed, four on wooden platforms within the lake, and four outside the lake, combining elements from different phases and practices based on the fragmentary excavation data (Hourmouziadi *et al.* 2000). Construction was also partly based on stability and feasibility reasons and the wish to 'use uncertainties and open questions' (Almatzi *et al.* 1999), in a combination of contemporary methods and those 'presumed to have been used by prehistoric constructors'. Experimental archaeology was not the sole goal: it was abandoned when other priorities imposed this, for example, whenever the time, labour and money required would be disproportionate to the possibilities and intentions (Hourmouziadi *et al.* 2000).

Material found during excavations at Dispilio and elsewhere was used as well as material for which it was 'presumed that it must reasonably have existed'. The approach is based on the 'horizontal community of features of Neolithic settlements' and the 'chronologically vertical community of lake settlements' including ethnography. The reconstruction is not meant as a final answer, but as a basis for discussion (Almatzi *et al.* 1999). The result addresses all visitors, each one selecting according to their own knowledge and interests (Hourmouziadi *et al.* 2000). The Dispilio reconstructions are important for raising public awareness of the past, and especially of a past that was not 'monumental'. As at Chalain (Pétrequin, this vol.) or on the Federsee (Schlichtherle, this vol.), reconstructions based on wetland evidence can appeal directly to the visitor.

The wetland - National Park: Lakes Mikri (Little) and Megali (Great) Prespa

Mikri Prespa and Megali Prespa, the highest lakes in Greece (Mikri: 853.5m; Megali: 850m above sea level; maximum depth 8.4m and 55m), are situated at the frontiers with Albania and FYROM and divided from each other by a peninsula 4km long, and 200–1000m wide. Mikri Prespa's level varies during the year by between 0.8m to 1.8m (Katsadorakis 1996, pp.8, 9, 11).

Mikri Prespa is a Ramsar wetland, declared a National Park in 1974, an Important Bird Area and an area of

community interest (Natura 2000) (Catsadorakis & Malakou 1997, p.189). In 1975 the lakes and their periphery were declared a Site of Exceptional Natural Beauty. This is one of the very few wetland areas where so many funds have been granted for economic development and nature promotion, and the lakes were the object of the first integrated studies of nature and wetland landscape management done in Greece (Gerakis & Koutrakis 1996, pp.185–186).

Prespes is both a national park and a Ramsar site. The Forestry Department of Prefectures is responsible for the management of national parks, while Ramsar wetlands fall under the jurisdiction of YPEHODE (Kasioumis 1995, pp.505, 509). Forest Law concerns areas without human permanent settlements, but in Prespa with its 28,000 hectares, 12 villages and 1,300 inhabitants, conditions are different (Katsadorakis 1996, p.182). Protected areas are zones of strict protection of nature without any human intervention (Kasioumis 1995, p.495). Yet, in cultural landscapes such as Prespa, it is difficult to distinguish what is natural and what is not: here the conservation of habitats and wildlife is based upon coexistence with man and his cultural activities, such as fishing and animal husbandry. What is required is 'not to reach as much a natural state as possible, but as much an ancient man-made state as possible' (Catsadorakis & Malakou 1997, pp.94, 176–195). Landscape, biodiversity and culture are the main values of the Prespes (Gerakis & Koutrakis 1996, p.186).

A local non-profit organisation, the Society for the Protection of Prespa (SPP), has experimented since 1997 with a three-year reed management plan (Katsadorakis 1996, p.119) in the Pyli area. It received in 1999 a Ramsar international award, in the NGO category, for its pioneer methods of management and protection. Active contribution of local communities to the protection of the area is SPP's basic philosophy.

According to local oral tradition, all the settlements of the area were once on the banks of the lakes. Malaria, rising water levels and defence reasons made the inhabitants move to higher or more isolated areas (Karadedos & Tsolakis 1998, p.12). The oldest traces of settlement date from the Bronze and Iron Ages (Katsadorakis 1996, p.32), Hellenistic and Roman vestiges exist on St. Achilleios islet (initially a peninsula) and on the shores of Little Prespa, while a medieval city developed on the islet since the eighth century (Theologidou 2000). At the bottom of the lake a Byzantine paved road, and among the reeds the tower of the citadel gate can be seen (Païsidou & Theologidou 1998a). Most standing monuments are Byzantine or post-Byzantine churches, and a number of hermitages are attested since the thirteenth century on the Megali Prespa shores (Theologidou 2000). Some rock paintings may be vestiges of abandoned hermitages (Païsidou & Theologidou 1998b), today inaccessible from land (Evgenidou *et al.* 1991, pp.50–53). All of this evidence around the lakes suggests that there will also be evidence buried in the waterlogged deposits of the lake margins, similar to those known from the circum-Alpine lakes.

Deterioration problems of the standing monuments are due to devastation, abandonment, and exposure to weather conditions, decay (particularly for mud mortars) and bombardment during World War Two. In 1995, the eleventh Ephorate of Byzantine Antiquities (EBA), responsible for the safeguarding of Byzantine and post-Byzantine monuments, in collaboration with the Prefectoral Administration of Florina, started a project, financed by the European Union and the Greek State, for the repair, consolidation and promotion of monuments. The project includes drawings of the present condition, archival research and archaeological excavations. Interventions are minimised, so that the authenticity and historic value of the monuments be preserved. Notes, photographs and samples of building materials taken during the works are being studied further and analysed (Theologidou 2000).

On the 2000 World Wetlands Day (2 February), the Prime Ministers of Greece, Albania and FYROM, meeting at Prespes, declared the creation of a transfrontier Prespa park. This will include the environmental protection and sustainable development of the Prespa lakes and their surroundings. Co-ordination of management of natural ecosystems in the broader area is their first objective (M. Anagnostopoulou, *pers. com.*). It is to be hoped that in addition to this welcome development, and the on-going work on surrounding monuments, the potential of the buried waterlogged heritage will be recognised, leading to assessment and protection.

Coastal wetlands

'Sandy Pylos': Gialova lagoon and Voïdhokilia bay (South-Western Peloponnese)

Homer's 'sandy Pylos' is in Messenia and consists of a coastal plain to the north of the Navarino gulf, the Gialova lagoon and Divari (vivarium, used for pisciculture), and to the NW, Voidhokilia bay, open to the Ionian Sea, the latter declared a Particularly Beautiful Landscape. Gialova is a Natura 2000 site and an Important Bird Area. The coastal wetland and periphery reach 700 hectares (Gerakis & Koutrakis 1996, p.328).

Gialova has brackish water and communicates with the Navarino gulf by means of a narrow channel. Mud flats and wet meadows are inundated most of the year. In the Voïdokilia sand dunes, African Chameleon and Sea turtle (*Caretta caretta*) breed; they are included in a LIFE-Nature project (Gerakis & Koukrakis 1996, p.327–9; Bonetti 1998a; 1998b). Gialova was damaged by channels, ditches and roads, and its size reduced by draining in the 1950s.

There are an estimated 700 pre- and protohistoric sites in the prefecture of Messenia. In the area considered here sites are known from the Neolithic onwards. In recent times the famous battle of Navarino, which gave Greece its independence, took place in the gulf, attested by sunken ships still lying on its bottom, near the eastern coast.

Excavations have revealed important sites around these wetlands (Korres 1985; Yalouris 1966; 1968). One understands then the objections to the planned construction of a national road by the wetland, between Gialova and Pylos (Korres 1998). To these are added objections to the creation of a large (770 hectares) luxury tourist resort near Pylos in an Area of Integrated Tourist Development (POTA), considered a danger for the environment, as well as for the antiquities. The project will bring enormous changes, in particular if there is no previous study of environmental impact, no previous intervention for the protection of monuments nor a study for the wise use of natural resources. It involves extensive road works, construction of two golf courses, a congress centre, water-pools (Ta NEA 1999). These concerns were also expressed in a question at the Parliamentary Assembly of the Council of Europe (1998).

After basically negative reports by the responsible Ephorates and objections, the Central Archaeological Council (CAS) finally voted (1999) to accept delineation of the resort areas under certain conditions, namely to guarantee timely archaeological research in the area, funded by the enterprise. If antiquities are found, the enterprise must enhance them and possibly change plans of buildings and access routes. Free access to archaeological sites should be guaranteed, neither constructions nor interventions should be done on the coastline zone ('aigialos') and in the maritime area. The plans of any constructions should be presented to the CAS (Parnassas 1999). As stated above, where a conflict of interests like this involves wetlands, it is important that all parties are aware of the potential for waterlogged archaeological and environmental remains, and that the protection and management of these is built into the decision-making process.

Mesolonghi wetlands (Aitoloakarnania)
Deltas, lakes, bays, lagoons, including the Mesolonghi-Aitoliko lagoon which is a Ramsar wetland of 14,000 hectares, forests and a rich cultural heritage with traditional settlements and monuments of all periods coexist in Aitoloakarnania, although only 100 out of 5,000 hectares of marshes are left (Katsadorakis 1999, p.192). Local agencies (law 2742/1999) are charged with the management of the wetland resources and the preservation of their aesthetic and ecological value (Pergantis & Petrou 2000).

The coastal marshy environment offered safety and abundant food resources: important cities flourished here in antiquity (Gerakis & Koutrakis 1996, p.281). Oiniades, in a very strategic position (Moskhos 1999), had a monumental fortification, a theatre, an important port with shipsheds for its warships and other public buildings (Kolonas 1992). Its territory extended on both banks of the Acheloos (Schoch 1997, pp.52, 54–55). Initially a coastal city (Kolonas 1992) on the estuary, and later joined to the mainland it then became a hill in the shallow lake-marsh Meliti (Pergantis & Petrou 2000, p.24). The marsh was drained in the 1930s (Gerakis & Koutrakis 1996, pp.272, 276). Currently the monuments are often flooded because of the high aquifer.

A new YPPO sub-programme on 'Promotion and Enhancement of Ancient Oiniades', in the framework of a programme including the towns Pleuron and Palairos, has recently been approved (2001–2007). It will include research, consolidation, further excavation and management of Oiniades into an organised archaeological site (sixth EPCA; Y. Moskhos, *pers. com.*).

Skhoinias (Attica)
On the north-eastern coast of Attica, where wetlands are rare, Skhoinias, with its noteworthy flora and fauna, is of primary importance for the area. The 40 hectares of remaining marsh take water from rainfall and the Makaria source. To the south, a coastal pine forest still exists (3km x 400m) (Gerakis & Koutrakis 1996, p.331). Skhoinias was *not* included in the Natura 2000 network. Coastline changes had repeatedly modified the environment in prehistory (Baeteman 1985).

Important remains have been excavated in the area (Travlos 1988, pp.216–223). The marsh and forest are mentioned by Pausanias in connection with the battle of Marathon against the Persians in 490 BC. The victory messenger ran the first Marathon starting from this area. This brings us to the 2004 Athens Olympic games: at the time of writing, the construction of rowing and canoeing facilities is planned to cover a significant part of the Skhoinias wetlands; the latter will be declared a national park. Objections have repeatedly been expressed by environmental NGOs (Athens News 1996; WWF 2000). Here, then, is a further example of an ancient wetland, with both archaeological and environmental potential, where these heritage values need to be taken into consideration in the debate over its future.

Heridanos: the City river (Athens, Attica)

Its 'rivers' of discontinuous flow were never sufficient for Athens' needs (Kokkou 1989, p.154); they nevertheless influenced its development. 'Heridanos, the river of the ancient city' has been included in the environmental themes of the Department of Educational Programmes, Directorate of Prehistoric and Classical Antiquities, since 1992, after the initiative of the Council of Europe 'Europe seen by its rivers', as well as in the European Heritage Days 1999–2000, under the general theme of 'Water of Life' (Chryssoulaki 2000; Pini 2000).

A part of Heridanos is preserved in the Kerameikos ancient cemetery. Besides, during the Underground construction (1993), its bed was identified at 6m under the surface, excavations discovered some more parts and its course was reconstructed (Pini 2000; YPPO & EYDAP 2000). The CAS decided that the section discovered in the Monastiraki area will remain visible; the river will receive water from its own sources (Dizelou & Tsinari 2000).

Conclusions

Archaeological heritage management of wetlands in Greece is not centrally regulated, but protection of both cultural and natural environment is a duty of the State. Much depends on local initiatives and possibilities. Regional Ephorates of Antiquities, local authorities and environmental or cultural organisations may play an important role.

Problems are often created when there is conflict of interests, in particular if economic developments such as energy production and tourism prevail over culture and nature. Lack of political will in such circumstances is of course decisive. This is understandable in a country where water is precious and water resources have always been either exploited, rivers as power generators, lakes as irrigation water providers, coasts as holiday resorts, or feared, as marshes and flooding lakes, which were drained. Nevertheless, water is also closely linked with Greece's remotest history as well as present identity. The wealth of natural, archaeological and cultural heritage probably constitutes the most important asset of Greece. When this is at stake, its preservation should carry weight.

Fortunately, much effort has been applied in recent years in some wetlands in order to enhance and protect their heritage and there is considerable work in progress. Besides, environmental impacts are now assessed, and the Archaeological Service presents its conditions, when 'Great Works' are planned, in particular in wetland areas. It is only to be hoped that previous negative experience will help evaluate ambiguous situations and that heritage management will in the future be more systematically and efficiently provided for. It is also to be hoped that all organisations and individuals concerned with wetlands will come to recognise the potential for buried, waterlogged remains, in some contexts if not in all. To protect and manage these, they need to be identified, and methodical surveys for this purpose would be a welcome development in Greece.

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13: La Suisse

Denis Ramseyer

Résumé: *Pour évoquer la gestion et la protection du patrimoine en Europe centrale, nous avons choisi une région particulièrement riche en vestiges préhistoriques, celle des lacs du Plateau suisse. La Suisse a connu à partir de 1960 une période particulièrement féconde dans le domaine de l'archéologie grâce à la construction des autoroutes. Près de 100 millions d'Euros ont déjà été dépensés en Suisse depuis cette date pour l'archéologie dans le cadre de ces grands travaux. Si ces derniers ont incontestablement permis de décupler les connaissances sur notre passé, on doit aussi constater qu'il ne reste aujourd'hui, au bord des lacs, que de rares parcelles archéologiques intactes pour les générations futures.La prise de conscience de la fragilité de notre patrimoine archéologique et de la nécessité de sauvegarder et de gérer les vestiges en milieu humide est un phénomène récent. Il a fallu attendre en effet 1983 pour voir se concrétiser le premier ouvrage de protection sur le lac de Neuchâtel, suivi par d'autres dans les années 1990 sur les lacs de Morat et de Bienne. Les mesures de protection sont certes indispensables, mais les réalisations effectuées jusqu'à ce jour sont insuffisantes et fragiles, sans garantie sur le long terme.*

Il est urgent de mettre sous protection quelques unes des zones archéologiques les plus riches. Deux exemples significatifs sont évoqués ici: ceux de Montilier et de Greng, sur les rives du lac de Morat. On ne peut éviter le développement touristique et économique d'une région, mais celui-ci doit se faire en respectant les milieux naturels et par la même occasion les sites archéologiques qui sont situés dans les mêmes secteurs. Des discussions sont en cours pour sauver notamment ces deux zones archéologiques de valeur européenne. Des premiers résultats tout à fait positifs et encourageants ont pu être obtenus depuis peu, mais il reste encore beaucoup à faire pour les mettre définitivement hors de danger.

Introduction: La Rencontre de Marigny

La Rencontre Internationale de Marigny (lac de Chalain, France) avait réuni en 1994 une trentaine de spécialistes venus de France, de Suisse, d'Allemagne et d'Angleterre pour parler des mesures de protection des sites archéologiques en milieu humide. A cette occasion, différentes réalisations techniques ont été présentées et discutées, afin de proposer des solutions pratiques et efficaces pour sauvegarder les sites les plus menacés. Ce premier contact fut très enrichissant: il permit notamment de mieux orienter les travaux de protection et d'éviter de renouveler des erreurs commises pour certains d'entre eux.

Fig.13.1: La Suisse et les Trois lacs.

Si ce premier colloque international, publié deux ans plus tard (Ramseyer & Roulière-Lambert 1996), portait exclusivement sur les aspects techniques des ouvrages destinés à protéger efficacement un site archéologique contre l'érosion ou l'assèchement, il convient maintenant d'aborder le thème sous l'angle éthique et politique.

Historique des recherches et évolution des mentalités

L'historique des recherches archéologiques en milieu humide, sur les rives des lacs, le long des rivières et dans les tourbières, est révélateur du changement de mentalité des chercheurs au cours de ces cent cinquante dernières années (Ramseyer 1992).

Dans le cas de la Suisse par exemple (fig.13.1 & fig.13.2), les soixante-cinq années qui ont suivi la découverte des premières palafittes en 1854 peuvent se résumer à un ramassage non contrôlé d'antiquités, dont le seul objectif était de collecter de beaux et de curieux objets. Cette période est marquée, pour la partie occidentale de ce pays, par les travaux de la 1ère Correction des Eaux du Jura, qui ont provoqué l'abaissement des

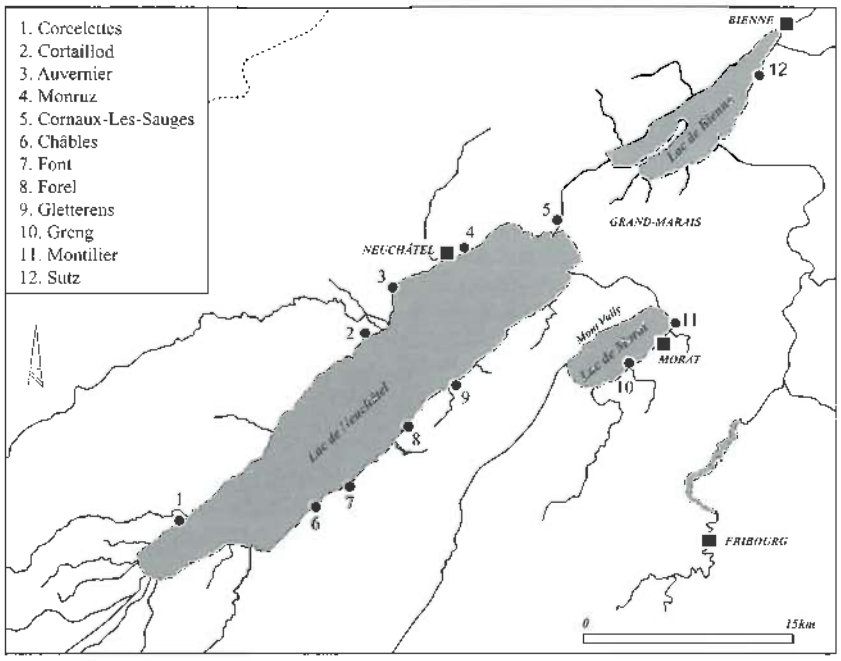

Fig.13.2: Situation géographique de la région des Trois Lacs et du Grand-Marais en Suisse occidentale et sites mentionnés.

niveaux des Trois Lacs de 2.7m et qui avaient pour but de gagner des terres agricoles et de prévenir les inondations. Ces travaux ont mis à nu des dizaines de villages lacustres préhistoriques jusqu'alors immergés; on pillait les sites dans une optique souvent lucrative, antiquaires professionnels ou amateurs de trésors livrant leurs découvertes au plus offrant. Dans l'esprit populaire du XIX[e] siècle, les vestiges appartenaient à tous: on ramassait les haches et les épingles en bronze comme on cueillait des champignons. Une description du pillage des rives du lac de Neuchâtel en dit long sur la mentalité de l'époque:

> Aussitôt, tel un vol de corbeaux sur un champ fraîchement labouré, une nuée de chercheurs et d'amateurs d'antiquités s'abattit sur ce nouvel Eldorado où chacun fouillait, creusait, remuait la terre, pillait en un mot et saccageait nos stations qu'aucun arrêté gouvernemental ne protégeait contre la rapacité de ces modernes vandales. Les riverains pouvaient profiter du beau temps pour fouiller; aussi échangeaient-ils le produit de leurs recherches contre de beaux écus sonnants et trébuchants. Mais tout a un fin; les stations dévastées s'épuisèrent et le petit commerce périclitait. C'est alors que surgit l'âge de la corne et son industrie. On le dénomma ainsi parce que les faussaires se servaient des cornes ou bois de cerf qu'ils trouvaient en grande abondance dans les stations lacustres (Peissard 1941, p.2).

Pourtant, dès la fin du XIX[e] siècle, des lois cantonales avaient été émises pour freiner cette frénétique destruction des sites. Elles étaient malheureusement peu respectées, mais quelques érudits ont réfléchi, dès cette époque, à la signification scientifique et à la valeur historique des objets découverts.

Dès les années 1920, une approche archéologique plus rigoureuse, plus scientifique, où l'on se soucie des différentes couches sédimentaires et de la mise en relation des différents objets dans leur contexte de découverte, apparaît. Paul Vouga a été l'un des pionniers dans ce domaine. Les fouilles qu'il a menées à Auvernier près de Neuchâtel dès 1919 sont exemplaires. Avec l'apport de la notion de stratigraphie, un progrès très net est ainsi amorcé, mais les sites sont si nombreux et si riches que personne ne préconise encore leur mise sous protection. Durant la première moitié du XX[e] siècle, on vendait parfois les objets que l'on découvrait pour pouvoir financer les campagnes de fouilles suivantes!

Le premier cas de fouille 'moderne' menée au niveau d'une région est celui de la 2[e] Correction des Eaux du Jura (1962–1969). Des travaux importants destinés à régulariser le niveau des lacs de Neuchâtel, Bienne et Morat, dans une région au potentiel archéologique exceptionnel, ont été menés durant une dizaine d'années. C'est dans la phase d'élargissement des berges de la Thielle et de la Broye que les sites archéologiques ont été explorés, sous la conduite de l'archéologue Hanni Schwab. Villages néolithiques, atelier de potier de l'âge du Bronze, pont celtique effondré (fig.13.3), pont romain, et bien d'autres vestiges encore, dans un état de conservation remarquable, sont apparus le long des cours d'eau élargis, réaménagés et canalisés dans cette vaste zone humide que l'on nomme le Grand-Marais (Schwab 1990; 1999).

Diverses menaces pèsent aujourd'hui sur les sites archéologiques encore conservés dans la tourbe qui caractérise les plaines fertiles entre les lacs: tassement des couches organiques de surface (sur près d'un mètre de hauteur durant le siècle écoulé), projets de labours profonds (heureusement non réalisés jusqu'à présent),

drainages, constructions de bâtiments. Le Grand-Marais et ses terres fertiles cultivées depuis l'époque préhistorique ont subi les outrages de divers aménagements au cours de ces dernières décennies, mais de vastes zones humides, renfermant encore des vestiges archéologiques fort bien conservés, sont aujourd'hui encore épargnées. Il s'agit donc d'être vigilants et de contrôler tout nouveau projet qui pourrait nuire à la préservation de ce patrimoine.

Le deuxième exemple à mentionner est celui des autoroutes, avec la promulgation en mars 1961 d'une loi liée à la construction des routes nationales, qui stipule que des fouilles archéologiques préventives doivent être entreprises s'il y a menace de destruction des biens culturels. En plus, les aménageurs des autoroutes financeraient à raison de 90% les travaux archéologiques situés dans l'emprise de constructions.

La signature de cette loi a été un tournant décisif pour l'archéologie suisse, un moment clé qui allait relancer la recherche archéologique à un niveau jamais atteint jusqu'alors. Depuis 1961, près de 100 millions d'Euros ont été octroyés à l'archéologie suisse par la

Fig. 13.3: Squelette sous le pont celtique effondré à Cornaux-les-Sauges sur la Thielle (canton de Neuchâtel), Ier siècle avant J.-C. Photo H. Schwab.

Confédération, dans la cadre de la construction des autoroutes (Kaenel *et al.* 1998). Une grande partie de ces travaux a touché les zones humides des lacs de Neuchâtel et de Bienne et a fait l'objet de recherches de grande ampleur, livrant un matériel archéologique d'une impressionnante richesse. Une partie de ces richesses archéologiques seront exposées au LATENIUM, le nouveau musée d'archéologie de Neuchâtel, à partir de l'automne 2001.

La période 1960-1999 est la plus sensible au niveau de l'évolution de l'état d'esprit de la population et des pouvoirs politiques vis-à-vis de notre patrimoine. Pour les archéologues, le sentiment général qui domine a été celui d'une prise de conscience d'une chance unique à saisir: pouvoir fouiller des habitats préhistoriques de manière scientifique, sur de longues durées, sur de grandes surfaces, avec du personnel qualifié et des moyens financiers considérables, constituait en effet une opportunité qui ne se reproduirait pas de sitôt. La recherche archéologique en Suisse a passé d'un seul coup d'un statut de bénévoles, chercheurs amateurs passionnés, à un statut de professionnels. En quelques années, des moyens financiers considérables ont permis un développement scientifique impossible à réaliser à grande échelle dans le cadre de fouilles cantonales, dont les moyens financiers sont plus limités.

Mais, parallèlement à ces énormes fouilles préventives menées au niveau national, où l'archéologue est sans cesse talonné par les pelles mécaniques et doit agir au plus vite, les chercheurs commencent à réaliser, à partir des années 1980, qu'ils sont en train d'épuiser les gisements par des sauvetages quelquefois démesurés: autoroutes, ports, maisons d'habitations: l'asphalte et le béton envahissent le paysage à grande vitesse, détruisant du même coup notre patrimoine.

De plus, au moment même où l'on réalisait qu'il fallait mettre sous protection certaines zones privilégiées, on observait une accélération de l'érosion sur la plupart des rives des lacs, menaçant une fois de plus notre patrimoine. Le lac de Neuchâtel est à cet égard un bel exemple: la régularisation du niveau du lac dans les années 1960 a provoqué un front d'érosion intensif à une même cote altimétrique, détruisant irrémédiablement les vestiges placés sur les rives ou immergés à faible profondeur. La circulation des bateaux à moteur, le nombre croissant de baigneurs occupant les plages, les aménagements des berges liés au développement touristique, provoquant notamment la disparition des roselières, ont également accentué la menace sur certains sites archéologiques jusque-là bien préservés. Les calculs établis depuis les années 1970 montrent que la rive sud du lac recule à certains endroits, de près de deux mètres par an; c'est ainsi à Font par exemple où des mesures de protection ont été tentées dans les années 1990.

Mesures de protection

1983 marque une étape importante dans l'histoire de l'archéologie suisse. Pour la première fois, un service archéologique cantonal met en place un ouvrage pour protéger un site archéologique lacustre; c'est à D.Weidmann, archéologue cantonal vaudois, que revient le mérite d'avoir entrepris les premières mesures de protection. L'implantation d'une palissade de mélèze et la pose de plusieurs tonnes de galets à Corcelettes (rive nord du lac de Neuchâtel), suivies par d'autres tentatives effectuées dans le canton de Fribourg (Font et Forel sur la rive sud du même lac, ainsi que Greng sur le lac de Morat), puis dans le canton de Berne (Sutz/Lattrigen sur le lac de Bienne) témoignent de la prise de conscience d'agir rapidement pour sauver ce qui peut encore l'être (pl.13.1 & pl.13.2).

La Rencontre Internationale de Marigny (1994) avait montré une réelle volonté de préserver ces sites et mis en évidence les efforts préconisés pour trouver les meilleures solutions techniques (Ramseyer & Roulière-Lambert 1996). A l'aube du XXI[e] siècle, il est réjouissant de constater que plusieurs Services archéologiques ont non seulement réfléchi au problème, mais ont également passé au stade de la réalisation d'ouvrages pour tenter d'enrayer le processus de destruction des sites les plus importants. Il faut cependant reconnaître que l'investissement mis en œuvre jusqu'à présent reste insuffisant. Tous, à part quelques rares exceptions, aussi bien en Suisse qu'en France, en Allemagne ou dans les Iles Britanniques, ont misé sur des méthodes douces, soucieuses de respecter l'environnement. Les ouvrages mis en place produisent un effet positif, mais pour combien de temps? Ces constructions fragiles qui nécessitent un entretien permanent ne pourront être que provisoires, en attendant de trouver des solutions plus durables. Faut-il alors se tourner vers des techniques plus lourdes et plus coûteuses?

Des murs faits de blocs de pierres taillés ont été posés il y a quelques décennies déjà sur certains secteurs des rives des lacs de Bienne (Sutz par exemple) ou de Neuchâtel (Châbles). Ces ouvrages n'ont pas été conçus dans le but de protéger des vestiges archéologiques, mais pour consolider les rives à divers endroits où le biotope naturel était menacé. Ces constructions massives protègent parfaitement le site à l'arrière du contrefort, mais les plages de sable avancées dans le lac, en bordure du mur, sont rapidement nivelées et érodées par les mouvements répétés des vagues qui battent sur les berges.

Un ouvrage particulièrement ambitieux a été testé en 1998 au large d'Yvonand (rive sud du lac de Neuchâtel) pour protéger une partie des rives naturelles de la Grande Cariçaie, l'une des plus grandes réserves naturelles de Suisse. Le groupe d'étude et de gestion, travaillant au centre de Champittet près d'Yverdon-les-Bains, au cœur même de cette réserve, cherche des moyens depuis de nombreuses années pour freiner l'avancée dévastatrice de l'érosion qui emporte chaque année plusieurs hectares de rives où nichent des espèces animales et végétales protégées. Plusieurs digues constituées de milliers de tonnes de gravats sortis des tunnels en cours de construction sur la rive nord du lac, ont été aménagées parallèlement à la rive, sur plusieurs centaines de mètres de longueur. Ces digues de plusieurs mètres de hauteur n'émergent qu'à peine à la surface du lac; elles servent de brise-lames et devraient ainsi empêcher le recul de la ligne de rivage qui se trouve à l'arrière. Les ingénieurs espèrent même parvenir à inverser le processus de sédimentation, avec une phase d'ensablement et non d'érosion des rives. Il faudra attendre quelques années encore pour juger véritablement du résultat de ces lourdes constructions.

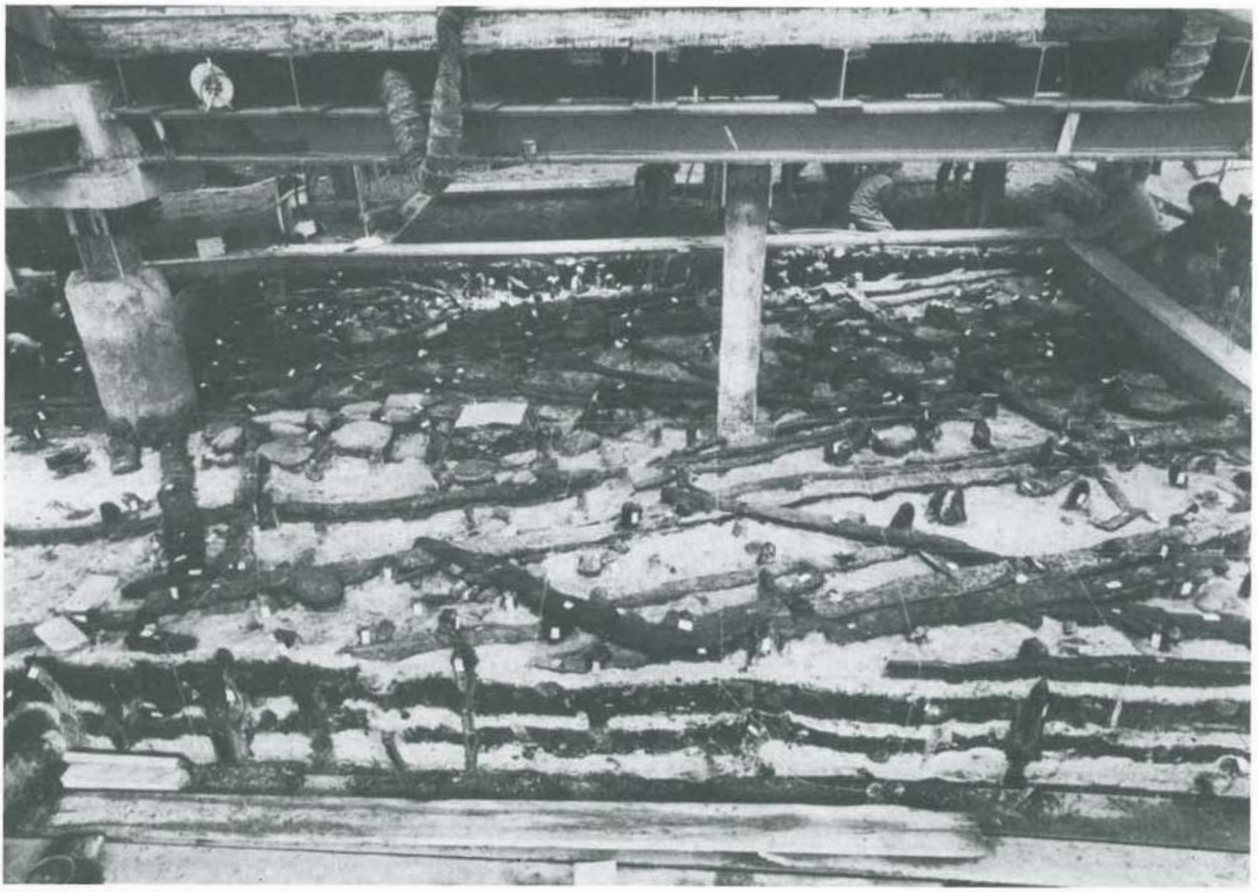

Fig. 13.4: Constructions modernes sur un site préhistorique: Mozartstrasse, ville de Zürich. Photo Büro für Archäologie, Zürich.

Fig. 13.5: Transport d'un bloc de 400 tonnes contenant les vestiges paléolithiques de Neuchâtel/Monruz. Photo D.Ramseyer.

Pour une protection durable

Il est indéniable que l'état de conservation exceptionnel des vestiges plusieurs fois millénaires découverts en milieu humide (Schlichtherle & Wahlster 1986) et la valeur extraordinaire de ces gisements pour la compréhension de notre passé méritent une protection prioritaire. Quel bilan tirer aujourd'hui de tous les efforts investis pour protéger et sauvegarder ce patrimoine?

La plupart des sites décrits sont placés en zones touristiques (plages, secteurs de détente et de loisirs) ou en zones touchées par le développement urbain, comme l'illustre la ville de Zürich (fig.13.4). Autrement dit, ces sites sont localisés sur des points stratégiques où l'enjeu économique est particulièrement sensible (Ruoff 1987). Une solution idéale serait de mettre sous protection les zones de grande valeur historique ou archéologique. Mais dans la réalité, les priorités économiques priment, c'est évident. On ne peut aller à l'encontre des décisions politiques qui vont dans le sens d'un développement industriel, touristique et économique toujours plus marqué. Au cours de ces dernières années, la Confédération helvétique et les Etats ont accordé des moyens financiers considérables pour procéder à des interventions d'urgence. Le but visé par ces fouilles de sauvetage est avant tout de "libérer" les secteurs menacés en documentant les gisements touchés par les travaux de constructions et en prélevant le mobilier archéologique directement touché. On a même procédé, cas extrême, au découpage et au transport d'un bloc de 400 tonnes contenant les vestiges d'un campement de chasseurs paléolithique pour qu'il puisse être fouillé en dehors de l'emprise des travaux, lors de la construction du tunnel passant sous la ville de Neuchâtel (fig.13.5). Toutefois, les promoteurs n'ont jamais, jusqu'à ce jour, modifié ou renoncé à leurs travaux pour éviter de porter atteinte à un site archéologique.

Des programmes d'inventaires, d'études et d'analyses dans les régions les plus sensibles sont en cours. Ainsi, après une prospection subaquatique systématique des berges du lac Léman, ce sont les sites lacustres des lacs de Neuchâtel et de Morat qui font l'objet d'une étude approfondie. Campagnes de prospections subaquatiques, repérage et cartographie des gisements, carottages destinés à évaluer l'état de conservation des couches anthropiques conservées sont systématiquement menés pour les cantons de Genève, Vaud et Fribourg. Cette étude est menée par le GRAP (Groupe de Recherche Archéologique Préhistorique) de l'Université de Genève, dirigé par Pierre Corboud. L'objectif final de cette opération de longue haleine qui a débuté en 1980 pour le Léman, en 1994 pour le lac de Neuchâtel, est de dresser un inventaire exhaustif des sites préhistoriques, d'en évaluer leur importance et de décider des éventuelles mesures de protection lorsque cela est encore possible. Pour la rive nord du lac de Neuchâtel, le choix s'est porté sur les fouilles extensives pour sauver les sites en perdition

(Egloff 1987; Arnold 1999). Ainsi, les villages de l'âge du Bronze de Cortaillod et d'Auvernier ont fait l'objet de fouilles subaquatiques à grande échelle avant que l'ensemble des habitats menacés ne soient totalement emportés par l'érosion particulièrement active dans ces secteurs (Arnold 1986). Pour le lac de Bienne, des sondages systématiques suivis de fouilles ponctuelles ont également été entrepris avant que l'érosion ne fasse disparaître les vestiges. Ces interventions ont été complétées par la mise en place de barrages légers pour protéger certains sites, comme à Sutz par exemple.

Pour la sauvegarde des sites de Montilier et de Greng

Une zone de première importance doit absolument être mentionnée. Il s'agit de la rive sud du lac de Morat, bien connue pour l'état de conservation et la richesse de ses vestiges néolithiques. A Montilier tout d'abord, des démarches sont en cours depuis octobre 1994 pour empêcher, lors de la construction d'immeubles, les excavations à plus d'un mètre de profondeur. Il ne s'agit pas d'empêcher l'extension et le développement du village actuel, mais de tenter d'émettre des clauses restrictives pour que les couches enfouies sous deux mètres de sable ne soient pas détruites. Une grande partie des vestiges préhistoriques de Montilier étant située en zone à bâtir, de nombreuses parcelles appartenant à des particuliers sont de ce fait directement concernées. Le Service juridique de l'Etat de Fribourg n'est pas favorable à l'engagement d'une procédure de restriction, car cette dernière occasionnerait de vives oppositions et d'inévitables procès, et irait à l'encontre du développement économique recherché par l'Etat et la commune. Les archéologues ont toutefois trouvé l'appui des offices de protection de la nature et de l'établissement cantonal d'assurance des bâtiments qui, pour diverses raisons (prévention des inondations notamment), ont réussi à modifier les plans d'aménagement d'un quartier d'habitations qui menaçait l'un des plus grands sites néolithiques de la région. Grâce à une loi établie en 1965 et qui n'avait jamais été appliquée jusqu'ici, les aménageurs ont accepté de rehausser le terrain et n'ont pas reçu l'autorisation de construire des caves sur la zone la plus riche en vestiges archéologiques.

Restent de grandes zones vertes, aujourd'hui en milieu naturel, qui devront être surveillées de près afin de maintenir leur survie. Bien que rares, de telles zones existent mais il n'y a aucune garantie qu'elles resteront hors d'atteinte de tout aménagement au cours du XXI^{e} siècle. L'une des plus remarquables de ces zones est certainement celle de Greng, presqu'île avançant sur le lac de Morat. Elle a fait l'objet d'une série de carottages en 1999 et d'une évaluation globale destinée à préciser l'importance du site. Des couches archéologiques en place couvrant une surface de près de huit hectares sont dans un état de conservation exceptionnel. La stratigraphie atteint plus d'un mètre d'épaisseur à certains endroits: on peut y trouver des textiles, des objets en écorce et en bois travaillés, datés de différentes époques allant de 3850 à 900 avant J.-C. Pareille situation n'est connue qu'en de très rares endroits sur le continent. Il s'agit donc d'une réserve archéologique de valeur européenne qu'il serait absolument nécessaire de mettre définitivement sous protection. Pour l'instant, aucune menace de construction ne pointe à l'horizon: mais pour combien de temps? Des démarches sont en cours pour sauvegarder ce patrimoine. L'érosion du lac qui menace gravement le secteur nord de cette remarquable réserve a été provisoirement (et localement) contrôlée par la mise en place d'une protection faite de galets, réalisée en 1998 avec une équipe de chômeurs de la région de Morat. Mesures certes louables et bénéfiques, mais tout à fait insuffisantes pour une zone d'une telle valeur.

Coopération entre écologistes et archéologues

Les différents exemples évoqués dans cet article montrent que les services archéologiques et les associations liées à la protection de l'environnement ont tout intérêt à se concerter et à regrouper leurs forces pour faire front à la menace qui pèse sur notre patrimoine naturel et culturel. Les mesures de protection des zones naturelles humides (marais, roselières lacustres) sont habituellement propices à la conservation du patrimoine archéologique. Ainsi, surveiller, entretenir et gérer ces milieux particuliers doivent aujourd'hui faire partie des activités essentielles des archéologues. Cette démarche, impensable il y a encore vingt-cinq ans, devrait être désormais considérée comme une priorité. Contrairement à ce que pensent trop souvent les milieux politiques et les citoyens de manière plus générale, les archéologues ne cherchent pas à tout prix à fouiller partout où ils le peuvent pour remplir des vitrines de musées. En laissant détruire ou en fouillant à outrance les derniers sites encore intacts, on détruit par la même occasion des informations essentielles, ne laissant aucune possibilité aux futures générations de reprendre l'étude des gisements avec des techniques meilleures et des possibilités d'analyses beaucoup plus fines. Gérer et conserver les sites, c'est aussi préserver notre mémoire collective.

En essayant de convaincre les milieux politiques, en luttant pour la sauvegarde de certaines zones privilégiées, on parviendra à sauver peut-être une partie des sites menacés, mais une partie seulement. Il est utopique de vouloir tout conserver. Nous sommes amenés à opérer des choix, en fonction des intérêts et des possibilités qui se présentent. Si les fouilles sont inévitables, sauvons alors au moins le matériel découvert. Les archéologues qui ont l'habitude de fouiller les zones humides savent bien qu'il est très délicat, très long et très coûteux de traiter et conserver les objets en matière organique, surtout lorsqu'ils sont de grandes dimensions. Pour faire face à ce problème, les cantons de Neuchâtel et de Fribourg ont placé dans des caisses, après étude, des pirogues, des bois de constructions et divers échantillons de pièces architecturales. Plusieurs centaines de témoins plusieurs fois millénaires ont été replongés dans le lac de Neuchâtel,

Fig.13.6: Fouille de sauvetage du site néolithique de Montilier (Muntelier/ Platzbünden) en 1979, Fribourg. Photo Service archéologique cantonal.

par plusieurs mètres de fond, et pourront à l'avenir être ressortis et réétudiés si nécessaire. Le dépôt 'sous-lacustre' est un moyen sûr et efficace de conservation à long terme, qui a en plus l'avantage de ne pas encombrer les caves des musées (Ramseyer 1999).

Pour d'autres objets considérés comme rares, de qualité exceptionnelle ou d'intérêt scientifique particulier, nous préconisons des moulages en résine synthétique. C'est ce que fait le Service archéologique de Fribourg par exemple, en association avec le Musée du Malgré Tout à Treignes (Belgique), et ce que font également d'autres musées. Les moulages ont un avantage certain: ils permettent de laisser la pièce originale dans un lieu sûr; c'est le moulage qui est présenté, manipulé, transporté et prêté dans des écoles ou dans le cadre d'exposition. On peut faire circuler l'information sans détériorer l'original, extrêmement fragile.

Un autre moyen de sensibiliser le public est de procéder à des reconstitutions, à l'échelle grandeur nature, de villages, de bateaux, de ponts, de sépultures, ou de développer des activités montrant comment vivaient nos ancêtres, en expliquant leur mode de vie, leurs coutumes, leur savoir-faire souvent remarquable. Faire prendre conscience de ce passé est un premier pas important pour obtenir des accords destinés à protéger notre patrimoine. C'est en diversifiant les activités (animations pédagogiques, informations auprès du grand public, expositions, etc) que l'on parviendra peu à peu à mobiliser les citoyens et que l'on obtiendra le soutien nécessaire pour gérer notre patrimoine archéologique.

On a beaucoup critiqué, dans les années 1960–1970, la politique de l'archéologue cantonale de Fribourg qui engageait des écoliers sur les chantiers de fouille (fig.13.6). Si la participation de jeunes fouilleurs est contestée par les scientifiques qui soulignent le manque de formation et d'expérience de ceux-ci, ainsi que la difficulté de comprendre la complexité des opérations de terrain, il se justifie sur le plan financier (il ne s'agit pas dans ce cas d'ouvriers salariés, mais de camps de vacances pédagogiques et culturels), et surtout sur le plan de la sensibilisation de l'archéologie auprès du public. Ces jeunes vont plus tard entrer dans la vie active et participer au développement économique et culturel de leur région. Ce sont, ne l'oublions pas, de futurs enseignants, journalistes, industriels, économistes, députés, ministres... qui devront peut-être un jour intervenir pour prendre des décisions où l'archéologie sera directement impliquée. Le fait d'avoir été sensibilisé très jeune à la fragilité de notre passé est un atout dont doit tenir compte l'archéologue.

En attendant, l'érosion et l'assèchement de zones humides continuent jour après jour à faire des dégâts. Il faut donc agir rapidement. Doit-on multiplier et favoriser les petites interventions dites 'douces', peu coûteuses mais fragiles, ou tenter des grandes opérations, privilégiant un seul site, et utilisant de moyens techniques et financiers plus conséquents? La réponse est complexe. Si la situation est préoccupante, elle n'est pas désespérée. Une meilleure solidarité au niveau européen pourrait accélérer les prises de décisions. Les archéologues en sont conscients et travaillent dans ce sens depuis quelques années. Les efforts réalisés, bien que modestes, commencent à porter leurs fruits. L'archéologue sait qu'il ne peut agir seul, qu'il n'aura jamais suffisamment de poids pour s'imposer auprès de la collectivité publique et des politiciens. En s'alliant aux organismes chargés de la protection de l'environnement, en définissant des actions communes, la situation pourrait évoluer rapidement. Il est évident que ce n'est pas uniquement au niveau local ou régional qu'on résoudra les problèmes, même si de petites interventions ponctuelles sont souhaitables et souvent efficaces, mais au niveau européen. Si l'Europae Archaeologiae Consilium parvient à faire reconnaître l'importance et la valeur des sites archéologiques en milieu humide, et surtout la nécessité de les protéger, alors les chances de réussites deviendront réelles.

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Section III:
Case studies

14: Gestion du patrimoine archéologique en milieu humide: le cas de la France et des lacs de Chalain et de Clairvaux.

Pierre Pétrequin

Résumé: *Hormis dans le Jura et au nord-ouest des Alpes, où l'intérêt pour l'archéologie des milieux lacustres a été développé dès la fin du XIXe siècle et a repris dans les années 1970, l'exploration des zones humides commence tout juste en France dans les lagunes du littoral méditerranéen et dans les marais qui bordent la côte atlantique. En dépit de grosses opérations de fouille engendrées par la notion de sauvetage, les évaluations systématiques et les mises en réserve des milieux humides sont encore à peu près absentes du territoire français, dans un cadre juridique pourtant fort, mais rarement mis en application.*

A ce jour, les petits lacs de Chalain et de Clairvaux, dans le Jura, constituent l'unique exception à être prise en compte dans la politique nationale de gestion du patrimoine en milieu humide. On y compte respectivement 15 et 34 sites d'habitat, qui représentent la plus importante concentration humaine néolithique dans un petit bassin lacustre et un patrimoine unique en Europe pour les 31e et 30e siècles av. J.-C. Les programmes scientifiques développés dès 1970 ont permis la protection juridique de ces deux zones lacustre, parallèlement à des procédures d'évaluation archéologique globale et de protection physique contre l'érosion des rivages. Mais, dans une situation où les intérêts économiques sont forts et les responsabilités très diluées, la pression touristique semble devoir conduire à l'introduction d'un flux raisonnable de visiteurs: se posent également des problèmes d'entretien et de gestion de la couverture végétale, tandis qu'il n'existe aucune forme de concertation régulière entre les partenaires. Enfin, les défenseurs de l'environnement et des paysages sont absents du projet de conservation d'un environnement naturel et archéologique, qu'ils ont d'ores et déjà laissé condamner.

Introduction

Comme en Suisse, en Allemagne du Sud-Ouest et en Italie du Nord, l'intérêt pour les sites archéologiques de milieu humide s'est très tôt concentré, dès la fin du XIXe siècle, sur les rives des lacs glaciaires préalpins, intensément occupées *grosso modo* entre 3,800 et 850 av. J.-C. (années solaires), c'est-à-dire pendant la deuxième moitié du Néolithique et partie de l'Age du Bronze. Depuis lors, les sites les plus célèbres sont ceux de Chalain et Clairvaux sur le plateau occidental du Jura, pour ce qui concerne le Néolithique, et ceux du lac du Bourget, en Savoie, pour la fin de l'Age du Bronze. Sous le niveau de l'eau, la conservation des vestiges y a été exceptionnelle et des dizaines de milliers d'objets ont été récoltés pendant la période de la ruée sur les 'cités lacustres', de 1870 à 1913. Ces villages littoraux sont ensuite à peu près retombés dans l'oubli jusqu'en 1970, date du début de la reprise généralisée des recherches en milieu humide dans les pays qui jouxtent l'arc alpin. On s'est alors très vite rendu compte que l'abaissement généralisé des nappes phréatiques, le drainage des bas marais, l'érosion littorale et les labours profonds qui s'étaient développés entre-temps avaient été très dommageables à ce patrimoine que l'on redécouvrait alors, tandis que l'on mettait au point de nouvelles techniques de fouille subaquatique et d'analyses scientifiques sur l'environnement. De nombreux sites avaient pour partie disparu et, de ce patrimoine si célèbre au début du XXe siècle, ne subsistait plus qu'une poignée de sites souvent en plein processus de dégradation.

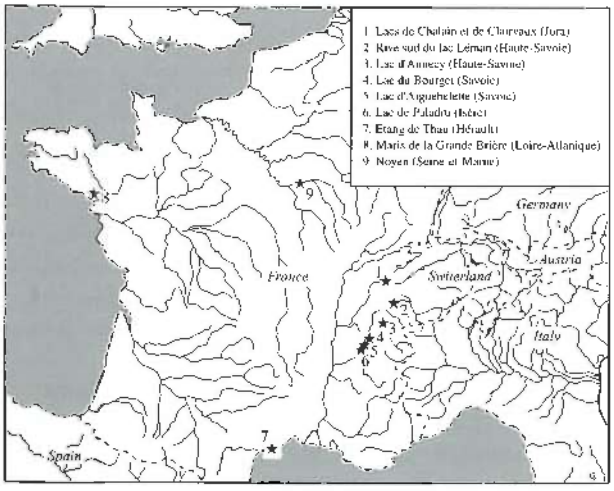

Fig. 14.1: Localisation géographique des sites archéologiques en zones humides en France.

1970 – 1980: une première phase d'évaluation du patrimoine en milieu humide

A la suite des travaux de R. Laurent en plongée subaquatique dans le lac du Bourget (Savoie), plusieurs projets d'évaluation et de fouille d'étendue limitée voient

le jour sur les lacs de barrage glaciaire au nord-ouest des Alpes. Clairvaux d'abord, en 1970, dans le cadre d'une fouille de sauvetage d'un village du 35e siècle av. J.-C. à l'emplacement d'une plage municipale; cet habitat au plan remarquable, avec une rangée de maisons séparées de la terre ferme par une palissade et une rangée de greniers à céréales du côté du lac, a montré que même les sites où la couche archéologique avait été érodée pouvaient livrer des informations tout à fait inédites sur la structure et les fonctionnements sociaux, si tant est que les poteaux des habitations étaient encore suffisamment bien conservés pour des études et des datations dendrochronologiques; après fouille, le remblaiement a été autorisé, mais avec la pose préalable d'un géotextile épais et imputrescible. La même année, à Clairvaux encore, débutait la fouille du site de la Motte-aux-Magnins, devenu un site-clé pour la compréhension des successions culturelles entre Rhin et Rhône; c'était le début d'une dynamique de recherche particulièrement active et qui se poursuit aujourd'hui, avec un programme de recherche conjoint du Centre National de la Recherche Scientifique et du Ministère de la Culture, qui est passé par la création, à l'Université de Besançon, d'un laboratoire entièrement consacré à l'étude des tourbières, des marais et des lacs, et à la mise en contexte des habitats d'ambiance humide ou amphibie.

En 1972, deux équipes commencent à travailler conjointement sur le lac de Paladru à Charavines (Isère), l'une sur un village néolithique du 28e siècle av. J.-C. (Bocquet 1994), l'autre sur un établissement littoral médiéval du XIe siècle ap. J.-C. (Collardelle & Verdel 1993). Dans l'un et l'autre cas, le statut légal de ces fouilles, faites entièrement en plongée selon les méthodes développées par R. Laurent au lac du Bourget, a été celui de sauvetage programmé, en raison de projets d'extension d'une plage et d'un petit port de plaisance; ces projets d'aménagement n'ont d'ailleurs jamais vu le jour, partiellement en raison de la réputation internationale rapidement établie pour ces deux sites archéologiques, où la conservation des témoins naturels et des artefacts était tout à fait remarquable. De plus, les objets néolithiques et médiévaux qui étaient mis au jour en telle masse chaque année ont favorisé la création et le développement d'un laboratoire de restauration à Grenoble, spécialisé dans le traitement des objets et des matériaux organiques issus des milieux humides (ARC-Nucléart, fondé en 1981).

Mais durant cette première décennie, les études globales et les évaluations du patrimoine archéologique ont été à peu près absentes. Le monde des préhistoriens français considérait qu'il s'agissait là d'une forme exceptionnelle de recherche, réservée à quelques privilégiés et sans conséquence aucune sur l'évolution de la discipline archéologique. Seule l'équipe de Clairvaux tentait, de son côté, d'explorer le bas marais avec une tarière pédologique un peu primitive, pour retrouver d'autres sites archéologiques encore intacts, préciser leur contexte dans le bassin lacustre et envisager une protection générale de la zone où l'humidité est permanente (Magny 1978); cette démarche a conduit au classement et à la protection, au titre des Monuments Historiques, des sites de Clairvaux IV et de Clairvaux, la Motte-aux-Magnins.

1980 – 1990: des grands projets de recherche

Ces dix années ont été marquées par quatre grandes opérations de terrain. La poursuite et la fin des fouilles sur le lac de Paladru, avec la publication monographique remarquée, dans le milieu des historiens, du site médiéval de Charavines, Colletières (Colardelle & Verdel 1993); pour la partie néolithique, l'exploitation s'est au contraire essoufflée peu à peu, car les préhistoriens découvraient les problèmes spécifiques que pose la fouille extensive d'un village et l'étude systématique des immenses séries d'artefacts et de témoins naturels conservés sous le niveau de l'eau; l'approche a donc été centrée sur les analyses dendrochronologiques plutôt que sur le mobilier archéologique.

A la suite de la publication d'un ouvrage général, en français, sur la préhistoire des ambiances humides (Pétrequin 1984), l'attention a commencé à se porter sur les lits majeurs de quelques grandes vallées et la découverte du site de Noyen, Le Haut-des-Nachères (Seine-et-Marne) a été la première extension de l'archéologie lacustre en direction des milieux fluviatiles. De 1982 à 1984, la fouille d'un paléo-chenal, tout à proximité du site néolithique de Noyen, a livré les vestiges, encore uniques en France, de campements de chasseurs mésolithiques avec les industries lithiques et les rejets osseux bien sûr, mais aussi une pirogue et des nasses en vannerie datées de 8,000 à 6,000 av. J.-C. (Mordant 1993); cette fouille a été réalisée en sauvetage, à l'occasion de l'extension d'une gravière. Une telle étude a ouvert la voie à une autre forme d'approche des milieux humides, une archéologie des chenaux comblés dans le lit majeur des rivières; d'autres découvertes ont bientôt suivi, comme le Néolithique de Paris, Bercy en bord de Seine et celui de la vallée de l'Oise; dans ce dernier cas, des zones de protection sont en discussion pour éviter, localement, l'extension des exploitations de sables et de graviers à la drague.

En 1986, la première recherche systématique sur tout un bassin lacustre, celui de Chalain (Fontenu, Jura), est impulsée par Pétrequin et Pétrequin (1988; 2000) dans le cadre d'un projet spécifique du CNRS et de la Sous-Direction de l'Archéologie, pour suivre l'histoire des relations entre les sociétés néolithiques et leur environnement sur la longue durée, en envisageant toutes les formes d'approche analytique favorisées par l'excellente conservation en milieu lacustre (voir, en particulier, Arbogast *et al.* 1995; Pétrequin 1996a; 1997; 1998; Pétrequin *et al.* 1998). L'idée alors mise en application est qu'il faudrait mettre à profit l'étude des

sites de milieu humide pour infléchir les problématiques et les raisonnements archéologiques sur de plus larges zones géographiques; ce sont les préliminaires indispensables, au sens de ces auteurs, à une nécessaire prise de conscience des archéologues professionnels eux-mêmes. Parallèlement débutait, à Chalain, la mise en protection des sites littoraux, question sur laquelle nous reviendrons plus loin.

Enfin, dans le cadre du Centre National de Recherches Archéologiques Subaquatiques, maintenant rattaché à la Direction de la Recherche Archéologique Sous-marine (DRASM), A. Marguet mettait en œuvre un programme ambitieux de prospection subaquatique, de relevé et de sondages sur tous les sites d'habitat de la rive sud du Léman et des lacs d'Annecy, du Bourget et d'Aiguebelette. Ce travail, poursuivi aujourd'hui encore avec ténacité, a permis un véritable inventaire, une réévaluation des sites du Néolithique et de l'Age du Bronze dans toute la Savoie et la Haute-Savoie, avec des ensembles majeurs dont plusieurs complètement inédits (Billaud & Marguet 1992; 1999). Une collaboration régulière avec les laboratoires d'analyses environnementales et dendrochronologiques a été essentielle pour réaliser ce qui, dans cette région, constituera une base documentaire indispensable à tout nouveau projet de recherche ou de gestion du patrimoine.

Nous voyons donc que cette évolution rapide a touché tous les milieux humides autrefois concernés par les travaux sur les 'cités lacustres' du nord-ouest des Alpes et, à un moindre degré, l'archéologie des lits majeurs sous les nappes phréatiques ou dans les rivières, comme la surveillance des dragages et la fouille de villages de l'Age du Bronze dans le lit même de la Saône (Bonnamour 1989). Mais il semble bien que cette prise de conscience ait bénéficié de longues traditions régionales, car ailleurs en France, elle reste encore peu développée en dépit d'indices très sérieux dans les lagunes du bord de la Méditerranée (Bronze final de l'étang de Thau) et les récentes destructions par élargissement du canal du Brivet dans les marais de la Grande Brière (Loire-Atlantique), à peu près sans surveillance archéologique.

Tout n'est donc pas dit, loin de là, dans le domaine de l'évaluation préalable du patrimoine archéologique français en milieu humide, où les prospections systématiques restent exceptionnelles et les rares spécialistes dispersés sur d'immenses territoires à étudier. Pendant ce temps, les milieux amphibies se dégradent et les destructions avancent.

Chalain et Clairvaux: une séquence chronologique de quatre millénaires

Nous avons insisté, jusqu'ici, sur l'histoire de la prise de conscience du milieu archéologique à l'intérêt des milieux humides, parce que ce processus conditionne une partie des actions à entreprendre; nous avons vu également que cette prise de conscience, hors des zones densément occupées par les lacs et les tourbières, restait encore très superficielle, à l'instar des littoraux marins où la surveillance archéologique est à peu près absente, pour ne pas parler d'éventuelles évaluations du patrimoine potentiel. Parmi le grand public au contraire, un vif intérêt a été déclenché par la parution d'ouvrages généraux très illustrés et par la présentation d'expositions de plus en plus nombreuses consacrées à ces thèmes (Pétrequin & Pétrequin 1988; Bocquet 1994). Mais du côté des décideurs, les réactions se font attendre; autant il est aujourd'hui possible de monter un projet de recherche centré sur les milieux humides, autant les notions de protection juridique et de constitution de véritables réserves représentent encore un véritable parcours du combattant dont l'aboutissement reste incertain, car, pour les sites archéologiques, le classement au titre des Monuments Historiques et la gestion des terres par l'Etat ne sont plus de mise. Pour preuve, nous en voulons l'absence de protection des dizaines de sites lacustres de Savoie et de Haute-Savoie, où aucune demande officielle de classement n'a encore émergé; c'est dans cette région également, hautement sensible au plan de l'archéologie des lacs, qu'il a fallu une véritable action scientifique internationale pour ajourner un projet d'aménagement du littoral qui aurait détruit le site protohistorique majeur qu'est Chens-sur-Léman, Tougues (Billaud & Marguet 1992). Depuis cet ajournement, la protection de Tougues n'est toujours pas mieux assurée; le site du Bronze final reste à la merci des promoteurs français et des financiers suisses, dans cette région où se développe un tourisme littoral de luxe.

Devant ces difficultés très réelles à asseoir une protection juridique durable, l'exemple unique en France de protection des lacs de Clairvaux et de Chalain (Jura) prend valeur de cas d'école.

La présence de villages littoraux néolithiques à Clairvaux est connue depuis 1870, à l'occasion d'un étiage exceptionnel du lac. A Chalain, c'est un captage artificiel du plan d'eau, pour utiliser l'énergie hydroélectrique, qui a conduit en 1904 à un abaissement momentané de 10 mètres, provoquant en même temps la découverte de sites néolithiques stratifiés dans les sédiments carbonatés et leur destruction partielle, par effondrement et glissement de la plateforme de craie lacustre dans le lac. La richesse des couches archéologiques à Chalain était si étonnante que L.A. Girardot, alors conservateur du musée de Lons-le-Saunier, a obtenu dès 1911 le premier classement partiel de la rive occidentale du lac au titre des Monuments Historiques.

De 1970 à aujourd'hui, les fouilles de Pétrequin ont montré que ces deux petits lacs (Clairvaux: 900m de longueur, Chalain: 3,000m de longueur) recelaient une des séquences chronologiques les plus longues d'Europe occidentale. A Chalain, les premiers défrichements démontrés, avec occupation riveraine permanente, sont

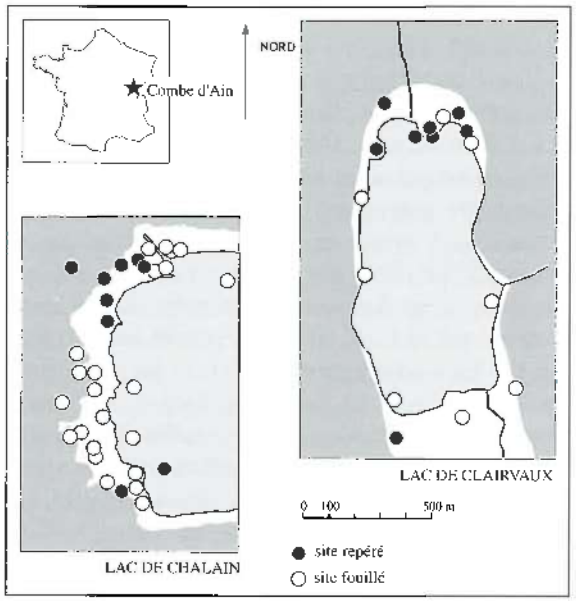

Fig. 14.2: Les sites archéologiques des lacs de Chalain et de Clairvaux (Jura) sont concentrés sur les rives émergées à l'étiage et dans les bas marais. Avec respectivement 34 et 15 sites stratifiés, ces deux lacs représentent la plus importante concentration d'habitats néolithiques littoraux connue en Europe. Dessin P. Pétrequin.

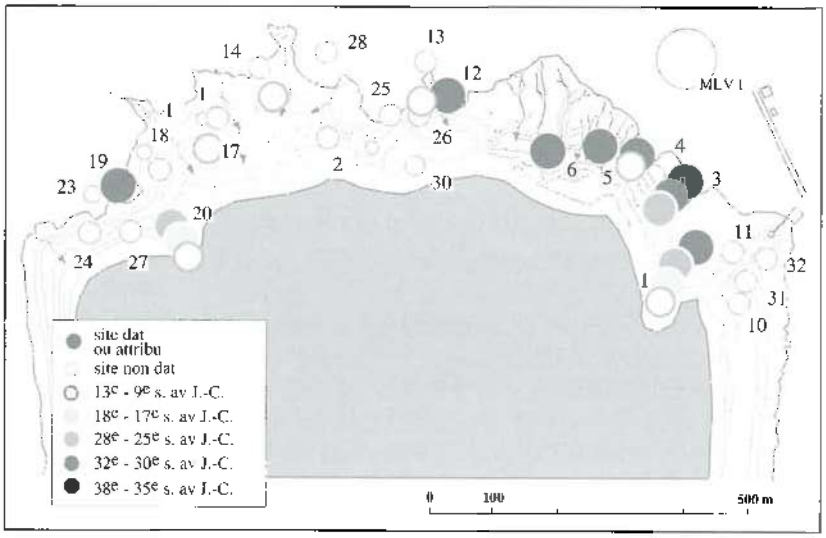

Fig. 14.3: Situation et chronologie des sites littoraux du lac de Chalain. L'ensemble de la zone, y compris le bas marais et une frange de 200 m à l'intérieur du lac, est inscrit à l'inventaire supplémentaire des Monuments Historiques. Dessin C. Croutsch.

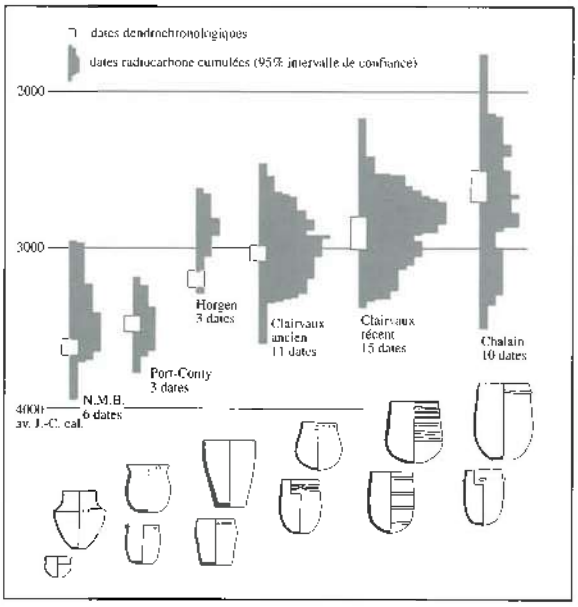

Fig. 14.4: Chronologie des occupations néolithiques de Chalain et de Clairvaux. La continuité des occupations est remarquable pour suivre l'histoire des communautés agricoles entre les bassins du Rhin et du Rhône. Dessin P. Pétrequin.

attribués à la 2e moitié du VIe millénaire av. J.-C., avec deux dates radiocarbone AMS: 5489–5229 cal. B.C. (6400 ± 85 B.P., UZ - 2987) et 5588–5295 cal. B.C. (6520 ± 170 B.P., Utc - 7507) (Richard 1994). Dès la fin du Ve millénaire, l'occupation s'intensifie (fig.14.2) pour atteindre son maximum pendant les 31e et 30e siècles av. J.-C.; à cette époque, Clairvaux compte au moins 5 villages sur sa périphérie, tandis qu'à Chalain, ce ne sont pas moins de 10 villages contemporains qui se répartissent le long de la rive occidentale (fig.14.3). Cette période d'étonnante croissance démographique, coïncidant probablement avec la colonisation du Jura par des populations d'origine méridionale (Giligny *et al.* 1995; Pétrequin 1998; Pétrequin *et al.* 1987–1988 & 1998), est un cas aujourd'hui unique où l'on peut étudier en détail, par phases chronologiques de 10 à 25 années, les modalités d'acculturation réciproque entre des communautés néolithiques régionales et les nouveaux arrivants. Cette période d'intense occupation à la césure des IVe et IIIe millénaires (fig.14.4) est complètement absente des lacs de Suisse occidentale, ce qui accentue à la fois l'originalité de Chalain et de Clairvaux et l'urgence qu'il y a à préserver des villages encore conservés sur l'intégralité de leur surface (pl.14.5). La séquence chronologique se poursuit jusqu'à la fin de l'Age du Bronze, avec des sites malheureusement déjà en grande partie érodés ou détruits. La découverte du site de MLV 1 (fig.14.3), sur une terrasse émergée en retrait du bas marais, montre le recul final de l'habitat pendant la remontée des eaux du lac dès les IXe-VIIe s. av. J.-C.

Il s'agit là d'une chronologie exceptionnellement longue, dont il n'est pas possible de dire, aujourd'hui, si elle est spécifique de Chalain et Clairvaux ou bien s'il s'agit du résultat d'une recherche de terrain particulièrement longue et détaillée pendant ces trente dernières années.

1990 – 2000 : une tentative de protection et de gestion du patrimoine à Chalain

L'originalité de Chalain tient également à son intégration dans un bassin lacustre encore peu transformé par les mises en culture et les aménagements touristiques (inscription au titre des Paysages dès les années 1950 et protection par la loi Montagne, qui interdit toute construction nouvelle à moins de 200m des rives). Il n'en demeure pas moins que le littoral de Chalain connaissait, depuis l'abaissement artificiel en 1904 et le batillage du plan d'eau pendant près d'un siècle, de profondes modifications de son rivage occidental, où les sites d'habitat néolithique étaient les plus nombreux: effondrements de la beine lacustre, recul des rives par érosion, assèchement du bas marais en raison des étiages artificiels en été et du drainage des champs cultivés sur la tourbière, déprédations répétées par les piétinements des baigneurs qui utilisaient la zone archéologique comme plage publique, en dépit du classement au titre des Monuments Historiques en 1911 (Pétrequin 1996b).

Parallèlement aux recherches archéologiques, les scientifiques (Centre National de la Recherche Scientifique), les gestionnaires du patrimoine (Service régional de l'Archéologie et Service régional des Monuments Historiques), en accord avec la Communauté de Communes du Pays des Lacs, ont pris la décision d'établir une protection durable des sites de Chalain. Cette protection a été réalisée en plusieurs étapes.

En 1989, une convention a été signée, en Préfecture du Jura, pour réguler l'exploitation hydroélectrique du lac et diminuer l'amplitude des fluctuations artificielles du plan d'eau par Electricité de France (EDF). Le batillage a été autorisé en été seulement entre les cotes d'altitude 489m et 486.25m, soit 3m d'amplitude au lieu des 8m à 10m pratiqués jusqu'alors; du mois de septembre au mois de mai, un régime de hautes eaux permet au contraire la remontée du niveau de la nappe phréatique dans le bas marais.

En 1988–89, un grillage de 2m de hauteur et plus de 1.5km de longueur a été posé, pour interdire physiquement les déprédations des touristes et des baigneurs. Cette opération visant au développement nouveau de la végétation riveraine est un succès complet et la question se pose maintenant de l'entretien d'une couverture arborée devenue parfois exubérante.

Le 21 décembre 1992, toute la zone archéologique occidentale du lac de Chalain (pl.14.6) est inscrite à l'inventaire supplémentaire des Monuments Historiques, pour élargir la protection MH de 1911, estimée trop étriquée.

En vertu de ce nouveau statut juridique, le Service régional des Monuments Historiques, en collaboration avec les scientifiques, réalise les premiers tests de consolidation du rivage en 1993, pour bloquer le recul du rivage et l'effet du ressac. Ce test, dont les résultats sont positifs, est prolongé en 1995 par la pose de géotextiles biodégradables en une dizaine d'années, l'apport d'argile de couverture et la mise en place de milliers de jeunes plants de végétation riveraine pour stabiliser le sol du rivage, sur près de 400m de longueur, dans les zones les plus sensibles aux phénomènes érosifs (Pétrequin 1996b, Pétrequin *et al.* 1996). Cette opération, qui a exigé un énorme investissement financier, s'est révélée un plein succès, avec le développement d'une végétation d'abord artificielle et qui, aujourd'hui, tend à évoluer vers une meilleure adaptation aux conditions amphibies de la plate-forme littorale émergée à l'étiage.

Toutes ces réalisations ont été extrêmement profitables à la survie des sites néolithiques littoraux de Chalain. Mais tout n'est pas pour autant gagné, car il s'agissait plutôt de décisions autoritaires consécutives à l'application de la législation sur les fouilles, les sites archéologiques et les monuments historiques.

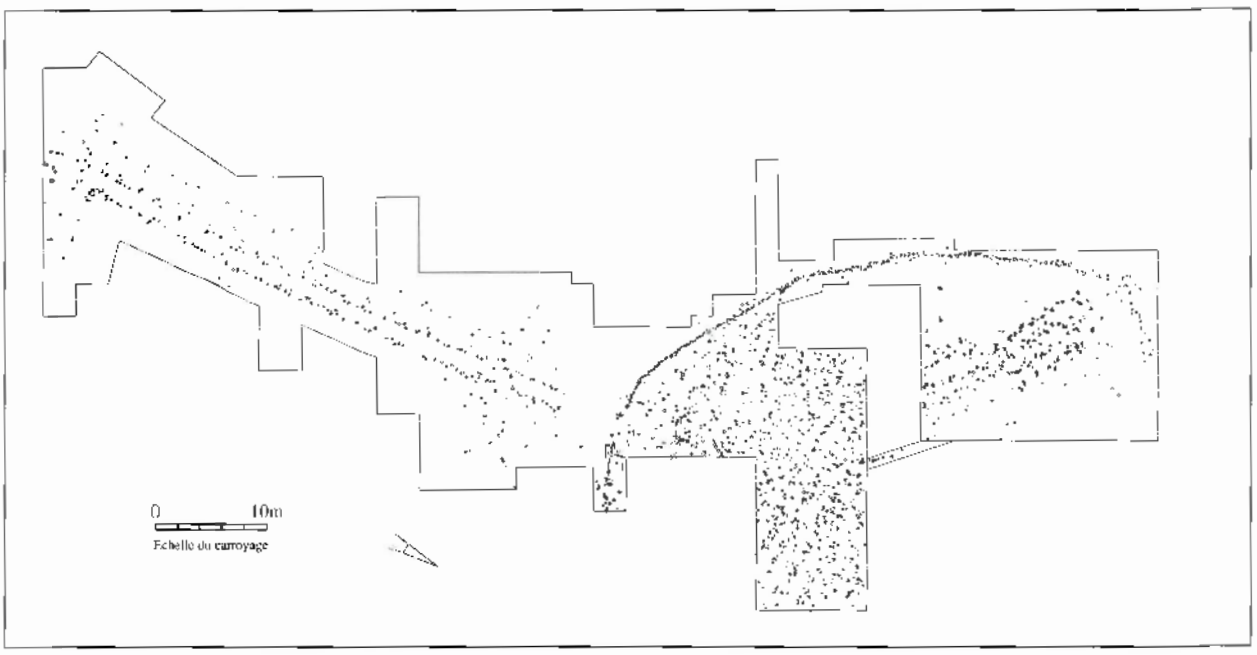

Fig. 14.5: Un exemple de village occupé du 32e au 30e siècle av. J.-C. : Chalain 19, avec un chemin d'accès, une palissade, un espace densément bâti et une construction isolée qui suggère des inégalités sociales à l'intérieur de la communauté villageoise. Dessin A. Viellet.

La perception sociale du patrimoine archéologique en milieu humide

En dépit des efforts considérables développés par les scientifiques et par une association loi de 1901 (le Centre de Recherche Archéologique de la Vallée de l'Ain) pour renouveler, chaque année, des expositions locales sur Chalain et publier très régulièrement des articles et des ouvrages destinés à un large public, il a bien fallu se rendre à l'évidence: ce projet de protection et de constitution d'une réserve archéologique provoquait des réactions très divergentes, bien sûr parce que de vieilles habitudes devaient être modifiées, mais aussi en raison des intérêts non déclarés qui divergeaient entre gestionnaires du patrimoine, Communauté de Communes, municipalités riveraines et cultivateurs.

Une politique d'achat de terrains pour commencer à constituer la réserve archéologique a été menée par la Communauté de Communes, avec un très large apport de crédits d'Etat. La Communauté de Communes devenait alors propriétaire et gestionnaire des terrains archéologiques. Et il a bien fallu se rendre compte que cette politique de protection recouvrait en fait un projet d'exploitation touristique massive, avec un restaurant et un bâtiment, en partie pour une présentation archéologique, qui aurait été construit en plein cœur de la zone archéologique et du périmètre de protection. Après bien des aléas où le Tribunal Administratif a dû être saisi, ce projet n'a pas vu le jour, ce qui a provoqué un large mécontentement des élus, qui ont eu le sentiment d'avoir été floués. L'achat des terrains est aujourd'hui bloqué et la gestion du foncier mise au point mort; de même l'entretien de la clôture n'a pas été fait, pas davantage que la gestion de la végétation.

Ce dernier point d'ailleurs mécontente notablement les agriculteurs qui savent que les labours profonds, en mélangeant les tourbes superficielles et les craies sous-jacentes, peuvent conduire à de bons rendements céréaliers; la destruction consécutive des sites archéologiques et l'abaissement progressif des réserves d'eau du sous-sol ne saurait, pour eux, constituer un critère valide, sauf exception.

Le projet de rendu au public, tel qu'il avait été conçu par les scientifiques et les gestionnaires du patrimoine, devait être mis en œuvre rapidement, mais en dehors de la réserve archéologique. Il devait permettre de sensibiliser le public et le tourisme estival aux milieux humides et aux recherches archéologiques sur les sites de Chalain qui ont été inscrits, en 1995 sur la liste des Sites d'Intérêt National. Une préfiguration, à échelle réduite, avait d'ailleurs été réalisée en 1988–89, avec la construction de deux maisons expérimentales en bordure du lac (pl.14.2). Ces maisons dans le brouillard sont d'ailleurs devenues une image emblématique à la fois de la recherche archéologique en milieu humide et de la région de Franche-Comté. Mais le détournement du projet initial, en particulier après consultation des deux cabinets d'étude privés, n'a fait qu'accentuer le déséquilibre entre les scientifiques et leurs partenaires locaux et régionaux, tous bientôt engagés dans un dialogue de sourds où les protecteurs du patrimoine naturel ont toujours brillé par leur absence. La perception sociale d'une réserve archéologique et botanique s'en est donc trouvée complètement faussée (Pétrequin 1999).

C'est d'ailleurs bien le problème qui a été dégagé par la Rencontre internationale tenue à Marigny-Chalain en 1994 et regroupant des collègues français, suisses, allemands et anglais confrontés aux mêmes difficultés de protection du patrimoine archéologique en milieu humide. A l'issue de cette réunion, on pouvait afficher un certain pessimisme. Devant l'érosion des sites archéologiques et des milieux amphibies, les solutions temporaires des archéologues apparaissaient de faible extension et de durabilité incertaine. Pourtant, ces réalisations modestes étaient loin d'être inutiles; dans tous les cas, elles participent à une forme de propagande archéologique, en d'autres termes à la nécessaire prise de conscience sociale qui est le préliminaire à des solutions plus durables et de plus grande envergure.

La question de la protection des sites archéologiques passe donc aussi par la conviction d'avoir à modifier la vision sociale de l'utilisation des rives et des milieux humides. C'est en faisant connaître les problèmes de la disparition rapide d'un patrimoine archéologique de très haut intérêt que les préhistoriens pourront trouver des collaborations efficaces, où les protections limitées, dans un strict intérêt archéologique, sont de peu d'avenir dans l'ambiance de fonctionnements sociaux et économiques aussi complexes que sont les nôtres. L'archéologie n'est pas l'affaire de tout le monde; la gestion commune des réserves naturelles et archéologiques pourrait être de portée plus générale et parfois emporter la conviction (Pétrequin 1996c). Mais dans le cas de Chalain et de Clairvaux, naturalistes et environnementalistes ne sont pas encore présents autour de la table de négociation.

L'évaluation globale du patrimoine archéologique de Chalain

En 2000, la Sous-Direction de l'Archéologie vient d'accorder les moyens d'une évaluation globale du patrimoine archéologique de Chalain, par sondages à la tarière. Sur toute la zone protégée au titre des Monuments Historiques, soit 60 hectares, l'équipe du CNRS a réalisé 16 transects orientés de la terre ferme en direction du lac, c'est-à-dire une longueur totale explorée de plus de 5.5km, avec la description détaillée de 1,050m de carottes sédimentaires. Cette évaluation a permis, en trois mois, de doubler le nombre de sites archéologiques à l'extrémité occidentale du lac. De plus, il s'agissait de déterminer la géométrie des remplissages de la cuvette lacustre et de cartographier les associations végétales selon leur intérêt phyto-sociologique. Les nombreux intervenants concernés par l'avenir de Chalain ont donc maintenant entre les mains un document très détaillé, qui permet de définir des zones de sensibilité des sites néolithiques, des groupements de végétation et de la nappe phréatique. Ce document scientifique (*Chalain 2000. Cinq millénaires d'archéologie lacustre mis en question*) sera publié en 2001, dès réception des datations radiocarbone, pour lui donner une large audience régionale et nationale.

Et le moment sera venu de retourner à la table de négociation pour décider ensemble de la gestion d'une zone très sensible, où s'affrontent les intérêts divergents des scientifiques, des élus, des agriculteurs et des promoteurs d'un tourisme de masse.

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15: Schutz und management archäologischer Denkmale im Bodensee und Federsee

Helmut Schlichtherle

Abstrakt: *Das Landesdenkmalamt Baden-Württemberg führt seit 1979 eine systematische Erfassung und Betreuung der zahlreichen Feuchtbodenfundplätze, insbesondere der prähistorischen "Pfahlbausiedlungen" im südwestdeutschen Alpenvorland durch. Die Voraussetzungen sind am Bodensee und Federsee sehr unterschiedlich und bedingen verschiedene Strategien der praktischen und präventiven Denkmalpflege. Das Management der Fundstellen wird von den Denkmalbehörden in Verbindung mit den Wasserbehörden und Naturschutzorganisationen vorgenommen. Am Bodensee liegen die Probleme vor allem in der und privater Nutzung der Ufer- und Flachwasserzone für Freizeit- und Schiffahrtseinrichtungen. Andererseits bewirken verschiedene Umweltveränderungen starke Erosionsvorgänge. Neben Rettungsgrabungen mit verschiedenen Methoden der Unterwasserarchäologie werden Projekte zur Einbringung von Erosionsschutz durchgeführt. Am verlandeten Federsee, der heute eine große Moorlandschaft bildet, verursachen vor allem die Entwässerung und Methoden moderner Landwirtschaft eine fortlaufende Austrocknung und Zersetzung der Feuchtbodendenkmale. Konflikte bestehen mit zahlreichen Grundeigentümern und dem Interesse der Kommunen an Straßenbau und Ausweitung der Baugebiete. Hier wird in enger Verbindung mit Naturschutzorganisationen eine Strategie großflächiger Reservatbildung verfolgt. Das Ziel ist die Verwandlung nahezu des gesamten Moores in ein Naturschutzgebiet, in dem durch Flächenerwerb, Flächenumlegung und stellenweise Wiederanhebung des Moorwasserpegels archäologische Kernzonen besonders berücksichtigt werden. Ein Teil des Gebietes ist, unterstützt durch EU-Programme (LIFE und LEADER), bereits in ein Reservat verwandelt. Archäologische und naturkundliche Moorlehrpfade und ein Freilichtmuseum sorgen für Akzeptanz und Besucherlenkung.*

Seit das Landesdenkmalamt Baden-Württemberg im Jahre 1979 mit einer systematischen Bestandsaufnahme der Feuchtbodenfundplätze im südwestdeutschen Alpenvorland begann und 1981 eine Arbeitsstelle in Hemmenhofen am Bodensee eingerichtet hat, in der eine Gruppe von Archäologen und Naturwissenschaftlern vor Ort zusammenarbeitet, sind umfangreiche Erfahrungen zum Umgang mit dem Kulturgut unter Wasser und in Mooren gesammelt worden (Schlichtherle & Wahlster 1986). Die Arbeitsstelle ist eine ständige Einrichtung und wurde 1997 als eigenes Referat in der Organisation des Landesdenkmalamtes verankert. Nach mehr als 20-jähriger Tätigkeit im Bereich der Erkundung archäologischer Feuchtbodenfundstellen, der Durchführung von Ausgrabungen und wissenschaftlichen Auswertungsprojekten, aber auch des Denkmal-managements im Kontakt mit Grundeigentümern, Kommunen und anderen Fachbehörden, verfügt die Arbeitsgruppe heute über eine gute - wenn auch längst noch nicht vollständige - Übersicht der archäologischen Quellen und ihrer Problematik. Diese schließt Kenntnisse zur akuten und potentiellen Gefährdung der Fundstellen sowie Erfahrungen mit Rettungsgrabungen und Projekten zur Reservatbildung ein. Die dabei zutage getretenen Kontraste zwischen dem Bodensee, einem internationales Gewässer, dessen längster Uferabschnitt zu Baden-Württemberg gehört, und dem Federsee in Oberschwaben sind stark und verdeutlichen die unterschiedlichen Erfordernisse der rettenden und präventiven Denkmalpflege in den Seen und Feuchtgebieten des Alpenvorlandes (Abb.15.1).

Der Bodensee gehört zu den großen, von Schmelzwässern aus den Alpen gespeisten Seen, mit relativ geringer Verlandung. An den meisten Uferabschnitten liegen deshalb die archäologischen Denkmale noch heute im freien Wasser, beziehungsweise einsedimentiert in der Flachwasserzone (Schlichtherle 2000a). Nur in einzelnen Buchten, wie z.B. in der 'Bleiche' bei Arbon am Schweizer Ufer, sind sie unter der heutigen Landmasse von Sedimenten bedeckt. Es handelt sich vor allem um prähistorische Ufersiedlungen, sogenannte 'Pfahlbauten' der Jungsteinzeit und Bronzezeit, aber auch um Baustrukturen des Mittelalters und der frühen Neuzeit, in wenigen Fällen auch römischer Zeitstellung. Vor allem Hafenbauwerke, Sperrwerke, Brücken, Mühlenbauten und Fischfanganlagen sind hier zu nennen. In den Flachwasserzonen, insbesondere aber im Tiefwasser erhielten sich zudem zahlreiche Schiffswracks. Die Denkmale in der Flachwasserzone sind den jährlichen Seespiegelschwankungen ausgesetzt und liegen im Sommer etwa 1–5m unter der Wasseroberfläche, bei Niederwasser im Winter jedoch nur um 0–2m. Wie bei Ebbe, kann dann ein Teil der Denkmale trockenen Fußes erreicht werden. In seltenen Fällen reichen Ufer-Baumaßnahmen und städtische Baugebiete über die

Ufersiedlungen, in der Flachwasserzone sind in ihrem Bereich jedoch vielfach Freizeitanlagen wie Bootshäfen, Bojenfelder und Strandbäder angelegt. Der größte Teil des Seebodens ist in öffentlichem Besitz. Konflikte entstehen somit selten mit einzelnen Grundeigentümern, sondern meist mit den Ansprüchen öffentlicher Nutzung.

Der Federsee ist hingegen den kleineren und kleinen Voralpenseen zuzurechnen, die über ein lokales Wassereinzugsgebiet verfügen, geringere Wassertiefen aufweisen und zur Verlandung neigen (Schlichtherle 1989). Vor allem prähistorische Feuchtbodensiedlungen von der Jungstein- bis in die Eisenzeit sind hier in Mudden und Torfe umfangreicher Verlandungsgebiete eingebettet. Fundstellen jüngerer Epochen sind hingegen weniger vertreten und beschränken sich auf Einzelfunde, Pfahlwerke und Wegverbindungen im Moor. Zahlreich jedoch sind Funde von Einbäumen aller Epochen von der Steinzeit bis ins Mittelalter. Die meisten der bekannten Fundstellen liegen unter landwirtschaftlich genutzten Grünflächen, nur wenige unter Wald oder im Randsaum städtischer und dörflicher Baugebiete. Häufig befinden sich die Fundstellen in Oberflächennähe, nur wenige Dezimeter unter der Grasnarbe. Der größte Teil des in zahlreiche Parzellen zersplitterten Grundbesitzes ist in Privathand. Konflikte entstehen vor allem mit der landwirtschaftlichen Nutzung, mit Aufforstungen, Straßenbauprojekten und den Ansprüchen der Kommunen auf Ausdehnung der Baugebiete in die Randflächen des Moores.

Die gesetzlichen Grundlagen für das Denkmalmanagement sind für beide Seen die gleichen. Sie liegen im Denkmalschutzgesetz des Landes Baden-Württemberg begründet. Dieses regelt die Anzeigepflicht und den Verbleib von Bodenfunden, die Verantwortung von Besitzern und Grundeigentümern, die Zuständigkeiten der Behörden, die Einrichtung von Grabungsschutzgebieten sowie die Sanktionierung von Verstößen gegen das Gesetz. In Baden-Württemberg gibt es keine gesetzliche Verpflichtung für Bauträger, sich an den Kosten archäologischer Rettungsmaßnahmen zu beteiligen. Das Landesdenkmalamt hat das Monopol zur Vergabe von Ausgrabungsgenehmigungen und führt den größten Teil der erforderlichen Maßnahmen im Gelände aus eigenem Etat selbst durch. Dies hat den Nachteil, daß für eine flächendeckende Betreuung des an archäologischen Denkmalen äußerst reichen Landes zu wenig Personal und Mittel vorhanden sind, zugleich aber den großen Vorteil, daß die Denkmalpflege Schwerpunkte bilden und diese mit Kontinuität und wissenschaftlicher Fragestellung kompetent verfolgen kann. Die Erforschung und Pflege des Kulturerbes unter Wasser und in Mooren bildet seit 1979 einen solchen Schwerpunkt.

In Verbindung mit der Naturschutzgesetzgebung und dem Wassergesetz bestehen weitere Möglichkeiten einer positiven Einflußnahme auf den Erhalt der Denkmale in Feuchtgebieten. Auf der Verwaltungsebene sind die Gebiete der beiden hier behandelten Seen getrennt. Das baden-württembergische Bodenseeufer gehört in den Verwaltungsbereich des Landkreises Konstanz (Regierungsbezirk Freiburg i.Br.) und des Bodenseekreises (Regierungsbezirk Tübingen). Das Federseemoor liegt im Landkreis Biberach (Regierungsbezirk Tübingen). Das Referat 27 Unterwasserarchäologie/

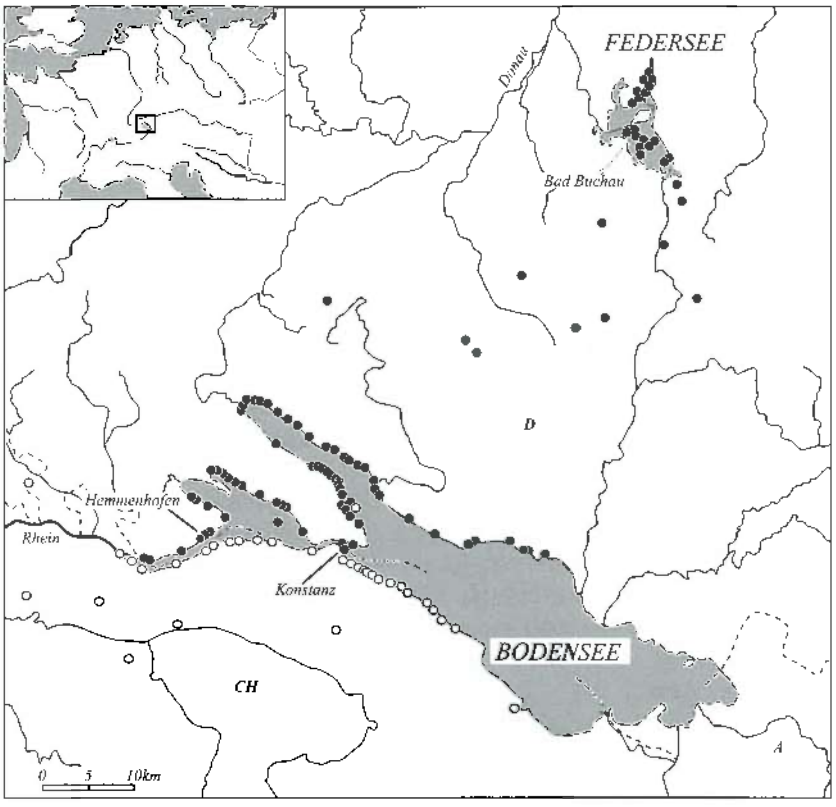

Abb.15.1: Der Bodensee und der Federsee sind die klassischen Fundgebiete der südwestdeutschen Feuchtbodenarchäologie. Mehr als 100 prähistorische "Pfahlbaustationen" sind in Baden-Württemberg bekannt (schwarze Punkte). Zeichnung A. Kalkowski.

	Bodensee	**Federsee**
Naturräumliche Voraussetzungen	Großer, wenig verlandeter See (539km²) mit weit in die Zentralalpen reichendem Wassereinzugsgebiet, bis heute mit starken Wasserspiegelschwankungen (*ca.* 1.5–4m)	Kleinerer, stark verlandeter See (33km²) mit kleinem Wassereinzugsgebiet, heute reguliert und mit geringen Wasserspiegelschwankungen (*ca.*0.5—0.8m)
Sedimente	Seekreide, Sand, Beckentone	Hoch- und Niedermoor, Mudde, Beckentone
Lage der Denkmale	Prähistorische Siedlungen und Strukturen des Mittelalters und der Neuzeit vor allem in der heutigen Flachwasserzone, Schiffsfunde meist im tieferen Seebecken	Prähistorische Siedlungen unter Torf in der heute verlandeten Zone, Einbaumfunde und weitere Strukturen ebenfalls in der Verlandungszone
Art der Quellen	Prähistorische "Pfahlbauten":Pfahlfelder, Hausgrundrisse, Palisaden, Kulturschichten mit verstürzten und vom Wasser bewegten Ablagerungen. Aus Mittelalter und Neuzeit auch Sperrwerke, Hafenanlagen, Brücken, Mühlenbauten, Fischfanganlagen und Schiffe.	Prähistorische "Moorsiedlungen": Ebenerdige Hausfußböden mit Feuerstellen, Pfosten und Wandteilen, Palisaden, Bohlenwege. Vereinzelt Fischfanganlagen und Einbäume aller Epochen.
Prospektionsmethoden	Begehung bei Niederwasser, Bohrungen und Sondiergrabungen bei Niederwasser, Taucharchäologie, Luftbildarchäologie, Beobachtung von Baumaßnahmen. Im tiefen Wasser gute Erfolge mit Side Scan - Sonar.	Beobachtung von Drainagearbeiten, Bohrungen, Beobachtung von Baumaßnahmen. Mit geringem Erfolg auch Luftbildarchäologie und geophysikalische Messungen.
Grabungstechniken	Grabung bei Niederwasser im Winter und Caissongrabungen, Einsatz von Pumpen, Taucharchäologie	Grabung bei tiefem Moorwasserpegel im Sommer, Einsatz von Pumpen
Naturwissenschaftliche Untersuchungen	Gute Bedingungen für Sedimentologie, Pollenanalyse, Großrest- und Holzuntersuchungen, Dendrochronologie und Radiocarbondatierungen. Wechselhafte Bedingungen für Osteologie und Malakologie	Gute Bedingungen für Moorstratigraphie, Pollenanalyse, Großrest- und Holzuntersuchungen, Dendrochronologie und Radiocarbondatierungen. Wechselhafte Bedingungen für Osteologie. Schlechte Bedingungen für Malakologie.
Eigentümer der Denkmale	Vor allem Land Baden-Württemberg	Bis 1995 vor allem zahlreiche Privateigentümer, heute zunehmend Land Baden-Württemberg
Gefährdung durch	Erosion, Baumaßnahmen, Hafenanlagen, Freizeittourismus (Schiffahrt, Badebetrieb, Sporttaucher)	Austrocknung, Drainage, moderne Landwirtschaft(schwere Maschinen, mikrobieller Torfschwund durch Düngung)
Schutzmaßnahmen	Bildung einzelner Reservate in Zusammenarbeit mit den Gewässerdirektionen. Einbau von Erosionsschutz (Geotextil, Kiesabdeckung)	Bildung großflächiger Reservate in Zusammenarbeit mit dem Naturschutz. Flächenerwerb, Flächenumlegung, Anhebung des Moorwasserpegels
Management der Reservate	Untere Denkmalbehörden und Landesdenkmalamt Baden-Württemberg, Gewässerdirektion Donau-Bodensee und Hochrhein-Bodensee, teilweise Naturschutz	Untere Denkmalbehörde, Landesdenkmalamt Baden-Württemberg und Naturschutz

Abb.15.2: Unterschiede in Bestand und Management der Feuchtboden-Kulturdenkmale am Bodensee und Federsee.

Feuchtbodenarchäologie des übergreifend organisierten Landesdenkmalamtes hat somit an beiden Gewässern verschiedene Ansprechpartner. Dies hat jedoch nur einen geringen Einfluß auf Unterschiede im Denkmalmanagement.

Die abweichenden Strategien der Archäologischen Denkmalpflege an beiden Seen haben ihre Ursachen vielmehr in den Unterschieden der naturräumlichen Ausstattung, der archäologischen Quellenlage und der Eigentums- und Nutzungsverhältnissen (Abb.15.2, Abb.15.3 & Abb.15.4). Es würde viel zu weit führen, hier auf alle Aspekte näher einzugehen. Auf Probleme der Prospektions- und Grabungstechnik, unterschiedliche wissenschaftliche Fragestellungen aufgrund der Zugehörigkeit zu verschiedenen Landschafts- und Kulturräumen sowie das unterschiedliche Potential der Gefährdung und Zerstörung ist bereits in anderen Publikationen eingegangen worden. Im Folgenden soll vor allem beschrieben werden, wie es an beiden Seen bisher gelang, über das Tagesgeschehen der Denkmalpflege hinaus präventiv zu wirken und Reservate für die künftige Forschung zu bilden.

Ein wichtiger Schritt zum Management der Ufersiedlungen am Bodensee war die Einbringung der archäologischen Kartierungsergebnisse in die Raumordnungsplanungen, wo sie im Rahmen der Bodenseeuferpläne der Regionalverbände Hochrhein-Bodensee und Bodensee-Oberschwaben 1984 Bestandskraft erhielten. Auf der Basis dieser Pläne, in denen alle bekannten Ufersiedlungen als Kulturdenkmale verzeichnet sind, kommen die anstehenden Wasserbauplanungen 'auf den Tisch des Denkmalpflegers'. Zu zahlreichen Bauanträgen sind seitdem im Rahmen behördlicher Anhörungsverfahren Stellungnahmen abgegeben worden. Vielfach, aber nicht immer, decken sich die Interessen von Gewässerschutz, Naturschutz und Denkmalschutz, so daß in der Vergangenheit meist verträgliche Lösungen zum Erhalt der Denkmale gefunden werden konnten. Bei der Beurteilung von Baumaßnahmen und Genehmigungen für den Betrieb von Bootsliegeplätzen und Schiffahrtsrouten ist insbesondere auch die Folgewirkung weiter entfernter, die archäologischen Stätten nicht direkt betreffender Maßnahmen zu bedenken, die das Gleichgewicht der Flachwasserzone stören und zu Erosion in den Denkmalen führen können.

Eine positive Wirkung auf die Gesamtsituation in der Flachwasserzone des Bodensees haben zudem sogenannte Renaturierungsmaßnahmen, die in der Vergangenheit von den Wasserwirtschaftsämtern, heute von den Gewässerdirektionen Hochrhein-Bodensee und Donau-

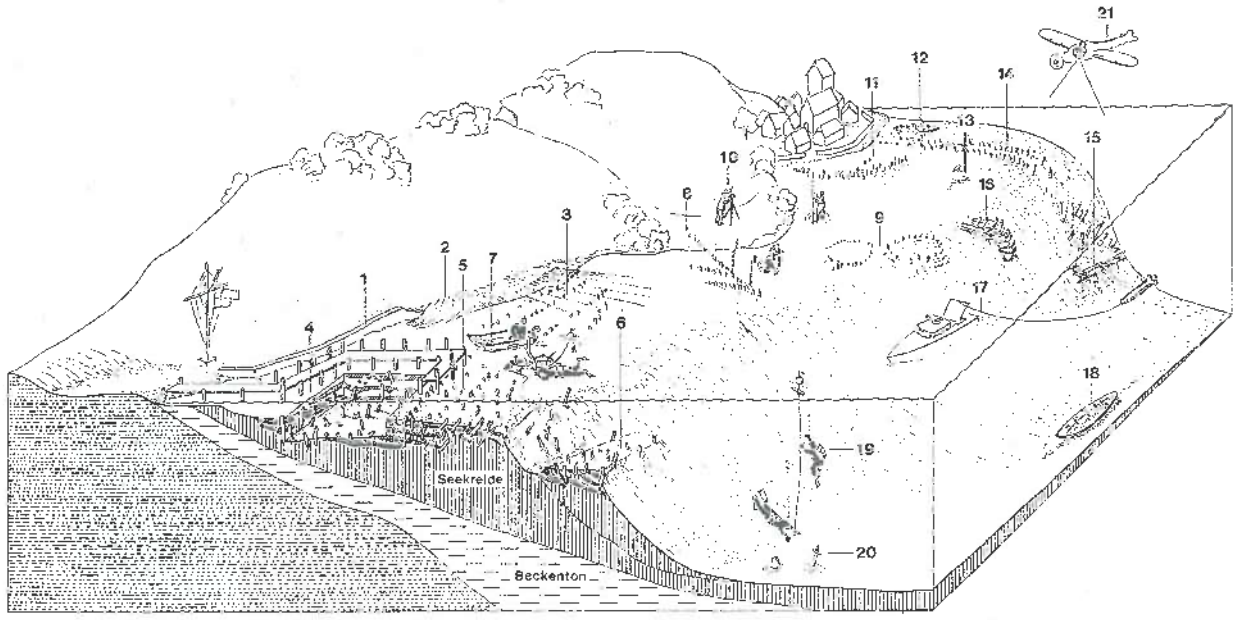

Abb.15.3: Kulturdenkmale im Flach- und Tiefwasser des Bodensees. Idealisierte Darstellung ihrer Lage und der Erkundungs- und Erosionsschutzmaßnahmen.1 Ufermauer, Ursache von Erosion durch Wellenreflektion; 2. Renaturiertes Ufer mit natürlichem Böschungswinkel; 3. Erosionsschutz von Pfahlbausiedlungen in der Flachwasserzone durch Geotextil- und Kiesabdeckung; 4. Zerstörung eines Siedlungsbereiches durch ausgebaggerten Yachthafen; 5. Pfahlbausiedlung mit mehreren Kulturschichten; 6. Abgerutschte Scholle mit Pfahlbauresten; 7. Tauchgrabung im Flachwasserbereich; 8. Reste historischer Fischfanganlagen (Fachen); 9. Riese, Fischfanganlagen Mittelalter/Neuzeit; 10. Erfassung von Kulturgut; Vermessungen, Bohrungen in der Flachwasserzone; 11. Sperrwerk, Annäherungshindernis des Mittelalters; 12. Wrack in der Flachwasserzone; 13. Steckengebliebene Ruderblätter; 14. Pfähle von Molen und Landungsbrücken; 15. Abgerutschte Landestelle; 16. Abgerutschtes Wrack; 17. Forschungsschiff mit Side Scan- Sonar; 18. Wrack im Tiefwasser; 19. Forschungstaucher im Tiefwasser; 20. Einzelfunde; 21. Luftbildprospektion. Zeichnung H. Schlichtherle u. A.Kalkowski.

Bodensee durchgeführt werden. Diese Maßnahmen beseitigen Uferverbauungen und stellen in der Regel durch Überschüttung von unnatürlichen Uferabschnitten (z. B. Ufermauern) wieder natürliche Böschungswinkel her. Vielfach waren damit die Wiederansiedlung von Schilf und naturnaher Ufervegetation verbunden, so daß eine Verringerung der Wellenreflektion und eine Beruhigung der Flachwasserzone bewirkt werden. Die Denkmalpflege ist in die Planung der Maßnahmen einbezogen und übt im Bereich von Bodendenkmalen Einfluß auf Gestaltung und Bauausführung aus.

Trotzdem ist das Kulturgut in den Flachwasserzonen des Bodensees noch immer in erheblichem Maße bedroht. Viele Uferabschnitte, insbesondere unmittelbar vor den Ortskernen, sind noch nicht renaturiert oder sind dafür ungeeignet. Zahlreiche vor Jahrzehnten errichtete Uferverbauungen und Hafenanlagen zeigen Folgewirkungen in Form einer flächengreifenden Erosion in der Flachwasserzone, die zur raschen Freilegung und Abspülung von Pfahlfeldern und Kulturschichten führt (Bürgi & Schlichtherle 1986). Umfang und Erosionsgeschwindigkeit sind in mehreren lokalen Studien untersucht worden. Zudem bewirken allgemeine Umweltveränderungen wie das 'Schilfsterben' und leichte Veränderungen der Seespiegel, die vermutlich durch Rückhaltebecken in den Alpen verursacht sind, Erosionsvorgänge. Der Denkmalpflege bleibt neben einer Beobachtung der Zerstörungsvorgänge zum einen, die Möglichkeit der Rettungsgrabung durch eine bei winterlichem Niederwasser betriebene 'Caisson-Archäologie' oder durch die ebenfalls zumeist im klaren Winterwasser agierende 'Taucharchäologie'. Zum anderen sind Maßnahmen zum Erosionsschutz eingeleitet worden, deren Methoden sich noch in der Erprobung befinden und deren Langzeitwirkung beobachtet werden muß. Der Seegrund in der Pfahlbaubucht von Wangen wurde in mehreren Etappen 1986 bis 1995 mit einer etwa 10,000qm messenden Abdeckung aus Geotextil und Kies vollständig versiegelt (Schlichtherle 1996). Weitere Kiesabdeckungen auf Geotextil erfolgten 1999 in der bronzezeitlichen Siedlung Bodman-Schachen (pl.15.1 & 15.2) (Köninger & Schlichtherle) und - in Folge einer Auflage durch den Hafenbetreiber realisiert - in der neolithischen Siedlung Dingelsdorf-Unterrieß. In der Pfahlbaubucht von Sipplingen wurden 1991 etwa 1000qm mit verschiedenen Geotextilien abgedeckt, deren unterschiedliche Eigenschaften getestet werden (Müller & Schlichtherle 1998). Zudem wurden Erfahrungen mit der Abdeckung durch Feinkies gemacht. Weitere Projekte sind geplant. Es zeichnet sich jedoch ab, daß solche Erosionsschutzmaßnahmen aus verschiedenen Gründen nur in einer ausgewählten Zahl von Siedlungen durchgeführt werden können. Die Reservatbildungen sind

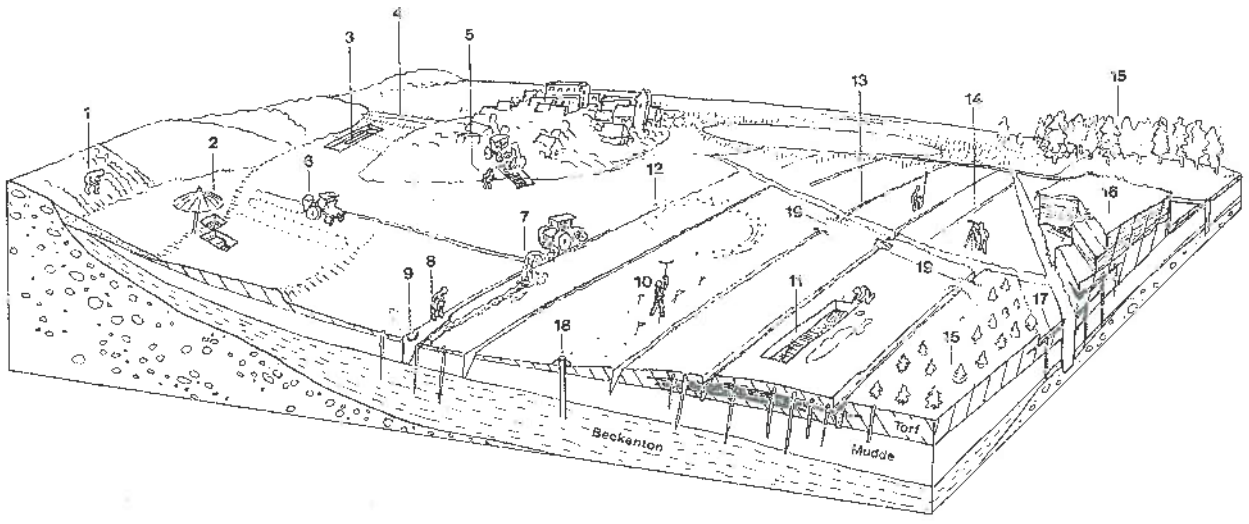

Abb.15.4: Kulturdenkmale im Federseemoor. Idealisierte Darstellung ihrer Lage und der Erkundungs- und Wiedervernässungsmaßnahmen. 1. Begehung spätpaläolithischer und mesolithischer Fundstellen am mineralischen Rand des Seebeckens; 2. Sondiergrabung einer mesolithischen Station im Torf; 3. Sondage mit prähistorischem Bohlenweg; 4. Mittelalterlicher Straßendamm; 5. Beobachtung von Baugruben am Rand der mineralischen Insel Buchau; 6. Intensive landwirtschaftliche Nutzung des Moores als Wiesland, Düngung beschleunigt den Torfschwund, schwere Landwirtschaftsmaschinen verpressen archäologische Fundstätten im weichen Grund; 7. Mechanische Ausfräsung vertieft die Entwässerungsgräben; 8. Archäologische Prospektion durch Beobachtung frisch gefräster Gräben; 9. Durchschnittener Einbaum; 10. Archäologische Prospektion durch Bohrungen, Bohrungen für Pollenanalysen; 11. Sondiergrabung in einer jungsteinzeitlichen Moorsiedlung; 12. Durch Torfschwund und Sedimentsetzung an die Oberfläche kommende Palisade einer bronzezeitlichen Moorsiedlung; 13. Ein Entwässerungssystem mit unterschiedlich tiefen Gräben durchzieht das gesamte Moor; 14. Vermessungsarbeiten zur Lokalisierung von Fundstellen; 15. Vom Torfstich verschont gebliebener Rest der ursprünglich mächtigen Torfbedeckung; 16. Aufforstungen beschleunigen die Austrocknung; 17. Durch Ausgrabung und Austrocknung in der Nähe eines Hauptentwässerungsgrabens weitgehend zerstörte Moorsiedlung; 18. Meßstation zur Kontrolle des Moorwasserpegels; 19. Verschließung von Entwässerungsgräben durch Erdbrücken und Wehre zur Wiedervernässung. Zeichnung H.Schlichtherle u. A. Kalkowski.

am Bodenseeufer somit nur punktuell und ohne Einfluß auf den generellen Zustand des Gewässers.

Völlig andersartig haben sich die Bemühungen um Reservate am Federsee (pl.15.3) entwickelt (Schlichtherle & Strobel 1999). Dort war bereits im Zuge erster Sondagen die akute Gefährdung der in den Verlandungsmooren liegenden Fundstellen durch Sauerstoffzutritt und Austrocknung festgestellt worden. Ursache waren die seit dem 18. Jahrhundert vorgenommenen Seespiegelabsenkungen und die im Handbetrieb aber auch industriell durchgeführte Ausbeutung des Moores durch Torfstich, in neuerer Zeit vor allem weitere Entwässerung und Düngung der Wiesen durch moderne Landwirtschaft. Da der größte Teil der Flächen in Privatbesitz und landwirtschaftlicher Nutzung war, wurde dort 1985 mit dem Erwerb von Flächen begonnen. Hierzu standen Sondermittel des Finanzministeriums Baden-Württemberg zur Bildung archäologischer Reservate zur Verfügung. Das Staatliche Vermögens- und Hochbauamt Ulm übernahm die Kaufverhandlungen. Zunächst bestand die Hoffnung, daß es gelingen könnte, ganze Siedlungsflächen Zug um Zug zu erwerben, um dann die Entwässerung zu bremsen. Schon bald stellte sich heraus, daß dies bei der starken Zersplitterung des Privateigentums in zahlreiche Parzellen nicht gelingen kann. Zudem zeigten erste hydrologische Gutachten, daß es einer umfangreicheren, größere Flächen umfassenden Veränderung der Moorwasserpegel bedarf, um Reservate zu begründen. Weiterhin mußte an eine angepaßte Pflege der Flächen gedacht werden, die eine Sukzession durch Verbuschung und Bewaldung verhindert. In der Bezirksstelle für Naturschutz und Landschaftspflege Tübingen und im NABU-Naturschutzzentrum Federsee fanden wir Partner, die ihrerseits an einer Erhaltung des einzigartigen Lebensraumes interessiert sind.

Das Kerngebiet des Federseemoores und wenige kleine Flächen außerhalb waren bereits seit Jahrzehnten (erste Flächen seit 1911) Naturschutzgebiet. Die Flächenkäufe, in die erhebliche Summen investiert worden sind, wurden nun von einem Programm zur Ausweisung weiterer Naturschutzgebiete flankiert, das in vier Etappen vier Schutzgebiete (Federsee Süd, West, Nord und Steinhauser Ried) begründen wird. Als Pilotprojekt wählte man das Südliche Federseeried aus, wo nach umfangreicher öffentlicher Diskussion die Verordnung des Naturschutzgebietes 1994 erfolgte. Damit konnte das Regierungspräsidium Tübingen einen Antrag auf Durchführung eines beschleunigten Zusammenlegungsverfahrens stellen, das dann vom Amt für Flurneuordnung und Landentwicklung Riedlingen angeordnet und umgesetzt wurde. Durch die Bezirksstelle für Naturschutz Tübingen und die Stadt Bad Buchau beantragte EU-Fördermittel im Rahmen der Programme 'LIFE' und 'LEADER' brachten namhafte Unterstützung für die Entwicklung von hydrologischen Konzepten zur

Abb.15.5:Archäologische Sondierung im Bereich eines neolithischen Hauses, das von einem Entwässerungsgraben durchschnitten wurde. Moorsiedlung Seekirch-Stockwiesen 1993. Foto H. Schlichtherle.

Abb.15.6: Parzellennetz des nördlichen Federseemoores (Grenze des Moores gestrichelt) und Eintragung der mit Sondermitteln erworbenen Flächen (schwarz). Kartierung Staatliches Vermögens- und Hochbauamt Ulm 1999. Die Numerierungen 1-8 markieren archäologische Bodendenkmale.

Abb.15.7: Verhandlungen im Rahmen des Zusammenlegungsverfahren im südlichen Federseemoor unter der Federführung des Amtes für Flurneuornung und Landentwicklung Riedlingen im Rathaus Bad Buchau 1999. Foto H. Schlichtherle.

Wiederanhebung des Moorwasserpegels, zur Ausarbeitung von Landschaftspflegeplänen, Besucherlenkung und Umsetzung der Maßnahmen (NABU (Hrsg.) 1999). Die Flächenumlegung erfolgte im Jahr 2001. Dachurch gelangen die Kerngebiete zum großen Teil geschlossen in öffentlichen Besitz und umfassen auch die ausgewiesenen archäologischen Vorrangflächen, in denen sich bedeutende Feuchtbodensiedlungen befinden. Mit den Wiedervernässungsmaßnahmen soll im Jahr 2001 begonnen werden. Pegelmeßstellen sind eingerichtet und kontrollieren den Erfolg.

Das archäologische Kulturgut spielte in der öffentlichen Auseinandersetzung mit Kommunen und Landwirtschaft eine wichtige Rolle und trug wesentlich zur Akzeptanz des umfangreichen Eingriffs in die Besitzstrukturen bei. Ein Archäologischer Moorlehrpfad wurde im Rahmen des Projektes eingerichtet und führt zu den Originalfundstätten im Gelände, die durch Teilrekonstruktionen und Tafeln erläutert werden (Schlichtherle 2000b). Ein archäologisches Freigelände mit der Rekonstruktion von stein- und bronzezeitlichen Häusern wurde im Rahmen des Projektes errichtet und ergänzt das bereits bestehende, als Zweigstelle des Württembergischen Landesmuseums betriebene Federseemuseum, in dem sich die Originalfunde befinden.

Die weiteren Reservatbildungen im Norden und Westen sind derzeit im Gange. Vor allem im Norden sind sie für einen seit 1980 entdeckten und sondierten Bestand von mindestens sechs hervorragend erhaltenen Moorsiedlungen der Jungsteinzeit von großer Bedeutung (Abb.15.5, Abb.15.6 & Abb.15.7). Am Federsee wird es somit gelingen, nahezu das gesamte Moor mit einer Fläche von etwa 30km², also eine ganze Landschaft in ein Naturschutzgebiet zu verwandeln. Dieses umfaßt zugleich zahlreiche Achäologische Reservate, zu deren Erhaltung die Wiederanhebungen des Moorwasserpegels beitragen werden.

Es sei abschließend vermerkt, daß auch am Schweizer Ufer des Bodensees seitens der Kantonsarchäologie Thurgau die Aufgabe der Denkmalpflege unter Wasser intensiv wahrgenommen wird. Auch dort erfolgten entsprechende Kartierungsarbeiten, auf deren Basis heute das Denkmalmanagement durchgeführt wird. Erosionsschutzmaßnahmen gehören zum Aktionsprogramm. Gemeinsame, grenzüberschreitende Projekte im Bereich der archäologischen Forschung, aber auch im Rahmen der Öffentlichkeitsarbeit werden durchgeführt (Brem & Schlichtherle 2000). Hierzu zählen Sonderausstellungen in den Museen, Vorträge, populäre Schriften, Pressearbeit, die Betreuung ehrenamtlicher Mitarbeiter und die Aufklärung der zahlreichen Sporttaucher zur Vermittlung eines Verhaltenscodex im Umgang mit dem Kulturgut unter Wasser (Schlichtherle 1995).

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16: Thorne Moors: a contested wetland in north-eastern England

Robert Van de Noort

Abstract: *This paper explores the past, present and future of Thorne Moors. First, the paper addresses the landscape context of the Moors within the Humberhead Levels, and the archaeological and palaeoenvironmental resource. It also explores the management and protection of the archaeological and palaeoenvironmental resource of the Moors. Finally, it looks at the future with reference to the opportunities provided by its possible designation as a Ramsar site.*

Introduction

Thorne Moors is a high-profile wetland site in England (fig.16.1). It is the largest remaining example of a remnant lowland raised bog in England (Lindsay *et al.* 1992), and its national and international importance to nature conservation, archaeology and natural history are beyond doubt (pl.16.1). Peat extraction continues and although this is not necessarily considered an impediment to future, long-term restoration of this wetland, the archaeological and palaeoenvironmental resource diminishes rapidly. This paradox has been highlighted on several occasions in the national press and Thorne Moors is the principal focus of political lobbying and activity by a wide range of organisations, including the Council for British Archaeology, the Peatland Conservation Consortium, Earth First!, Friends of the Earth and the Thorne and Hatfield Moors Conservation Forum. English Nature, the government's statutory nature conservation advisor, has maintained an approach based on 'partnership' with the peat producers, with a view to mire restoration in the long term (eg Kohler 1997).

Thorne Moors can be regarded as an unfortunate but 'classic' example of nature conservation legislation failing to protect the archaeological and palaeoenvironmental resource of the area (eg Eversham *et al.* 1995), and of archaeological legislation unable to extend its terms of reference to include important landscapes that have strong nature conservation value. The editors requested that this paper would address the issue whether this dichotomy could have been overcome if Thorne Moors had been designated a Ramsar site. This matter is pertinent and also timely - after many years of debate, the United Kingdom government recently announced its intention to purchase Thorne Moors and declare it a Special Protection Area or SPA (Department of the Environment, Transport and the Regions press release of 16 September 2000). Although the matter is unlikely to be resolved speedily, this change in government policy provides new opportunities for integrated management and protection of the archaeological and nature conservation aspects of Thorne Moors.

In this paper, I will explore the past and future of Thorne Moors. First, the paper addresses the landscape context of the Moors within the Humberhead Levels, and the archaeological and palaeoenvironmental resource. It then explores the management and protection of the archaeological and palaeoenvironmental resource of the Moors. Finally, it looks to the future with reference to the opportunities provided by its possible designation as a Ramsar site.

Thorne Moors in the Humberhead Levels

Thorne Moors lies within the Humberhead Levels, (fig.16.2) a region recognised by English Nature as one of its 'Natural Areas' and by the Countryside Commission as a 'Character Area' (English Nature & the Countryside

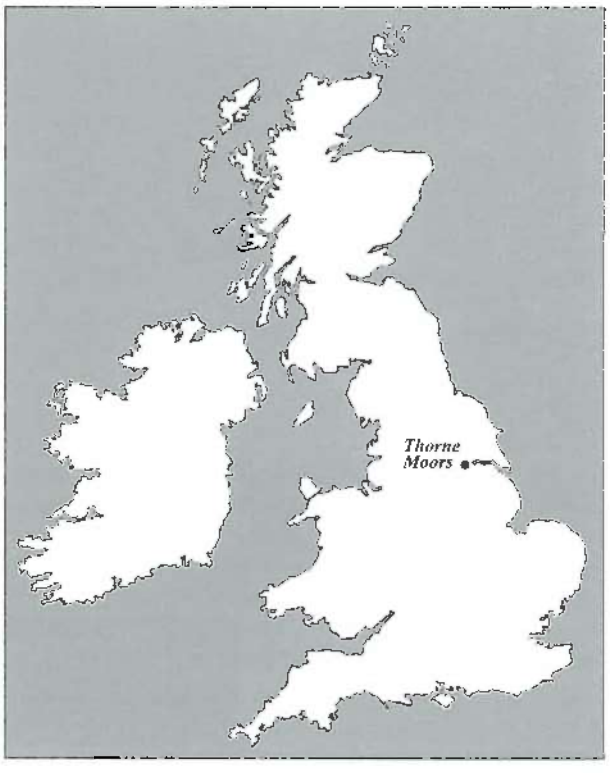

Fig.16.1: Location of Thorne Moors.

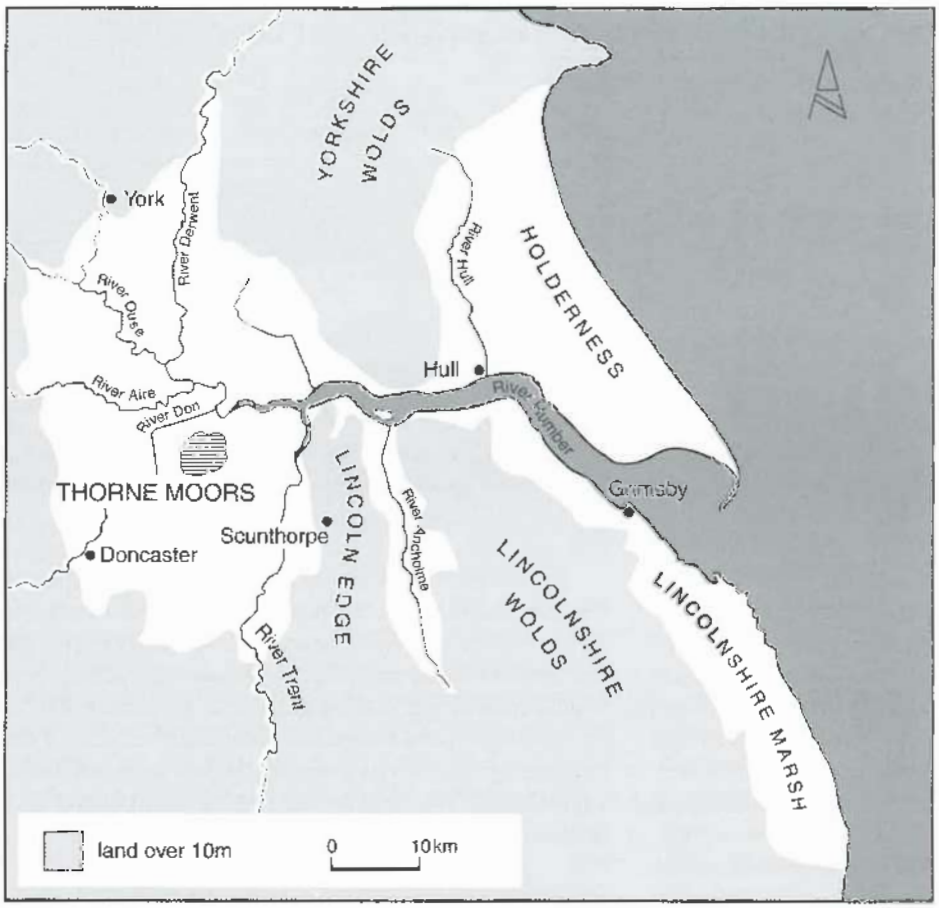

Fig.16.2: Location of Thorne Moors in the Humberhead Levels, in the Humber wetlands.

Commission 1996). This area is predominantly flat and lies at or below current high-water mark in the Humber estuary. The Levels occupy an area of the pro-glacial Lake Humber, that existed around 11,000 BC (Gaunt 1987), and several major rivers developed at the end of the existence of Lake Humber, when melt water drained through the Humber Gap (Van de Noort & Davies 1993). These rivers, including the Trent, Ouse, Don and Idle, incised deeply in the gently undulating bed of the silted-up Lake Humber but did not provide effective drainage to the surrounding landscape. The rise in sea level during the Holocene resulted in the development of extensive wetlands in the Humberhead Levels. This development affected initially only the river channels, but from *c.*3200 cal BC the natural drainage of the Levels was impeded by the continuing sea level rise and, through the process of paludification, peat development commenced on Thorne Moors (Buckland & Dinnin 1997).

Given the gently undulating nature of the bed of the silted-up Lake Humber beneath Thorne Moors, paludification would have been localised, with the developing areas of peat subsequently combining to ever-larger areas of peatland (eg Buckland 1979; Smith 1985; Buckland & Dinnin 1997). On Thorne Moors it is possible that this process followed the development of a series of smaller mires, mesotrophic (ie mires with an intermediate nutrient status because water is received from both precipitation and groundwater) and ombrotrophic (ie mires that are rain-fed and therefore receive few nutrients) in character. The time-transgressive nature of peat development suggests that a mosaic of wetlands including carr woodland, together with deciduous forest containing oak, and pine forest with heath, may have grown on the area that is now Thorne Moors. The rise in water levels effectively drowned the forest on Thorne Moors (Dinnin 1997), and these woodlands were preserved in the peat.

Evidence for burning has been found on Thorne Moors. No stratigraphic evidence for more than one fire event was found and the burning was not necessarily contemporaneous. Research to date has been unable to establish whether the burning is anthropogenic or natural in origin (Dinnin 1994). There is evidence for a short-lived and perhaps localised phase of pine colonisation of the mire surface following the fire or fires (Buckland & Dinnin 1997). Thereafter, essentially ombrotrophic mire developed until mire hydrology was irreversibly disrupted during the later Middle Ages.

The extent of Thorne Moors around 1000 AD is thought to have been much greater than what survives today, extending northwards towards the River Ouse and eastwards towards the River Trent. Between 1100 AD and 1400 AD, *Sphagnum imbricatum* disappeared from Thorne Moors, having formed the bulk of moss peat up to then (Smith 1985). This suggests either climate changes or increased pollution. The 'Inclesmoor map' of early fifteenth century date shows Thorne Moors as being partially drained and parcelled up along its northern

margins (fig.16.3). Peat cutting, for fuel, was mainly undertaken by monastic centres with the earliest evidence dating back to the thirteenth or fourteenth centuries (Beresford 1986).

However, the demise of Thorne Moors only commenced after the drainage of the Humberhead Levels in the first half of the seventeenth century. The drainage work undertaken by the drainage engineer Cornelius Vermuyden and the Participants under royal patronage saw the diversion of the Rivers Don, Went and Idle, and the large-scale conversion of waste land into pasture in the Humberhead Levels (eg Dinnin 1997). Later, in the eighteenth and nineteenth centuries, the northern half of Thorne Moors was 'warped', a system whereby floodwater from the Rivers Ouse and Trent was used to raise the level of the land through sediment accretion (eg Gaunt 1994; Lillie 1997).

Peat cutting by hand commenced on Thorne Moors no later than the thirteenth or fourteenth centuries and continued until the early 1960s, when mechanised peat cutting replaced hand digging (Limbert 1986). Both the manual and the mechanical methods of peat cutting exploit the peat over relative small areas to a considerable depth, but the subsequent peat milling method, introduced on Thorne Moors after 1985 (fig.16.4), removes the top layer of peat over very large areas (eg Eversham 1991). This is illustrated in the following example - peat production was greatest around 1910, when 70,000 tonnes of peat for animal litter were cut from an area of *c.*500 hectares. In 1985, the *c.*25,000 tonnes of peat milled for compost were taken from an area in excess of 1000 hectares (Eversham 1991, p.9).

The archaeology of Thorne Moors

The archaeological resource of Thorne Moors is threefold, finds and sites from within the peat, sites and finds from the pre-peat surface, and the palaeoenvironmental evidence. The evidence has been collated and published in Van de Noort *et al.* (1997).

Only one archaeological site has been reported from within the peat from Thorne Moors this century, a short trackway of Bronze Age date (Buckland 1979). Compared to other extensive peat workings in England and elsewhere, for example the Somerset Levels or the Midlands of Ireland, such a dearth of archaeological finds is surprising. Nevertheless, when we explore antiquarian reports of discoveries from Thorne Moors the dividend is greater. Perceptions of wetlands in the past have resulted in the deposition of people and valuable objects in deep peatlands throughout north-western Europe (eg Van der Sanden 1996). The votive or ideological basis for this practice can be traced back into the Neolithic period and continued into the Roman period and beyond (Bradley 1990).

The antiquarian discoveries are without exception associated with drainage activities, peat cutting and

Fig.16.3: The 'Inclesmoor map' map c.1407, showing Thorne Moors, surrounding villages and rivers. Redrawn by the Humberside Archaeological Unit.

excavation of buried trees, the latter used for firewood, fence staves and ships' masts (Stovin Ms 1882). These intrusive works provided opportunities for the identification of archaeological remains such as worked timbers and bog bodies, which are not achieved by modern archaeological techniques, such as field walking, aerial reconnaissance or geophysical survey (Coles & Coles 1996).

Archaeological discoveries from what was Thorne Moors include at least two bog bodies, both reported by Stovin (1747, cf. Turner & Scaife 1995) in a letter to the Royal Society:

> Abut sixty years ago, or seaventy, the servants of Mr James Empson, of Goole, was digging turff in this great Waste, and one of them cutt a man's arm off by the shoulder, which he carried home to his master, who took the bone out and stuff'd it, and made a present of it to Dr. Johnson, of York, an antiquarian.

> At Thorne, in these moors, about ten years ago, as one William Biddy, of Thorne, was digging turff, he found the entire body of a man with his teeth firm in his head; the hair of his head firm and fast on, and of a yellowish collour, either naturally so or dyed by the water of this moor. His skin like a peece of tanned leather. He took the body up intire, after having lay there some hundred years.

The antiquarian literature offers an additional number of bog bodies and archaeological observations. However, provenancing these antiquarian sightings remains difficult. What were newly constructed drains in the seventeenth century (eg Dutch River, Three Rivers, Hatfield Waste Drain) relate mostly to areas outside the limits of the present Thorne Moors, although they were considered to be part of the pre-drained Thorne Moors or the nearby Hatfield Moors. Bog bodies from Hatfield Chase have been reported by de la Pryme (1699) and Hunter (1828), and a pair of sandals from Amcotts, in the lower Trent valley was recently dated to the late third to fourth centuries AD on stylistic grounds (Turner & Rhodes 1992), implying the former existence of a bog body of Roman date.

Other antiquarian observations on the peatlands of the Humberhead Levels concern the buried trees. Once again, the provenance of many observations remains unsecure, but the following quote from de la Pryme's letter to the Royal Society (1699) illustrates the importance of this resource:

> It is very observable, and manifestly evident, that many of those trees of all sorts have been burnt, but especially the pitch of fir trees, some quite through, and some all on one side; some have been found chopped and squared, some bored through, others half split with large wooden wedges and stones in them, and broken axe-heads, somewhat like sacrificing axes in shape, and all this in such places, and at such depths, as could never be opened, since the destruction of the forest, till the

Fig.16.4: Thorne Moors during peat extraction.The tree-stumps littering the ground are of prehistoric date and provide a valuable archive of environmental data.

> time of drainage. Near a large root in the parish of Hatfield, was found 8 or 9 coins of some of the Roman emperors, but exceedingly consumed and defaced with time.

The discovery of Roman coins seems unambiguous and whether the broken axe heads were found associated with the worked timbers or from somewhere else in Hatfield Chase remains unclear. Nevertheless, natural cracking of waterlogged pine and oak following desiccation produces characteristics which are clearly distinct from the anthropogenic splitting of green or weathered wood, and the recognition of axe marks and the remains of axeheads and wedges must reflect actual working of timber.

The most recent archaeological site from the peat on Thorne Moors is the prehistoric trackway, discovered in 1971 by William Bunting during drain clearance and subsequently partly excavated. It concerns a site of several large trees with charred surfaces, where a limited excavation revealed 'a short stretch of a rough trackway, constructed of timbers of various sizes, orientated approximately south-east to north-west' (Buckland 1979, pp.10–11). The bark from one of the timbers provided material for a radiocarbon date of 1510-910 cal BC (2983±110 BP; Birm-358), and although several timbers appeared to show oblique chop marks, detailed investigations could not establish if and what artefacts had been used to modify the wood. No artefacts were found on the site. The trackway lay close to the base of the peat, over Lake Humber silts. It could not be traced over any length, and may have formed a temporary crossing place over a wet area.

From the area known as Nun Moors, between Thorne and Thorne Moors, several prehistoric finds are recorded. These include a Mesolithic tranchet axe, a Neolithic polished stone axe, and flint flakes nearby and a possible Neolithic flint flake (Magilton 1977). Apparently, all finds came from sand ridges beneath the peat, exposed through peat wastage after Nun Moors was effectively drained. An undated sword is mentioned in the Yorkshire Philosophical Society Annual Report of 1862, having been found in Hatfield Chase, but is further unprovenanced. A hoard of Middle Bronze Age equipment was alleged to have been found in 1747 near Crowle (Dudley 1949), but a recent examination of sources suggests that the hoard comes from Burringham, on the east bank of the River Trent (Buckland 1979).

The palaeoenvironmental value of the peat itself, and the buried trees contained within the peat, must be considered the greatest asset of Thorne Moors (Buckland & Kenward 1973). As a receptacle of pollen from a wide region, Thorne Moors can inform on vegetation history, climate change and human impact on the environment in northern England for a near-uninterrupted period of five millennia. The macrofossil remains that constitute the greater part of the peat hold a detailed history of wetland development on Thorne Moors, as described above. Furthermore, the remains of trees that represent the landscape immediately predating the development of peat on Thorne Moors offers important insights into the wider landscape of the Humberhead Levels before paludification changed its character. It may also hold evidence of human activity within the forest, but to date this remains unproven (Buckland & Dinnin 1997).

Management and protection

The appreciation of the nature conservation and archaeological value of Thorne Moors has developed only slowly over the last 50 years. While for some, such as William Bunting, the Moors always represented an outstanding asset to nature conservation, the use of the moors as a dumpsite for urban waste, or as the location of a regional airport was still considered by the local authorities in the 1970s.

Thorne Moors has been described as a unfortunate but 'classic' example of nature conservation and archaeological legislation failing to protect the archaeological and palaeoenvironmental resource of the area (eg Eversham *et al.* 1995). The whole of Thorne Moors was notified as a Site of Special Scientific Interest (SSSI) in 1981. Part of Thorne Moors was purchased in 1985 and designated as a National Nature Reserve (NNR). This area, of some 73 hectares, represents the peat workings dating from 1890s to the 1920s, with important examples of mire and fen habitat (Roworth 1991; 1997).

The NNR within Thorne Moors has been managed to the benefit of the biodiverse vegetation in the former canals which were used for shipping cut peat, and the strips of peatland that remained (largely) uncut. The archaeological resource within this area is most likely to have benefited considerably from the nature conservation actions, with a full protection of the peat itself. The management regime was aimed at containing water within the NNR through a system of pumped recharging of the water table (Meade 1992). Any waterlogged archaeological and palaeoenvironmental remains contained within this area would have benefited from continued high water tables and good quality water within the NNR, ie water with low oxygen and nutrient levels. Any archaeological sites predating the peat have also been preserved. It is worth noting at this point, however, that the preservation of archaeological and palaeo-environmental remains within the NNR was not considered within the management plans.

The SSSI status bestowed in 1981 upon the remaining 1845 hectares of Thorne Moors provided little more than a notional protection to the archaeological and palaeoenvironmental resource. Peat extraction continued more or less unhindered and neither archaeological remains within the peat, or below the peat were offered any protection. Existing planning permissions and

decisions were unaffected by the SSSI designation. On Thorne Moors, as is the situation on many other wetland sites in England, the licenses and planning permissions for peat extraction date in majority to the 1950s (ie the post-war revival in the peat industry).

An agreement announced in 1992, but not signed until 1994, saw the transfer of the ownership or freehold of Thorne Moors from the peat producers (then Fisons plc Horticulture, later Levington Horticulture and now The Scotts Company (UK) Ltd) to English Nature. This transfer was on the basis of a leaseback agreement, whereby the peat producers are to continue peat extraction but an average of 0.5m of basal peat must remain for future restoration and conservation (Roworth 1997). Following the announcement in 1992, nearly 1000 hectares of peatland was transferred to and has since been managed by English Nature.

Central to this agreement is the concept that the raised mire of Thorne Moors can be restored after peat extraction has been completed. The main focus of this management was based on published recommendations on mire restoration (eg Wheeler & Shaw 1995), and the prevention of the loss of water from the area became the priority. The management plan, however, failed to acknowledge the fundamental need for protection of the archaeological and palaeoenvironmental resource.

In 1995, parts of Thorne Moors together with nearby Hatfield Moors were declared the Humberland Peatlands NNR. The NNR totals 1,381 hectares and is situated within the SSSIs, which for both Moors measures 3,318 hectares. The enhanced status of Throne Moors reflected the fact that its ownership had been transferred from the peat producers to English Nature. Nevertheless, peat extraction has continued on Thorne Moors, although a rolling programme of handovers of land where peat extraction has ceased has resulted in a growing control by English Nature of the remaining peat. As was the case within the area designated earlier as NNR, maintaining water levels and controlling vegetation, in order to limit evapotranspiration, formed the core management issues (Roworth 1997), but the archaeological and palaeoenvironmental issues were not explicitly addressed by English Nature.

In 1997, English Nature put out to consultation recommendations to reduce the SSSI of Thorne Moors by 5%, and of Hatfield Moors by 35%. This was met by a storm of protest, most notably from Friends of the Earth, and following the consultation the recommendations were withdrawn.

The benefit of nature conservation management to the archaeological and palaeoenvironmental resource has undoubtedly been positive. The advantages of retention of water and the cessation of peat extraction for parts of Thorne Moors undoubtedly outweigh the disadvantages of building dams of peat, with or without archaeological supervision, forming part of the nature conservation management (cf. Cox *et al.* 1995). However, the archaeological and palaeoenvironmental resource were never part of the considerations, other than as a matter to be 'mitigated'.

Legislative controls available to the archaeological community were also found to be ineffective in the case of Thorne Moors. Scheduled ancient monuments are defined as man-made structures and remains, and prehistoric landscapes and woodland that may or may not have been managed or modified by people in the past do not qualify for inclusion in the schedule.

More recent archaeological guidance that operates within the planning framework, for example *Planning Policy Guidance 16, Archaeology and Planning* (Department of the Environment 1990) has had little effect on the impact of peat extraction and drainage because planning permission generally predates this guidance. However, a review of the planning permissions resulted in new conditions added to the renewal of the planning permission by the authorities of Doncaster Metropolitan Borough Council, North Lincolnshire Council and East Riding of Yorkshire Council. This included, for the first time, requirements for archaeological work aimed to identify archaeological remains to be undertaken on behalf of the peat extractors.

More recently, the need for holistic and larger-scale work has been recognised. This is in part based on the recognition that Thorne Moors forms part of the Humberhead Levels landscape that has been extensively drained, and that the rewetting of the Moors cannot be achieved without addressing the wider issues of water in drained landscapes (eg Meade 1999). The Countryside Agency-led programme 'Value in wetness', which is focused on the Humberhead Levels (Pasley 1999), addresses this wider issue. The programme includes many facets, but is essentially aimed at developing practical solutions to the problems of water shortage during the summer months and water excess in winter months, in partnership with the local rural communities.

In all, the archaeological and palaeoenvironmental resource of Thorne Moors has become increasingly better protected over the last three decades. In particular land where commercial peat extraction has ceased is well-protected. Nevertheless, the statutory protection of the archaeological and palaeoenvironmental resource of Thorne Moors has yet to be achieved and remains a main goal for the archaeological community.

The future of Thorne Moors

Designating Thorne Moors as a SPA under the European Birds Directive, as recently announced, will provide the highest level of protection available to wildlife conservation sites in the United Kingdom. All new

developments and activities will need to be assessed for their impact on the interests for which the site has been classified. If and when the United Kingdom government's announcement regarding the future of Thorne Moors is effected, it is likely that it will also be designated as a Ramsar site. Thorne Moors has been listed as a candidate Ramsar site since 1991.

This designation will provide the planning authorities, for the first time, with the opportunity and obligation to review existing consents for mineral extraction that may impact on these interests (ie Regulation 50 of The Conservation (Natural Habitats, &c.) Regulations 1994). Any proposal that will adversely affect the integrity of the SPA can only be permitted in the overriding public interest and in the absence of alternatives. However, it is not clear whether this opportunity will be used to address the archaeological and palaeoenvironmental resource of the Moors alongside the ecological considerations. It is also unclear whether peat extraction falls within the definition of 'overriding public interest'. A recent parliamentary subcommittee report states that no viable alternative for peat as a growing medium is currently available, and that the market for peat has grown strongly in the last decades (Department of the Environment, Transport and the Regions 1998).

So, what advantages would the designation of Thorne Moors as a Ramsar site bring to the archaeological and palaeoenvironmental remains? The designation of Thorne Moors within an international treaty would undoubtedly raise the profile of the site further, but in terms of implementation, compliance, enforcement and effectiveness of the treaty, the greatest benefit would be derived from the requirement to *conserve* wetlands as habitats of distinctive ecosystems. This requirement challenges directly the concept currently held by the landowner, English Nature, that the raised mire of Thorne Moors can be restored after peat extraction has been completed. Conservation of the wetlands, rather than future regeneration, will provide a basis for the protection of the archaeological and palaeoenvironmental resource of Thorne Moors. Ramsar designation would challenge the rationale of the current management of Thorne Moors, to the benefit of the archaeological and palaeoenvironmental resource. Furthermore, it is undeniable that nature conservation would also benefit from a holistic approach to preservation.

Whether or not Ramsar designation would exclude further peat extraction from the Moors remains to be seen. After all, the Ramsar Convention permits 'sustainable wise use' of listed sites, but it seems likely that the present arrangements would be reviewed following the designation of Thorne Moors as a Ramsar site (Farrier & Tucker 2000).

Conclusion

Thorne Moors is recognised as a site of national and international importance to nature conservation and archaeology. Over the last three decades, the ecological and archaeological value of the site has been diminished by peat extraction and drainage of the site. Attempts and approaches to manage and protect the Moors have failed to integrate the protection of the ecology with the protection of the archaeological resource, although it is recognised that in practical terms the ecological management increasingly contributes to the protection of the historic environment. However, the designation of Thorne Moors as a Ramsar site requires conservation of the wetlands habitats, rather than the future regeneration of the raised mire that forms the main focus of the current management regime. Such a change in emphasis will contribute to the future protection of the archaeological and palaeoenvironmental resource.

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17: Wetland birds in the archaeological and recent palaeontological record of Britain and Europe

John Stewart

Abstract: *Archaeologists and palaeontologists, using faunal remains, have been able to identify a number of bird species within the archaeological and palaeontological record, within which wetland birds are represented. This paper presents a taxonomic review of known wetland bird species within this record including species, now extinct, no longer breeding in Britain and northern Europe, or which have in recent years begun to return, or to appear for the first time. Information gained through this record illustrates the past history and development of wetland species and the effects which wetland changes have had on them. The paper demonstrates what this evidence can tell us about the response of wetland bird species to past and therefore possibly future environmental change.*

> We can let our minds wander back to the misty realms of fifteen hundred years ago, to a wonderful Britain which was alive with bird song from coast to coast, which sheltered wolves, bears and boars in its dark woodlands, cranes in its marshes, bustards on its heaths and beavers by its streams, and we can visualise the great pink pelican sweeping on its huge pinions over the reedy waterways which then penetrated by secret paths into the very heart of what is now Somerset. (Whitlock 1953).

Introduction

In north-west Europe drainage and land reclamation has meant that of all major habitats, wetlands may have been the most severely depleted during the Holocene. This is certainly true of Britain (Whitlock 1953). The consequences to wetland birds can be gauged from the species which vanished as breeding populations from Britain and/or elsewhere in north-west Europe. Examples include the Dalmatian Pelican, the Common Crane, the Spoonbill, the Great White Egret, the Night Heron, the Osprey, the White-tailed Eagle, the Black Tern and possibly the Pygmy Cormorant and the Greater Flamingo. Another possible result of the loss of wetlands may be that certain birds, such as the Mute Swan and the Common Crane, diminished in size due to habitat impoverishment.

Sea-level rise has also meant that coastal wetlands, particularly inter-tidal ones, were lost during the earlier parts of the Holocene, affecting birds such as waders, ducks and geese in particular. This, in tandem with the climate change which caused the sea-level rise, will have dramatically altered the distribution of migratory species in these groups.

A variety of sites in north-west Europe which yielded wetland birds have been published over the years (Bulleid & Gray 1911–17; Soergel 1955; Bramwell 1975; Classon & Prummel 1979; Prummel 1987; 1993; Northcote 1979; 1980; Bochenski 1983; Harrison 1982; 1987; Reichstein & Pieper 1986; Zeiler & Clason 1993; Zeiler 1991; Stewart 1999; Lawerier 2001). These include both geological sites and those which are purely archaeological where bird bones presumably represent the remains of meals (Bramwell 1975). The geological sites, such as the various Fen deposits of East Anglia and Danish peat deposits, provide the best preserved remains of wetland birds, often constituting near complete to complete skeletons (Northcote 1979; Stewart 1999).

Taxonomic Review

Wetlands of one sort or another support a greater biomass of birds than any other habitat. This is perhaps best exemplified by the fact that many of the largest birds in north-west Europe are wetland birds. These include members of the *Anseriformes*, *Gruiformes* and *Ciconiiformes* such the swans, geese, ducks, herons and allies, storks and cranes. Any loss, therefore, of such habitats will have a greater visible effect on the bird faunal history of an area, as seen through the fossil record, than loss of other habitats. The consequences of wetlands loss to song birds (passerines) are also likely to have been significant although, due to the difficulties of recovery (they are small and require sediment screening) they cannot be adequately addressed. Identification of songbird bones to species is also a problem so their physical record, even if it were complete, would be ambiguous.

Identification is the most crucial part of any study of bird bones and considerable difficulties exist (Stewart 1999, in press) which signify that any uncritical review of the literature may lead to erroneous conclusions. Many taxonomic groups are problematic in this regard and the ducks, together with the song birds, are possibly the most difficult to identify. The osteology of ducks is conservative and while identifications exist in the literature in profusion

the present author is very concerned about their reliability and hence they have been left out of this review.

An important point to note, as regards the changes to wetland bird distributions, is that they are not synchronous which could argue for different causes. This may be best demonstrated by the birds, which have subsequently been re-established despite there being no significant recovery of wetlands. Recently some wetland birds have either become re-established (Common Crane and Spoonbill) or have come to Britain for the first time (Little Egret). The new breeding records of spoonbill and Little Egret in England have been explained by the global warming phenomenon (Unwin 2000).

There are only a few *taxa* that are fairly common in the archaeological record and have changed little, if at all, in their distribution. The obvious example is that of Grey Heron (*Ardea cinerea*). There are species which inexplicably have few or no records even though they might be expected such as the Coot (*Fulica atra*) and the Moorhen (*Gallinula chloropus*), the Water Rail (*Rallus aquaticus*), the three European crake species, Spotted Crake (*Porzana porzana*), Baillon's Crake (*Porzana pusilla*) and Little Crake (*Porzana parva*), the Little Bittern (*Ixobrychus minutus*), the Osprey (*Pandion haliaetus*), and all of the grebes like the Great-crested Grebe (*Podiceps cristatus*), the Black-necked grebe (*Podiceps nigricollis*), the Red-necked Grebe (*Podiceps grisegena*), Slavonian grebe (*Podiceps auritus*). Others have records but have diminished dramatically in numbers and have become locally extinct in some areas, such as the Bittern (*Botauris stellaris*), the Black Tern (*Chlidonias nigra*), the Common Crane (*Grus grus*), the Marsh Harrier (*Circus aeruginosus*), the White Stork (*Ciconia ciconia*), the White-Tailed Eagle (*Hariaeetus albicilla*) and the Spoonbill (*Platalea leucorodia*). The Great Cormorant (*Phalacrocorax carbo*) disappeared in Britain but only from freshwater habitats. Others still are rare in the record and have disappeared from most or all of the area like the Dalmatian Pelican (*Pelicanus crispus*), the Pygmy Cormorant (*Phalacrocorax pygmeus*), the Great White Egret (*Egretta alba*) and the Greater Flamingo (*Phoenicopterus ruber*). There are also species whose modern breeding distribution is close to north-west Europe and should be considered but have as yet not been found on archaeological or palaeontological sites. These include the Black Stork (*Ciconia nigra*), and the Squacco Heron (*Ardeola ralloides*). Finally, there are the Night Heron *Nycticorax fenensis* and the Crane *Grus primigenius* both extinct species named on dubious fossil grounds.

What follows is a discussion of a few of these examples whose distributions have changed.

The Common Crane (*Grus grus*)

The Common Crane has a relatively good palaeontological and archaeological record having been found at numerous Holocene sites of various ages in Britain (Boisseau & Yalden 1998) and north-west Europe (Newton 1901; Bochenski 1993; Zeiler & Clason 1993; Zeiler 1991; Prummel 1993; Stewart 1999). Crane bones are common in the record, as cranes were eaten and hence their bones are found among domestic waste in towns as well as peat deposits. References to them having been eaten are found in many texts. For instance, a list of presents sent to William Moore of Losely on the occasion of his daughter's wedding on 3 November 1567 includes 9 cranes 'out of the marshland in Norfolk' (Simon 1944). Other texts mention that 'Crane is hard of digestion and maketh yll juice, but beyng hanged up longe in the ayre, he is the less unholsome' (Simon 1944). This probably accounts for the fact that later on the crane was 'no longer sought after; such is changing fancies of English fare' (Smith n.d.).

The widespread nature of the crane's former distribution in Britain is further illustrated by the large number of place names with prefixes such as *cran*, *trani*, *cron*, *corn* or *cranuc* (Boisseau & Yalden 1998). Cranes probably became extinct as breeding birds in Britain in the sixteenth century (Whitlock 1953) and in countries such as Denmark in the early nineteenth century. The species started breeding in Denmark again in 1925 (Cramp & Simmons 1980) while it continued to breed in areas such as northern Scandinavia and Poland until the present day (Cramp & Simmons 1980). Recently, the crane has become re-established as a breeding species in East Anglia (Boisseau & Yalden 1998).

The Dalmatian Pelican (*Pelicanus crispus*) (fig.17.1)

The identity of the Pelicans which bred in Britain was for some time obscure or else they were erroneously believed to have been White Pelicans (*Pelicanus onocrotalus*) (Whitlock 1953). The historical sources were inadequate in naming the species involved and the 'Pelican' recorded by Sir Thomas Browne in 1663 in Norfolk may have either been an escapee from London or a vagrant from south-eastern Europe (Whitlock 1953). The pelicans were in fact Dalmatian Pelican (*P. crispus*) which bred in north-west Europe including Britain (Joysey 1963; Northcote 1979). Dalmatian Pelicans are better suited to the climate of north-west Europe, than White Pelicans, as well as to the shallower water bodies of areas such as the East Anglian Fens (Northcote 1979). Physical evidence for the presence of pelicans in Britain was perhaps most famously noted from an archaeological point of view by Joysey in his paper 'A scrap of bone' in Brothwell and Higgs (1963). Sites where the species has been recorded include the Fen peat deposits, Glastonbury Lake Village in Somerset and the King George Dock, Hull (Bulleid & Gray 1911–17; Northcote 1979). The finds from East Anglia and Hull date from Godwin's pollen Zone VII while those from Glastonbury are from Zone VIII which coincides with the Iron Age (Northcote 1979).

Dalmatian Pelicans have been found in some numbers in Vlaardingen in Holland in Neolithic deposits (Clason

& Prummel 1979). Nine bones of at least three individuals were found at this site. There is also an undated record of a pelican which is not identified to species from the Maasvlakte in Holland (Kompanje & Kerkhoff 1991). This specimen was part of material from various man-made waterways, which was dredged up when the waterways were being dug.

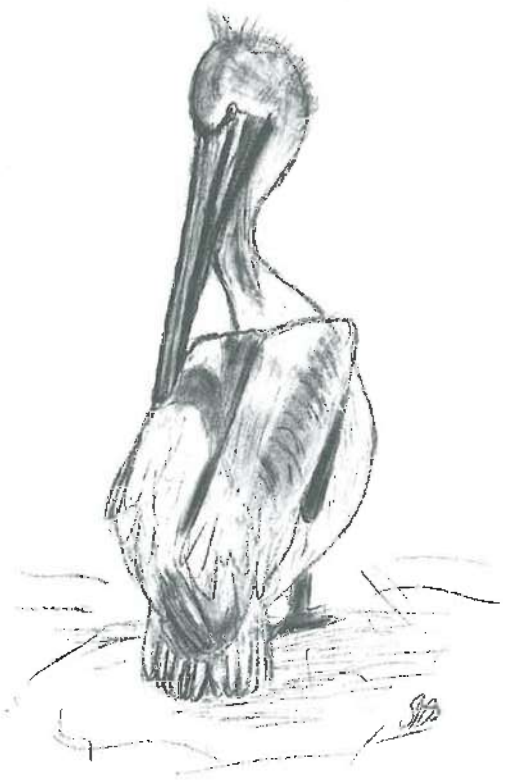

Fig.17.1: Drawing of Dalmatian Pelican (Pelicanus crispus) *at London Zoo (by author).*

The species has also been reported from Denmark (Northcote 1979). There are six verified specimens and one unidentified to species. Six of the specimens were dated to Jenssen's Danish pollen zones VII and VIII which correspond to Godwin's zone VII or *c.*4000–7000 years BP (Northcote 1979).

Clason and Prummel (1979) quote Pliny who stated that the Dalmatian Pelican formerly bred in the estuaries of the rivers Rhine, Scheldt and Elbe. They further speculate that their loss was at least partly due to the disappearance of the biotope that supported this species.

The Great Cormorant (*Phalacrocorax carbo*)

Today, the Great Cormorant in north-west Europe is comprised of two subspecies *P. carbo carbo* and *P. carbo sinensis*, the former being significantly larger than the latter (Ericson & Hernandez Carrasquilla 1997). *P. carbo carbo* is currently restricted to the north and western edges of the area. This was probably not, however, always the case. Ericson and Hernandez Carrasquilla (1997) have shown that during the prehistoric and early historic periods in southern Sweden the larger subspecies resided all year while today the smaller one breeds there and is joined by the larger one in winter. The same appears to have been true in Denmark and elsewhere in Europe in earlier times and it may be that the smaller subspecies is a relative newcomer to Western Europe (unpublished data).

The trend today is for the smaller subspecies, *P. c. sinensis*, to be more of an inland bird while *P. c. carbo* has come to favour a marine environment as it has been replaced inland by *P.c. sinensis*. This may have contributed to confusion in Britain regarding the true habitat of the cormorant. There was a recent topical controversy resulting from the cormorant becoming re-established in freshwater habitats in Britain following a ban on their culling. The Wildlife and Countryside Act in 1981 (HMSO 1981) banned the killing of many wild bird species including the cormorant. This led to a growth in the bird's numbers in fresh water habitats where gamekeepers had formerly culled them. The culmination was a headline in the *Angling Times* with many sports fishermen and fish farmers claiming that the birds were only colonising freshwater habitats as a result of over-fishing at sea (Anon 1996). However, there is clear evidence of Cormorant breeding in freshwater habitats at Glastonbury where immature birds were found indicating inland breeding during the Iron Age (Bulleid & Gray 1911–17; Stewart *pers. obs.*). Furthermore, these cormorants appear to belong to the larger subspecies. This example is not one where habitat depletion is clearly to blame, because the birds were culled. It may be the case that cormorants particularly favoured flood plains and lakes found on them. These were gradually destroyed by agriculture, urbanisation and river management. The recent increase in cormorants may have been helped by flooded quarries found in many areas which may mimic former habitats, and of course put the birds into direct conflict with fishermen as many of the quarries are stocked with coarse fish.

The Pygmy Cormorant (*Phalacrocorax pygmeus*)

The Pygmy Cormorant has one fossil record in Britain from a timber-lined well on an archaeological site in Stert Street, Abingdon in Oxfordshire (Cowles 1981). This, however, appears to be the sole record from north-west Europe. There is no reason why the left and right carpometacarpus should be mistaken for any other species. Indeed, Graham Cowles went to some trouble to confirm the identifications by retrieving a carpometacarpus of the species by means of dissecting it out of a spirit specimen from the collections of the Natural History Museum at Tring in Hertfordshire. There is no guarantee that these specimens, dated to the fifteenth and sixteenth centuries, emanated from a breeding colony in Britain. Today the species' breeding range is Albania, Macedonia, Romania,

Bulgaria, Greece, the Black, Caspian and Aral Seas and Asia Minor east to Iran, although it formerly bred in Hungary and Algeria (Cowles 1981). The climate during the time when the timber-lined well shaft became filled may have been warmer than today as vines are known to have been grown in Abingdon at about 1380, possibly explaining the presence of this thermophilous bird. However, it was not long afterwards that the climate deteriorated dramatically with severe winters in the 1430s (Cowles 1981). Therefore, such an avenue of investigation would seem unrewarding.

The species has occurred as a vagrant in north-west Europe but never as a breeding species. Another example of an exotic of a similar age, a parrot which was not identified to species, was found at Castle Mall in Norwich and clearly did not represent a breeding species in Britain. In this instance the specimens were found in a pit fill dated to the mid-late seventeenth century (Albarella *et al.* 1997). It would be wise, therefore, to treat the remains of Pygmy Cormorant with caution until perhaps the species is found in a different context.

The Spoonbill (*Platalea leucorodia*)
The Spoonbill today is found in Europe as far north-west as Holland. The species formerly bred in Britain (Harrison 1982; Whitlock 1953; Gurney 1921) and has recently become re-established (Unwin 2000). There is some possible confusion over spoonbill records in the literature because some records may refer to the dabbling duck, the shoveller (*Anas clypeata*).

In Holland there is a record of Spoonbill from the Roman castellum Velsen 1 dated to AD 15–30 (Prummel 1987; 1993). The record was interpreted as a natural death as it was claimed that fish and shellfish eating birds are unpalatable (Prummel 1987). There is also a single record from Poland from the early medieval site of Santok (Bochenski 1993).

The Greater Flamingo (*Phoenicopterus ruber*)
There is a single archaeological record of the Greater Flamingo (*Phoenicopterus ruber*) in north-west Europe from the Neolithic 'northern site' at Kolhorn in Holland (Zeiler & Clason 1993). They attributed the find to the warmer climate than today during the Sub-boreal as well as the presence of a saltwater lagoon in the vicinity of the site. The author has seen the specimen, observing that it was poorly preserved, and would like to see it once more before accepting it without question.

The Black Tern (*Chlidonias nigra*)
There appear to be only two records for the Black Tern from either the archaeological or palaeontological record for the Holocene of north-west Europe. They are the record from the Late Holocene site of Duzej Sopwy Cave in Poland (Bochenski 1993) and the two bones from Haithabu in Germany (Reichstein & Pieper 1986). The species is, perhaps surprisingly, a lost breeding species to Britain and bred in Norfolk and Lincolnshire in large numbers until the first half of the nineteenth century (Whitlock 1953). It may be reasonable to question whether, in light of this fact, the species has been adequately considered when terns have been identified as at Baynard's Castle in London (Bramwell 1975). In this instance both Sandwich Tern (*Sterna sandvicensis*) and Common/Arctic Tern (*S. hirundo*/*S. paradisaea*) bones were identified. Black Tern bones are unlikely to be mistakenly identified as the former because Sandwich Terns are significantly larger, although the latter may cause problems.

The Little Egret (*Egretta garzetta*) and the Great White Egret (*Egretta alba*)
Recently the Little Egret (*Egretta garzetta*) has become established as a breeding species in Britain for the first time (Lock & Cook 1998). The reason given for their recent shift in distribution is increased north-westerly post-breeding dispersal which has led to birds over-wintering in these areas and subsequently staying on to breed. The protection offered to many wild birds by the EC Birds Directive in 1979 has also been quoted as having possibly been influential (Lock & Cook 1998). The Little Egret has no archaeological or palaeontological records in north-west Europe although the larger Great White Egret (*Egretta alba*) has two records despite no longer breeding in the area and being restricted to similar areas as the Dalmatian Pelican today (south-eastern Europe). The two records of Great White Egret are from a Medieval urban context in Amsterdam and a late Medieval castle in Breda both in Holland (Rijksdienst voor het Oudheidkundig Bodemonderzoek 1999).

The Night Heron (*Nycticorax nycticorax*) and the Extinct Night Heron (*Nycticorax fenensis*)
The archaeological and fossil record of the Night Heron (*Nycticorax nycticorax*) is not very extensive. The species is known from London Wall where it formed part of a food refuse deposit (Harrison 1980). Two further records exist in Holland, one from Haarlem dated from Late Medieval to early Post Medieval and Zutphen with an Early Medieval date (Rijsdient voor het Oudheidkundig Bodemonderzoek 1999). Today the species breeds as far north as the English Channel but does not reach Britain except as a vagrant.

The extinct Night Heron species *Nycticorax fenensis* was named in 1950 by Madeleine Friant of the Laboratoire d'Anatomie comparée du Muséum National d'Histoire naturelle de Paris (Friant 1950). The two specimens in the Sedgwick Museum in Cambridge were originally identified as Bittern but Friant believed them to belong to an extinct species of Night Heron larger than the nominate species. A re-examination of these specimens is planned for the near future by the present author.

The White-Tailed Eagle (*Hariaeetus albicilla*)
This species of eagle became locally extinct in Britain in

the late nineteenth century due to persecution by gamekeepers, having already suffered as a result of wetland drainage in earlier times (Whitlock 1953). In this respect it may be most similar to the Marsh Harrier (*Circus aeruginosus*) which probably disappeared in Britain and subsequently recovered. Many birds of prey and scavengers have been persecuted in this way including the Peregrine Falcon (*Falco peregrinus*), the Red Kite (*Milvus milvus*) and the Raven (*Corvus corax*). Some of these birds also suffered as a consequence of the use of DDT in farming as a pesticide which led to the thinning of egg shell of predatory birds. The persecution by gamekeepers and the use of DDT have now diminished dramatically due to international laws preventing them.

The White-tailed Eagle today might be thought of as a north and north-west breeding bird of upland areas suggested by its present and more recent occurrence in north-west Europe. However, both written records and archaeological and palaeontological finds show a quite different picture (Reichstein 1974; O'Connor 1993). It appears that they probably formerly bred in the lowlands to the south and south-west of the region. Finds are relatively common on archaeological sites and they may have had religious significance at certain times (Parker 1988), and a predominance of wing bones suggests its feathers may have been used at other times for fletching arrows (Reichstein 1974). At Haithabu in Germany it is the most common wild species and 184 bones of this species, representing a minimum of 32 individuals, were found (Reichstein & Pieper 1986). The White-tailed Eagle may also have behaved as an urban scavenger as proposed by O'Connor (1993) further explaining how common it was in the past.

Size decrease in bird species due to wetland loss

Northcote (1981; 1983) has documented size change in Mute Swans between the Neolithic to Bronze Age and the present day in the Cambridgeshire fens. In her 1981 paper she explained the size decrease as being part of an evolutionary trend, without further explanation. Presumably Northcote was influenced in this first paper by a Mute Swan bone from the Late Pleistocene of France which was bigger again than the Earlier Holocene population she had measured. In the 1983 publication she attributes the change to the fact that Mute Swan populations have been managed or domesticated in Britain and that this process caused a change in their size. Climate change may well be an unlikely cause, as stated by Northcote (1981; 1983), as any differences in climate between the deposition of the Fens and the present are negligible. Another explanation may be that habitat impoverishment due to Fen drainage may have caused the size decrease.

More recently, it has been demonstrated that a similar phenomenon may have affected the British and possibly other European populations of Common Crane (Stewart 1999). In this instance the explanation is more complex because large crane bones in Britain and elsewhere have been assigned to the extinct late Pleistocene species *Grus primigenia* Milne-Edwards (Harrison & Cowles 1977).

A number of authors have used a variety of methodologies to address the question of the validity of *Grus primigenia*. These arguments have primarily been based on analyses of non-metric osteological traits and on the zoogeographic distributions of the fossils in relation to modern taxa, together with perceptions about the significance of these types of information.

The main hypotheses that have been proposed regarding the taxonomic identity of the anomalously large cranes in western Europe have been as follows:

1. They belong to an extinct species named *Grus primigenia*.
2. They belong to the modern species *Grus antigone*, the Sarus Crane, whose geographical range has become much reduced.
3. They belong to the Common Crane, *Grus grus* whose size may have changed or whose modern variation was not known.

   To these I have added:
4. They belong to the Siberian White Crane, *Grus leucogeranus*.
5. The answer lies in a combination of two or more of the above scenarios.

The likelihood that the large crane bones represent *G. antigone* is probably low because this crane is a sedentary Asian species whose breeding is tied to monsoon climates. Sarus cranes do not breed if the monsoons fail (Johnsgard 1983). If climate is a determinant of breeding, then *G. antigone* could not represent large crane in Europe. The bird's sedentary nature also makes it unlikely that this species was once present in Europe, since becoming a tropical monsoon-adapted sedentary species was probably intrinsically linked to how the species arose in the first place. To suggest that both these aspects of the Sarus Crane's nature had changed, while possible, would be special pleading. *Grus antigone* is therefore unlikely to be the identity of the large crane fossils. The possibility that some of the crane fossils represent evidence for *G. leucogeranus* in Europe should be borne in mind. This is perhaps the next most likely crane to be found in the area, particularly during the last glaciation, although no evidence exists for it as yet.

In order that the remaining hypotheses could be tested the present author conducted a metrical survey of crane bones, modern and old, regardless of whether they were previously assigned to *Grus grus*, *G. antigone* or *G. primigenia* (Stewart 1999). This showed for the first time that the bones of male *G. grus* were larger than those of females. In the initial stages of work on the British material it seemed possible that the lack of female-sized specimens in the fossil record could be part of the answer. If the

species *Grus grus* had diminished in size since about the Roman times, so that ancient females were approximately the size of modern males, then the large specimens, which have been called *Grus primigenia*, may be large ancient males (Northcote 1982; Northcote & Mourer-Chauviré 1985; 1988). This could signify that *Grus grus* had simply decreased in size during the Holocene. However, material from the Danish peat deposits included bones that were the size of modern females which would seem to counter this argument, unless the Danish specimens belong to a differently sized population or subspecies from those found in Britain.

The British fossil cranes appear to show that the size distribution of cranes is different to that of the modern Common Cranes measured. The modern cranes measured were mostly Scandinavian breeding birds and possibly some more north-easterly breeding birds. The British Holocene fossils are probably breeding birds since they are certainly known to have bred in Britain (Southwell 1901; Gurney 1921), and Britain is outside the modern migratory corridor (Cramp & Simmons 1980). It is therefore interesting to speculate that the British breeding population may have been made up of larger birds. The alternative explanation, of another species, extinct or extant, cannot be wholly eliminated. However, to suggest that the large cranes are conspecific with the extant common crane is a more parsimonious explanation given the lack of fossils the size of modern females. It would seem more likely that the overall size of the common crane in Britain was larger than the modern northern population, than to suggest that there were consistently no small females preserved in the fossil record.

The difference seen in the fossil cranes may have had similar causes to the size reduction documented for the Mute Swan (*Cygnus olor*) by Northcote (1981; 1983) which may be due to the effects of habitat destruction by wetland drainage. The fact that both species have changed size over approximately the same period is compelling evidence for a similar cause which excludes domestication as an explanation for the change in Mute Swan size. The swans, however, persisted in Britain whereas the cranes were lost. Wetland drainage, which has been extensive in Britain (Gurney 1921), would almost certainly have caused the extirpation of the British Common Crane population. The apparent size reduction in the Common Crane throughout Europe, if correctly deduced from my analysis, may have occurred when the species became extinct in its more southern and western breeding areas, such as Britain, due to habitat destruction.

In summary, it appears that the size decrease of Common Cranes and Mute Swans in Britain during the past was probably due to the effects of habitat impoverishment by wetland drainage. Whether the same occurred throughout Europe is less easily demonstrated. The Mute Swan has not been studied and some evidence exists to suggest that the Common Crane was larger in mainland Europe than modern Scandinavian populations. Whether all cranes became smaller across Europe or, as is perhaps more likely, the more southern breeding populations, which disappeared were larger than the present Scandinavian birds, is uncertain.

Inter-tidal wetlands and the effects of sea-level change during the Holocene

Given the work of Devoy, Shennan and others (Devoy 1982; Shennan *et al.* 1983; Long & Roberts 1997) it is clear that quite substantial changes in sea-level, and hence the positions of the coastline of north-west Europe, have taken place over the Holocene. Such changes will undoubtedly have had an effect on the areas available to birds, which rely on coastal habitats, whether as breeding or wintering grounds. Most important are both the topography of the submarine areas immediately offshore in north-west Europe and the amount of sea-level change during the Holocene. These two factors will affect the amount of coastal wetlands that will have been lost. The most severe effects will have taken place in areas of small altitude change such as in the North Sea, as illustrated by Coles (1998). Such regions would have included large areas of inter-tidal mudflats and salt marshes, which undoubtedly would have provided huge areas for birds, which frequent such habitats. Migratory birds such as ducks, geese, swans and waders and sea birds would have been greatly affected by the loss of such areas. Also affected would have been coastal freshwater wetlands, which would have been salinated as sea-level rose leading to a loss of habitat.

A collection of sub-fossil birds of unknown age made by the author and his father from the beach of Cadzand in Holland may prove to be of Holocene age. These specimens were dredged from submarine deposits off the coast. These deposits may well represent the drowned coastal environments, which must once have existed along the North Sea in the earlier Holocene. The collection consists mostly of undetermined ducks and geese, Great Auk (*Pinguinis impennis*), smaller auks such as Razorbill or Guillemot (*Alca torda* or *Uria* sp.), a diver (*Gavia* sp.), a Curlew (*Numenius arquata*) and an undetermined passerine. Similar material was dredged to build up the Maasvlakte where again various ducks were found as well as Great Auk, Red-throated Diver (*Gavia stellata*), pelican (*Pelicanus* sp.), White-tailed Sea Eagle (*Haliaeetus albicilla*) and Guillemot (*Uria aalge*) (Kompanje & Kerkhoff 1991). It would seem likely that these birds belonged to Maasvlakte Fauna III of Vervoort-Kerkhoff and van Kolfshoten (1988) which includes domesticated mammals such as *Bos taurus* (domestic cattle), *Ovis aries* (domestic sheep) and *Capra hircus* (goat) and appears to be dated to the Holocene. Furthermore it may be that due to the presence of a similar range of taxa at Cadzand the birds there are also Holocene. These remains may well be the physical evidence for drowned coastal wetland habitats off the coast of Holland.

Conclusion

Lister (1996) recently described the primary ways in which terrestrial vertebrates respond to environmental change. These consist of behavioural accommodation, distributional shift, ecophenotypic modification, evolution and extinction. Of these, the destruction of wetlands has certainly brought about local extinctions as well as distributional changes and may also have led to evolution or ecophenotypic modifications in birds such as the Mute Swan and Common Crane. It should be borne in mind that evolutionary changes could cause a mistaken belief that extinctions had taken place. This may have been the case with *Grus grus* which may have changed size during the later Holocene in Britain or the larger population may have represented an extinct subspecies which became extinct during the seventeenth century.

The effects of future global warming on birds has received attention of late (Moss 1998). In this paper the possible effects of this phenomenon are listed such as earlier and more successful breeding of species, greater success of wintering species, positive and negative changes in breeding range of taxa, changes in localities of feeding grounds for passage migrants, different patterns of vagrancy and effects on inter-tidal feeders due to sea-level rise. It may be the case that some of the new breeding records that have been witnessed in Britain of late, like the Spoonbill and Little Egret, increases in the Cetti's Warbler (*Cettia cetti*) population and the movement north in Europe of species like the Black-winged Stilt (*Himantopus himantopus*) are due to global warming. Although it must be added that a decrease in the movement north by some of these in the 1990s, when global warming was more marked, as compared to the 1960s and 1970s, when the movement north was fastest, may discredit this mechanism (Rhys Green, *pers. com.*). These birds are first seen in new regions as increasing vagrant records and eventually start to breed. This is not to say that all vagrant species will develop within this pattern. It has been noted, however, that this pattern gives added importance to vagrants and that single records of species in the fossil record can not therefore be dismissed (Schelvis 1993). The alternative is that the appearance of new taxa to an area may have been of interest to the human inhabitants and collected for that reason (Schelvis 1993). It should perhaps be stated that the many changes of bird distribution, that have been witnessed in recent years, have not been adequately explained, so the reason for ancient changes in the fossil records will prove more difficult to find. Perhaps the best example of this is the Collared Dove (*Streptopelia decaocto*) which first reached north-west Europe from the East during the 1950s. No consensus exists as to why it spread so far and so fast, 1,200 miles in twenty years (Fisher 1966).

Drainage has had a dramatic effect on wetland birds in north west Europe. The public is largely unaware of the species that were probably lost due to the actions of humans in this 'developed' part of the world. If we are to talk about ecological conservation in the Third World it would be as well to put our hands up and acknowledge the damage we have done ourselves. At the same time it is important to recognise that some of the changes in distribution may be 'natural' and would happen regardless of our actions. It is perhaps another facet of our arrogance to assume that all changes in distribution are caused by ourselves. All information regarding ancient records of rare, unexpected or disappeared bird species is of value and may help reconstruct the so-called 'natural' state of the north-west European avifauna of the past. The archaeological record is invaluable in this regard and the types of finds I have discussed above should be reported to organisations deciding conservation policy. No formal liaison is being conducted at present and this should be redressed.

Acknowledgements

I would like to thank my father Robert Stewart for discovering the Holocene faunal assemblage at Cadzand and his tireless energy in finding both fossil bones and modern carcasses for comparative purposes. Tabitha Stewart Stacey is thanked for making me smile. Alexis Willett proof-read the manuscript for which I am immensely grateful. Rhys Green of the RSPB and the Zoology Department in Cambridge is thanked for advice on more recent wetland bird changes. Thanks are due to Dale Serjeantson, Zbigniew Bochenski, Lisette de Vries and Roel Lawerier for providing references and interesting records of some of the wetland bird species. I would also like to acknowledge Bryony Coles for inviting me to write this contribution giving me as it does an opportunity to address the subject which I feel has been neglected for far too long.

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18: Archaeology and Ramsar in England

David Bull and Bryony Coles

Abstract: *Following a consideration of the common ground between the aims of the Ramsar convention and the needs of wetland archaeology, the workings of Ramsar in England are outlined. Five case studies are then examined to explore the position of archaeology within a range of Ramsar sites in England. These are the Cambridgeshire Fens, the Nene Washes, the Midland Meres and Mosses, the New Forest Valley Mires and the Thames and Medway Estuaries and Marshes: the extent to which archaeology is incorporated into management plans for these sites is found to vary. The paper concludes with a short description of the major differences in the requirements of archaeology and nature conservation, and the prospects for co-operation in protection and management.*

Introduction

Elsewhere in this volume others have commented on the background to the Ramsar Convention, the significance of wetland archaeology (Coles chapter 1) and European legislation and designations affecting or relevant to wetland archaeology (Marsden chapter 2). In this paper we seek to establish the common ground, to determine where the aims and objectives of the Ramsar Convention are related to, and have a potentially positive effect on, the archaeology and palaeoenvironmental record held within wetlands. The paper focuses on England, but the implications, we hope, are relevant throughout Europe and beyond.

Article 1.1 of the Ramsar Convention defines wetlands as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres'. Wetland archaeologists define wetlands as 'any area of land covered by water for part of each year, or of each day, or which has been drowned by water at any time in its existence' (Coles 1984, p.1). Marine shipwrecks are regarded as underwater sites and a specialist and separate discipline.

The wetland types defined by Ramsar are of varying archaeological significance. Coastal environments such as estuaries and salt marsh are important wetland types for archaeology eg Goldcliff in South Wales and Romney Marsh in south-east England, both of which contain buried and surface archaeological features. Temporary wetlands on the other hand, tend to be of less significance with drying out leading to the loss of their wetland archaeological values. Artificial wetlands can be of archaeological interest in themselves, for example old peat cuts, moats, and duck decoy ponds all have cultural significance. Peatlands and raised bogs are particularly important habitats for the preservation of the archaeological and palaeoenvironmental record as demonstrated elsewhere in this volume (Coles chapter 1); raised bogs in particular probably have a higher profile, relatively speaking, in the world of archaeology than that of Ramsar, although there is a Global Action Plan for Peatlands (GAPP) currently under discussion.

Article 2.1 of the Convention states that 'each contracting party shall designate suitable wetlands within its territory for inclusion in a List of International Importance' (Carp 1972). Inclusion on the List gives these areas recognition and status as being internationally

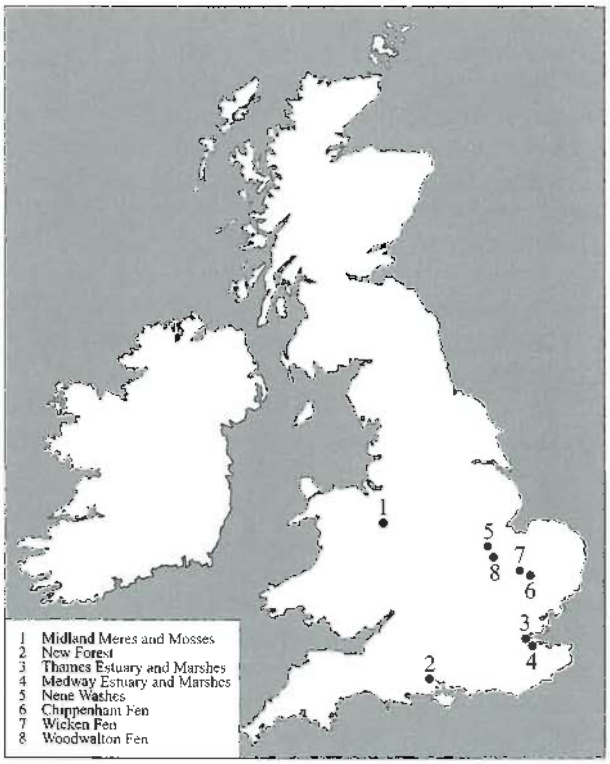


Fig.18.1: Map showing the location of the Ramsar case studies.

important wetlands (Matthews 1993). This form of designation and protection is of particular value to archaeology in those places where wetland archaeological values are not recognised, or where they are under-funded or generally lacking support. The Ukraine for example, has little investment in the wetland archaeological record, but has over 750,000 hectares of wetlands protected by Ramsar designation (Frazier 1996). Keeping wetlands wet is of general benefit to the wetland archaeological record, and if Ramsar designation achieves this then all to the good.

In article 3.1 of the Convention the contracting parties agree to 'formulate and implement their planning so as to promote the conservation of wetlands included in the List, and as far as possible the wise use of wetlands in their territory' (Davis 1993, p.8). The 'wise use' of wetlands was defined by the Convention in 1987 as 'the sustainable utilisation for the benefit of mankind, compatible with the maintenance of the natural properties of the ecosystem' (Davis 1993, p.8). The 'Wise Use' concept of 'sustainable utilisation' suggests uses that preserve a range of wetland values and should therefore include the cultural and archaeological values. In this context, it is worth emphasising that archaeological evidence is not renewable, in the way that flora and fauna can sometimes be.

The Wise Use Guidelines, periodically reviewed by Ramsar, encourage participating governments to adopt national wetland polices involving reviews of existing protective legislation and the organisations and systems which deal with wetland management, as well as the development of monitoring and research projects (Davis 1993, p.9–10; Farrier & Tucker 2000, pp.21–42; Commission of the European Communities 1995). The updating of these guidelines provides an opportunity for participating governments to include an element of archaeological protection within them.

Ramsar in the UK

The Ramsar Convention came into force in the United Kingdom in 1976 and at the time of writing 157 British wetlands appear on the Ramsar List covering just over 747,000 hectares of diverse wetland habitats. This represents the largest number, though not area, of Ramsar sites in any one country among the Conventions members (Neild & Rice 1996, p.12).

The UK Ramsar Committee acts as the National Committee with representatives from the government departments for England, Scotland, Wales and Northern Ireland, their respective nature and environment agencies and a number of related non-governmental organisations, chosen for their active interests in wetland conservation, including the Royal Society for the Protection of Birds (RSPB) and the Wildfowl and Wetlands Trust (WWT). The committee meets twice a year and is chaired by the Department of the Environment Transport and the Regions (DETR), which represents the UK government's interest in Ramsar. The Joint Nature Conservation Committee, which has responsibility for providing information on UK sites for the Ramsar Bureau, is also represented on the committee.

The purpose of the committee is to assist the government in fulfilling its obligations under the Ramsar Convention, by providing strategic advice on related issues such as legislative reviews, policy directions, resource planning and technical support and advice. It also tracks conservation progress on Ramsar sites and acts as a monitoring body to ensure the wise use of Ramsar areas. The UK Ramsar Committee also advises the DETR on areas to be nominated as Ramsar sites at the Conventions.

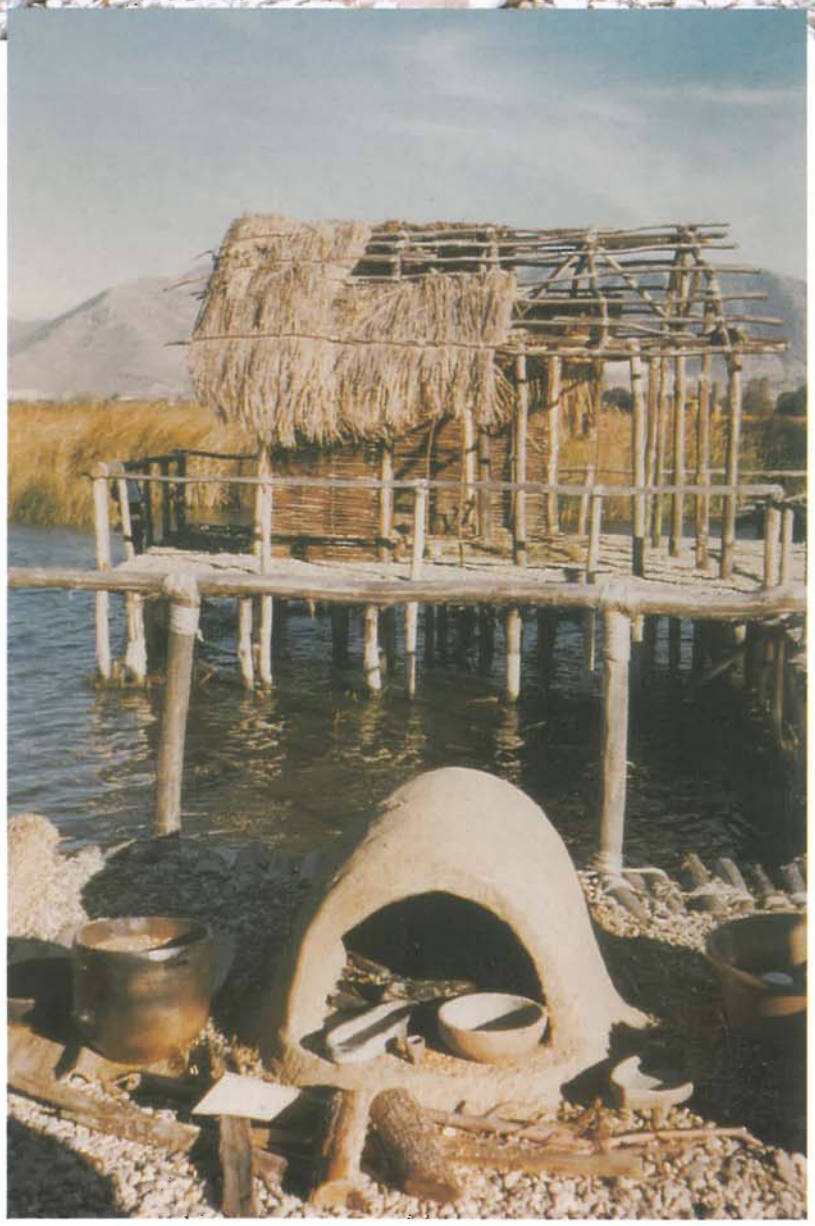
Ramsar sites are chosen for their nature conservation interests as defined by the Ramsar strategic framework and guidelines for the future development of the List of Wetlands of International Importance and in an attempt to implement the UK government's set strategic plan (JNCC & DETR 1998a). In England, Wales and Scotland no site is designated a Ramsar site unless it has already been notified as a Site of Special Scientific Interest (SSSI) or in Northern Ireland an Area of Special Scientific Interest (ASSI). Although non-governmental organisations are represented on the Committee they have very little say in the choice of sites put forward for designation. This and the restriction of the need for previous SSSI and ASSI designation is a limiting factor in the wetland areas put forward for designation.

The regional nature conservation agencies English Nature, Scottish Natural Heritage, the Countryside Council for Wales and the Northern Ireland Environment and Heritage Service, have responsibility for the monitoring and protection of Ramsar sites through the various legislation highlighted in chapter 2, this volume.

The Ramsar sites, under the protection of English Nature, are not directly monitored by English Nature, with resources at present being directed towards designation. An annual Wetland Bird Survey, which involves species counts and monitors bird numbers is undertaken. SSSI designation means that most sites are inspected, but only to assess the features for which they provide 'special interest'. At present very little monitoring of, for example, changes in hydrology and water quality takes place. Sites which are wholly or party managed or owned by English Nature as National Nature Reserves, by County Councils as local nature reserves or amenities, or by Non-Governmental Organisations (NGOs) such as the Royal Society for the Protection for Birds (RSPB), Wildfowl and Wetlands Trust (WWT), or local Wildlife Trusts may receive further monitoring.

In England there are at the time of writing, 75 Ramsar sites, the distribution of which is affected directly by the

Pl.12.1 (above): Remains of the multi-arched thirteenth century bridge of Koutsokamara on the Acheloos river, in the area of the construction of the Sykia dam, covered by rubble (Nikos Petrou).



Pl.12.2 (right): Dispilio on Lake Kastoria, Western Macedonia: A reconstruction of a Neolithic lake settlement (Ioanna Anagnostou 1999).

Pl.13.1: Erosion sur le site néolithique de Font (canton de Fribourg, lac de Neuchâtel), avant sa mise sous protection. (Photo Service archéologique cantonal, Fribourg)

Pl.13.2: Le même site après la pose des sacs de graviers destinés à le protéger de l'érosion. (Photo Service archéologique cantonal, Fribourg)

Pl.14.1: Vue aérienne du lac de Chalain depuis le nord-ouest. Il s'agit d'un cas exceptionnel de bassin lacustre où l'environnement a été peu modifié; l'arrière-pays peut encore y être étudié. La zone archéologique protégée au titre des Monuments Historiques s'étend depuis la route jusqu'à 200m à l'intérieur du lac (Cliché P. Pétrequin).

Pl.14.2: Reconstitution expérimentale d'une maison néolithique du 30e siècle av. J.-C. Cette reconstitution, quelle qu'en soit la valeur scientifique, est devenue l'image de marque de la recherche archéologique à Chalain. Tout autant que le cadre juridique, elle a permis de protéger la zone archéologique contre le développement d'un tourisme de masse, favorisé par des intérêts financiers locaux (Cliché P. Pétrequin).

Pl.15.1 (above): Bildung eines archäologischen Reservates in der Pfahlbausiedlung Bodman-Schachen, Bodensee. Verladeaktion von Kies auf ein Spezialponton zum Verklappen des Materials über dem archäologischen Siedlungsareal (Foto J. Köninger).

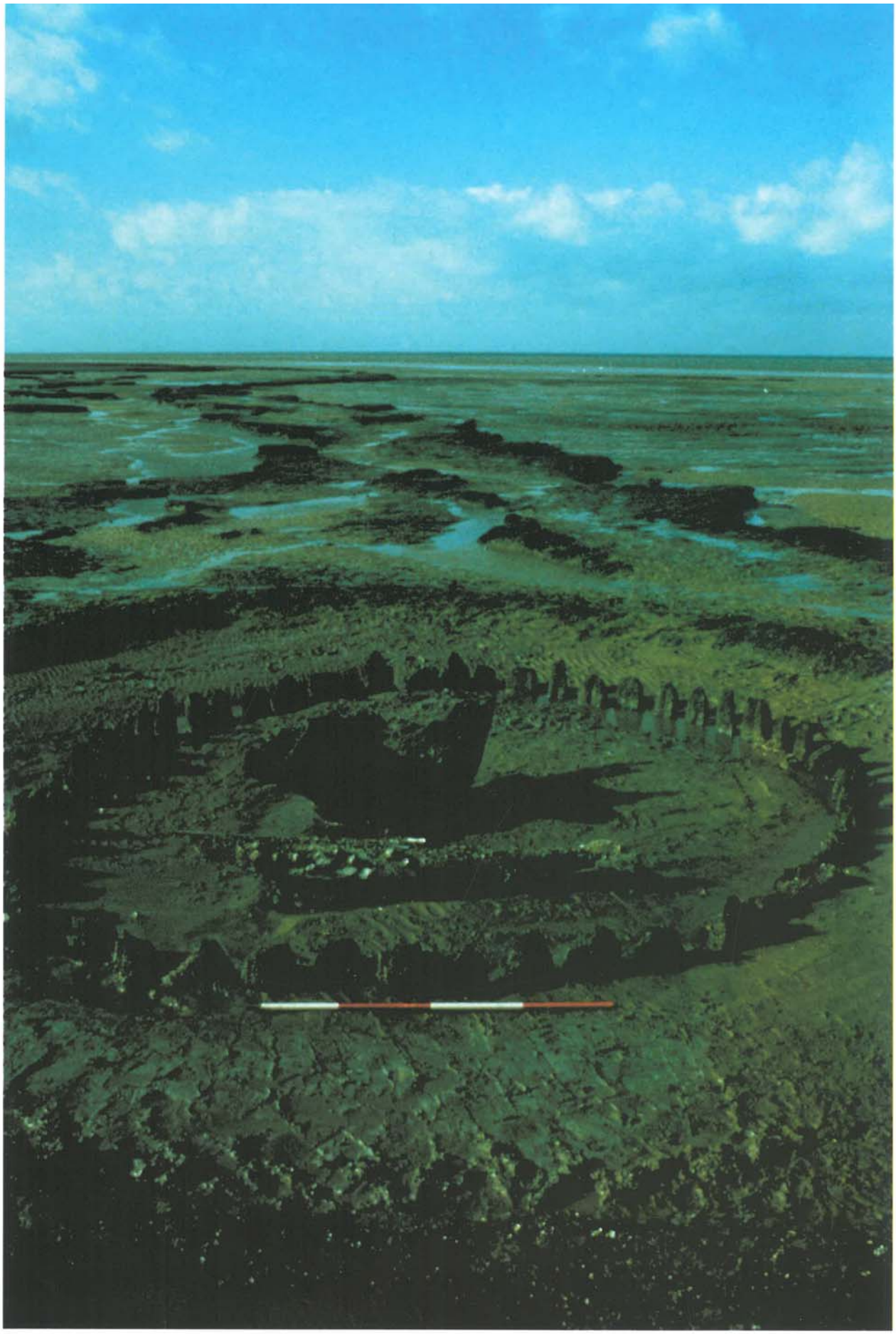
Pl.15.2 (right): Verlegung von Geotextilien und eines Stahlgittergewebes als lastübertragende Unterkonstruktion der Kiesabdeckung in Bodman-Schachen (Foto J. Köninger).

Pl.15.3: Luftbild des Federseemoores von Süden (Foto O. Braasch).

Pl.16.1: Thorne Moors and surrounding landscape from the air, showing the medieval strip fields to the north of the Moors (Keith Miller).

Pl.18.1: Bomere Pool, Shropshire, surrounded by extensive and well-preserved peat deposits over 8.5m deep, forming a rare environmental archive. (Photo North West Wetlands Survey)

Pl.18.2: Denny Bog in the New Forest, after the first phase of the LIFE valley mire restoration project.



Pl.19.1: Seahenge Early Bronze Age timber circle, Norfolk, as it looked in Autumn 1998. The inverted oak tree bole can be seen inside the circle and in front the remains of a long flat modern ship timber (English Heritage).

distribution of surviving wetland habitats, the location of other designations such as SSSIs and the Convention's original emphasis on the protection of wetlands of importance to wildfowl. The majority of Ramsar sites represent coastal and estuarine habitats on the south and east coasts associated with wildfowl migration. Inland sites mainly represent areas of surviving fen, peat and wet grassland in East Anglia, the north-west Midlands and some areas of the south and west. Central and northern England is poorly represented at present.

Archaeology and Ramsar

At the same time as nature conservation bodies were starting to respond to the loss of wetland habitats, English Heritage initiated the first of a number of wetland archaeological surveys to examine the potential wetland archaeological resource in England, with the establishment of the Somerset Levels Project. Subsequent surveys covered the Fens, the North West and the Humber wetlands (Coles chapter 4). A number of smaller, but equally important, research projects have been carried out, including the work of the Fenland Archaeological Trust, the Hullbridge Survey, the Severn Estuary & Levels Research Project and surveys on the Kent and Essex coasts, the North Kent Marshes Survey, Romney Marsh, and others.

It is clear that the areas identified as being of importance for their wetland habitats correlate reasonably well with those of known archaeological and palaeoenvironmental importance. Some important wetland types are under-represented within England's Ramsar List. These include, most notably, river valleys like those of Suffolk and the Upper Thames tributaries, raised peat bogs in northern England, and wet grassland, although new designations should improve the coverage.

Case Studies

The following case studies examine a number of Ramsar designated areas that have been chosen to illustrate a range of wetland habitats in different areas of England; the management schemes, which protect the natural qualities of sites, are outlined, and the varying archaeological and palaeoenvironmental records are considered in relation to the management plans.

Cambridgeshire Fens: Chippenham, Wicken & Woodwalton

Over the last 300 years less than 1% of the original Cambridgeshire fen has survived drainage. Three areas of remaining near natural fenland are the National Nature Reserves and Ramsar sites of Chippenham Fen (112 hectares), Wicken Fen (254 hectares) near Newmarket, and Woodwalton Fen (208 hectares) near Peterborough. All three sites are SSSIs, Wicken is a Special Area of Conservation (SAC) and Chippenham is a candidate SAC. Chippenham and Woodwalton Fens are managed by English Nature and the National Trust manages Wicken Fen. All three sites are important for their fenland and carr woodland habitats, supporting important and often rare species of invertebrates, birds and plant communities. All three sites undergo some form of active management

Fig. 18.2: Wicken Fen, Cambridge. The National Trust reserve consists of several adjacent blocks of fenland which have undergone different exploitation in the past, resulting in its present varied nature conservation interest and management.

to maintain high water tables and the biodiversity of the reserves.

At Chippenham Fen, English Nature maintains high water levels in summer through a series of 14 dams, designed to hold water collected through winter rainfall, within the dykes on the reserve (English Nature 1996a). During the spring and summer months, the fen meadows are mowed and the grass removed, and the carr woodland is thinned. The dykes are regularly *slubbed* (cleared) and the sedge beds are cut for thatching materials. Water abstraction from the surrounding landscape has affected the water table and the Environment Agency has established a recharge programme to compensate for the reduction in quality of the aquifer (JNCC & DETR 1998b, p.61).

At Wicken Fen (fig.18.2), lack of active management in the middle part of the last century led to the encroachment of fen carr and problems of peat shrinkage. In 1988 these problems were addressed with the removal of much of the carr woodland and the construction of a moat and the burial of a plastic membrane round the perimeter of the reserve to reduce water loss (Coles 1995, pp.49–52). A series of drains and sluices control the flow of water around the site and water is pumped into the reserve when needed. The biodiversity within the reserve is maintained by a complex system of sedge and plant litter cropping (Coles 1995).

The management system at Woodwalton Fen aims to keep the water table just below the surface of the reserve, and allows some areas to flood during the winter months; insufficient rainfall is compensated by pumping water into the reserve, artificially flooding it. The site is allowed to dry out slightly in the summer allowing active management to take place. A clay 'bund' has been constructed around the perimeter of the reserve to counter water loss, and dykes and sluices control the water inside the reserve (English Nature 1996b).

Within the three reserves, protection from draining and arable farming has meant less ground disturbance compared to the surrounding arable farmland, resulting in significantly fewer archaeological finds. However, some archaeological finds and features have been identified on all three reserves, mainly during earlier dyke-digging and similar intrusive operations, and there have been high recovery rates of archaeological finds on the arable farmland that surround the reserves. For Chippenham Fen, the Cambridge County Council Sites and Monuments record gives details of a variety of finds, including Roman coins, fibulae and pottery and a medieval cross base. During engineering works at Wicken Fen finds included a variety of animal and human bones, including Beaver and Red Deer. An extensive scatter of finds was recovered from ditch profiles and under the peat on the main drain, including burnt flint, domestic and wild animal bones, shards of pottery and tiles, covering a wide range of dates, from Roman to late medieval. Known Bronze Age activity within Woodwalton Fen includes a possible wooden trackway suggested by Godwin (1978, p.78), and a Bronze Age palstave, 17.5cm long, found embedded in a bog oak. All these finds suggest further archaeological information still exists within the peat of the reserves.

It should also be remembered that the surface landscape features of the surviving Fens themselves are of importance, Wicken for example has a number of medieval canals. All three have dykes and ditches, which represent a landscape at least 200 years old.

All three sites could provide important environmental information. It was at Woodwalton that Godwin began his classic work, establishing the nature of the Fenland stratigraphy in the 1930s (Hall 1992, p.33). Godwin (1978, p.74) suggested that the surviving 3.5m of peat deposits could provide palaeoenvironmental information back to the early Bronze Age or earlier, and both Chippenham and Wicken have similar peat reserves.

Only the Wicken Fen management plan mentions archaeology (The National Trust 1992), although they all make some reference to the recorded history of the sites. Systems designed to maintain a consistently high water table should provide suitable conditions for the preservation of archaeological and environmental remains, providing there is no significant fluctuation of water levels. This is particularly the case at Chippenham and Woodwalton, where previous peat cutting episodes may have brought potential archaeological features closer to the surface. At Woodwalton Fen, dipwells are used on a regular basis to monitor hydrology, with the other reserves relying on visual monitoring of the water levels.

Site maintenance activity such as the clearing of ditches, ditch cutting and other ground disturbing activities need to be monitored, as they could disturb archaeological features. At Wicken Fen any monitoring of such activities should be carried out by the National Trust's own regional archaeologist. The other reserves could well involve the appropriate County Archaeologist or the local English Heritage Inspector, or even an archaeological NGO such as the Fenland Archaeological Trust.

Overall the management of the three reserves is conducive to the preservation of the archaeological and palaeoenvironmental record, although it would be reassuring to see greater acknowledgement of their significance in all management plans and strategies. A contribution from archaeology to management of the reserves could include some form of survey by remote sensing, to characterise the nature of the peat bodies in greater detail.

The Nene Wash, Cambridgeshire

The Nene Wash is an area of 1,517 hectares of seasonally flooded grassland near Peterborough in Cambridgeshire.

The site represents one of England's few remaining areas of washland habitat, which is essential to the survival nationally and internationally of populations of wildfowl and waders. The network of dykes provides a further important habitat for a diversity of plant and animal life. As well as a Ramsar site the area is an SSSI and Special Protection Areas (SPA).

The site is managed partly as an RSPB reserve and partly as privately owned agricultural grassland. The RSPB has initiated extensive hydrological management schemes across its ownership, giving more control over the water table during crucial periods of the year. A water management plan has been agreed by the Environment Agency, as a consequence of seasonal flooding and to prevent the long term detrimental effects of the current high demand from domestic and agricultural water supplies. English Nature agreed a management plan for the area with the local water users (farms, landowners etc.) in 1992, and has a number of management agreements with landowners (JNCC & DETR 1998b, p.139).

A number of archaeological finds have been recorded from the Ramsar area including a Neolithic antler pick, and Roman pottery finds. The Fenland Archaeological Trust identified cut features, bone and flint finds of Neolithic and Bronze Age date, Iron Age plough marks buried by upper peat and numerous finds of Roman pottery, as a result of the 1982 dyke survey (Pryor & French 1993). Wooden remains of a post-medieval bridge structure with associated finds have been excavated (Welsh 1994) and the site contains an area of relict Roman field systems and a trackway which is now a Scheduled Ancient Monument (SAM). The structures that make up the Nene Wash, Morton's Leam, the re-directed Nene River and the various drainage systems are in themselves of historic landscape interest. Many archaeological sites surround the Nene Wash, significantly in a wetland context, the Late Bronze Age wooden structures such as Flag Fen (Pryor *et al.* 1986).

The area's exploitation predominantly for livestock grazing and hay production has meant less ground disturbance compared to the surrounding arable farmland, resulting in significantly fewer archaeological finds. This suggests better *in situ* protection for any buried archaeological features. Hydrological monitoring and raised water tables, under the present management system, should provide suitable conditions for the preservation of the archaeological and palaeoenvironmental record. As with the Cambridgeshire Fens, it would be reassuring to know that this was written firmly into the management plan.

Midland Meres and Mosses Phases One and Two

The Midland Meres and Mosses are a geographically distinct series of lowland open water and peatland sites, the majority of which are nutrient rich with associated habitats of reed swamp, fen, carr, damp pasture, and peat or heathland, supporting an important assemblage of rare, vulnerable or endangered species (English Nature 1998). There are over a hundred Mosses and Meres in Cheshire, Shropshire and Staffordshire, thirty of which make up the two Ramsar sites; of these seven are candidate SACs, four of which are NNRs, plus two further NNRs.

The North West Wetlands Survey of Cheshire, Shropshire and Staffordshire provided clear evidence of the importance of the archaeological and palaeo-environmental record contained in these meres and mosses (Leah *et al.* 1997; Leah *et al.* 1998, pp.104, 60–1). Important finds include prehistoric and medieval log boats, burnt mounds (enigmatic piles of burnt stones dating from the Bronze Age), bog bodies, for example those from Lindow Moss, and various other finds dating from the Mesolithic to the post-medieval periods.

The significance of the palaeoenvironmental record held within the Mosses and Meres is illustrated at Black Firs in Staffordshire, where the pollen record suggests a possible very early presence of cereals in the area (Leah *et al.* 1998, p.104). At Bomere in Shropshire (pl.18.1), in an area where good palaeoenvironmental evidence is sparse, peats 8.5m deep survive, and these have the potential to provide a long environmental history for the surrounding landscape including that relating to the nearby Roman town of Wroxeter (Leah *et al.* 1998, p.60).

The Meres and Mosses generally have been adversely affected by changes in agricultural practices and land use leading to increased eutrophication and reductions in the water table due to abstraction, drainage and afforestation. A number of the wetland sites have some sort of management statements or agreements to combat these problems, and those that are NNRs or managed by Wildlife Trusts have programmes of tree felling, heathland and peat restoration and water loss prevention, for example Fenn's and Whixall Moss (Coles 1995, p.58–61).

English Nature has a long term strategy for the conservation of the Meres and Mosses, which aims to achieve a holistic approach to their management, by influencing agricultural practices and land management within their water catchment areas through liaison with the Environment Agency, the Farming and Rural Conservation Agency and others (English Nature 1998). Individual management plans for specific sites are being drawn up, and the results of any action taken are being monitored and subsequently altered to enhance the care of individual sites (English Nature 1998).

The English Nature strategy plan notes the archaeological importance of these wetlands, with particular reference to the palaeoenvironmental record and the information it can provide (English Nature 1998, p.18). It highlights the vulnerability of the peat bogs in particular, and the benefits of their nature conservation management

Fig.18.3: Denny Bog, the New Forest, an example of the 'soft engineering' work carried out by the Forestry Commission to restore the valley mire; note the dam/bridge in the background and the heather bales in the centre.

and the importance of considering archaeological interests within management plans and site designations (English Nature 1998, p.18). However, there are no archaeological organisations or related individuals mentioned in the section containing details of the organisations English Nature plans to liaise with in the creation of management plans, nor in the section describing the monitoring of the wetlands. This long term strategy is in its infancy and its effectiveness can not yet be judged. If the strategy is implemented and is effective, the advantages to the heritage management of the Meres and Mosses in the long term would be great. However, the current problems may remain in the short to medium term, to the detriment of nature conservation and heritage values alike.

The New Forest valley mires

The New Forest Ramsar site, near Southampton, covers 28,002 hectares of semi-natural vegetation including valley mires, fens and wet heath, within an area of open and partially enclosed mixed woodland and heathland. The valley mires are unique to Britain with important plant and invertebrate communities, supporting significant numbers of waterfowl. Much of the Ramsar area is an NNR, SSSI and SPA, and the area may become a National Park. The Forestry Commission manages the majority of the Ramsar area and a commoners' council known as the Verderer Court oversees a complicated system of commoners' rights.

The New Forest Ramsar site has about 1000 recorded archaeological sites of which 184 are Scheduled Ancient Monuments, ranging from Bronze Age burial mounds, Iron Age hillforts and Roman kiln sites to Medieval hunting lodges. There have been no reported wetland archaeological finds, however work by Keith Barber and his students has revealed a considerable wealth of palaeoenvironmental information held within some of the valley mires (Barber & Clarke 1987, pp.33–44).

A European Commission LIFE-Nature Project has been operating within the New Forest Ramsar area for the past three years, including work to restore the valley mires habitats. Drainage operations in the 1840s and more damagingly in the 1960s and mid 1970s led to the loss and damage of a number of valley mires, by erosion and desiccation processes. The project aims to use 'soft engineering' to prevent further loss and to repair the valley mire habitats (Sean Cooch *pers. com.*).

An example of the restoration work can be seen at Denny Bog, one of the largest valley mires in the Forest, located 4.5 miles east of Lyndhurst (Cooch 1999). Here a

Fig.18.4: Silver Stream valley mire, the New Forest, a section of peat exposed by erosion along a drainage channel.

section of the main drainage channel, 2.5–3m wide and 1–1.5m deep, has been dammed using oak wood boards, the area behind it infilled first with tree stumps, then a layer of gravel and finally heather bales (fig.18.3 & pl.18.2) (Cooch 1999). This has decreased the energy of the water running through the mire to a natural level, preventing erosion and increasing the water level within the up-stream section of mire (fig.18.4). This system has been and is being successfully employed on other valley mires within the Ramsar area (Simon Weymouth *pers. com.*).

Although the Ramsar designation of the New Forest area was not a major factor in securing the LIFE-Nature project funding, it did provide a further incentive. It would be hard to obtain this level of funding to protect wetland sites for their archaeology or palaeoenvironmental interests alone, and projects like this one can go a long way in protecting the cultural resources of small and vulnerable wetland areas.

Thames Estuary and Marshes and Medway Estuary and Marshes

The Thames and Medway Estuaries and Marshes are adjacent Ramsar sites located on the south-east coast of England, with similar habitats, nature conservation management and archaeological records. They both represent important areas of rain-fed, brackish floodplain grazing with intertidal saltmarsh and estuary mudflats, supporting internationally important wildfowl populations, as well as a diverse assemblage of wetland plants and invertebrates. Both areas are SPAs, SSSIs and Environmentally Sensitive Areas (ESAs).

The archaeology of these Ramsar sites is known to be of considerable significance. Sea level change has resulted in buried landscapes comprising former ground surfaces and soil profiles, revealing evidence of past human exploitation of the area from the Palaeolithic onwards. The archaeological record demonstrates the importance of the Thames and Medway estuaries as communication and trade links between the south-east of England and the continent. Evidence of industrial activity includes Roman pottery industries, Iron Age/Roman and medieval salt production and Anglo-Saxon fish traps. Historical features such as forts, castles, navigational features and dockyards illustrate the naval and marine history of the estuary.

Current work by Wessex Archaeology on behalf of Kent County Council, entitled 'The North Kent Marshes Survey' should provide further detailed information about the archaeological record of the area. The recently published archaeological research framework for the Greater Thames Estuary provides a guide for developing the future understanding of the archaeology of the area (Williams & Brown 1999).

Various problems have affected the archaeological resource and the nature conservation properties of the estuaries. These include development pressures both industrial and residential, agriculture, increased coastal erosion, dredging and leisure activities such as power boating.

The Ramsar designation, along with SPA status, has played a major role in the protection of much of the North Kent Marshes. This is particularly true of the marshes around Cliffe which would have been lost to development had it not been for their designation as an SSSI and subsequently SPA and Ramsar site (Jim Glover *pers.com.*).

The RSPB has gained Stage Two funding from the Heritage Lottery Fund to appoint a project officer to further investigate their proposal to produce a working strategy and active management of some areas of the estuaries. They have been liasing with the archaeological interest groups to establish a close working relationship for the benefit of both the substantial archaeological interests and those of nature conservation, particularly wildfowl (RSPB 1999). The partnership between nature conservationist and archaeological groups was an important factor influencing the allocation of Heritage Lottery funding so far, as is the Ramsar designation of the area (Jim Glover *pers.com.*).

Conclusion

While the majority of Ramsar sites in England hold potentially significant archaeological and palaeo-environmental records, the case studies outlined above suggest that this is not always given a high profile in the Management Plans for individual sites. Fortunately, management of a wetland for nature conservation values is generally conducive to the protection of its heritage values as well, but for sustainability the heritage element needs to be firmly ensconced in the management of each reserve.

The case studies also illustrate, if only by default, one of the major differences between the nature conservation values and the heritage values of a wetland: the former can be catalogued, even enumerated, the latter cannot be so completely assessed, because much of the heritage component is buried and must remain so if it is to retain its value. However, coring will enable an informed estimate of palaeoenvironmental values to be made, and techniques of remote sensing are being developed which allow a better understanding of wetland development and the identification of some archaeological components. This evidence, together with the archaeology known from earlier decades, provides the basis for an informed assessment of the archaeological potential of a wetland, and its management requirements.

A further difference between the archaeological and nature conservation components of a wetland is that, once damaged, the archaeology cannot be restored whereas the

nature conservation elements can, to a limited extent. This is why artificial wetlands can become Ramsar sites, but there is no parallel in the archaeological world.

From this survey of archaeology on Ramsar designated wetlands, admittedly brief and clearly within one country only, it would seem that the prospects for co-operation are good. Basic differences need to be recognised, and mechanisms developed for consultation over Management Plans, and for liaison between the different archaeological and nature conservation interests. Our aim should be for the past of a wetland, and the past in a wetland, to be recognised amongst the integral values of these threatened habitats.

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19: Ramsar designation and the case of Seahenge

David Miles

Abstract: *This paper considers the effects of sea level change, with particular reference to the British coast and the effects of increased erosion on the inter-tidal zone, revealing previously hidden archaeological features. The case study considers the lessons learnt from the discovery and excavation of 'Seahenge', an Early Bronze Age timber circle, and illustrates some of the predictable and less predictable problems of working in the inter-tidal wetland zone. The monument's location, within the internationally important wetland bird reserve of Holme Dunes, Norfolk, among other designations a National Nature Reserve and Ramsar site, presented a number of issues described in the case study. The 'Seahenge' problem provides a good example of where archaeologists and nature conservation representatives have co-operated successfully for the benefit of both archaeology and nature conservation.*

Perhaps no single factor has influenced Britain's history, culture and national sense of identity more than the fact that Great Britain is a group of islands. It was not always the case: at the end of the last glaciation, about 10,500 years ago, the present British Isles were part of the northwest peninsula of mainland Europe. As ice sheets retreated northwards the sea level rose by over 130m, flooding the North Sea basin between the present east coast of England and Jutland. By about 8000 BP the English Channel was inundated, severing Britain from the European land mass.

This process of change has never become static. At the present time relative sea level is projected to rise around Britain by about 280mm by the year 2050. As a result of isostatic readjustment the UK tilts north-west/south-east and the rate of sea-rise is highest in the south-east, a predicted rise in the Thames Estuary of 700mm by 2050 and 410mm in East Anglia. Sea level rise will have an impact on the frequency of high tides, for example the highest levels recorded in Harwich once every hundred years could occur every decade. The long-term rate of sea-rise may also be enhanced by the effects of global warming. While writing this piece in France, *Le Monde* (3 November 2000) reported the preliminary results of the International Panel on Climate Change (IPCC), which estimates that average temperatures on the planet will rise between 1.5° and 6° between now and 2010. The IPCC also predict that the concentrations of CO_2 in the atmosphere will reach record levels during the twenty-first century; average global sea level rises are estimated to be between 0.14m and 0.8m. Two months later (28 December 2000) *Le Monde* reported 'Chaud, chaud, chaud, 2000 a été la plus chaude année du siécle en France'. The year 2000 had been the warmest ever in France since records began in the 1870s. In September 2000 the UK Environment Agency Report estimated that 5 million people in £214 billion worth of property faced increased risk of flooding through climatic change. In December 2000 a sizeable proportion of these people were experiencing the flooding for real. In Britain these trends will have a major impact economically and environmentally. The UK has the largest coastline of any EU member state, nearly 18,000km, of which 8,500km are in England. The effects of coastal erosion are greater around the east and south-east coasts where the geology is dominated by relatively young, soft, sedimentary

Fig.19.1: Location of the Seahenge monument on the Norfolk coast.

deposits, notably in Yorkshire, East Anglia and the Thames Estuary area. Many of these coastal areas are backed by hard coastal defences. As a result, coastal squeeze is a major problem, as intertidal salt marshes are squeezed against sea walls and eroded.

The antiquarian William Borlase, who in the mid-eighteenth century recorded discoveries around Cornwall and the Isles of Scilly, first noted the archaeological interest of the UK coast. In the nineteenth century with the construction of new docks, and the fashion for visiting the seaside, many new discoveries were made.

It is only recently that casual discovery has been replaced by systematic surveys, for example of the Severn Estuary in England and Wales, the Humber, Thames Estuary, the Solent and the Isle of Wight (Fulford *et al.* 1997; English Heritage & RCHME 1996; Isle of Wight Council 1997; Wilkinson and Murphy 1995; Bell & Neumann 1997).

These ground surveys of the inter-tidal zone have been supplemented by air-photography, as part of English Heritage's National Mapping Programme. This has recently been extended into Essex, Kent and Norfolk specifically to supplement the terrestrial coastal surveys. These surveys have served to emphasise the great potential of the coastal zone. This is recognised by the Government's *Planning Policy Guidance (PPG) Note 20: Coastal Planning* which indicates the need to protect and enhance the built and archaeological coastal heritage.

The inter-tidal zone has a distinct character: features associated with ships and shipping, the craft themselves such as the Bronze Age Dover boat, lost cargoes, harbours and docks, staithes, wharves, coastal activities such as fishing, wild fowling, salt production and oyster beds, sea and military defences and lighthouses. As a zone of erosion and deposition the coast can present a seamless landscape between dry land and the sea. The intertidal zone may contain peat beds originally formed in freshwater conditions, prehistoric submerged tree stumps, ground surfaces or even timber houses and other structures preserved in the muds, silts and peats. As the seamless coastal landscape dips into and under the sea there is the potential to recover pre-inundation prehistoric landscapes such as the Doggerland zone discussed by Bryony Coles (1998). Elements of this are most accessible in estuaries such as the Humber. Erosion also reveals features associated with dry land landscapes, exposed as sand dunes, silts and peats which themselves shift or disappear. The inter-tidal zone presents particular problems for the fieldworker; it is a shifting, changing and often dangerous environment in which archaeological features can be difficult to identify, locate or see in their entirety. The recent project at Holme-next-the-Sea, Norfolk, the survey and excavation of the Early Bronze Age timber circle known as Seahenge (fig.19.1 & fig.19.2), illustrates many of the predictable problems of working in an inter-tidal wetland and some less predictable ones.

Fig.19.2: Seahenge: the inverted oak hole revealed in Autumn 1998 (English Heritage).

A timber structure in the present inter-tidal zone at Holme-next-the-Sea was first reported to staff of the nearby King's Lynn Museum. They visited the site in August and September 1987; it was photographed and sampled. The site was entered into the Norfolk Sites and Monuments Record though its function, date and character were not known at the time. In particular, the inverted tree bole at the centre, which proved to be such a unique feature, was not then visible in the sand, peat and silt layers which covered it.

Eleven years later attention was once again drawn to the Holme beach when a Middle Bronze Age palstave was found in the sand about 10m north of the timber ring by a local amateur archaeologist, John Lorimer. The county Sites & Monuments Record officer visited the site in August 1998 and realised that the ring itself was man-made and that it might be associated with the bronze axe. In the ensuing decade erosion had removed more material from around the circle revealing its form more clearly and, in particular, the upturned tree bole (fig.19.2). Norfolk Landscape Archaeology, the County Council's field unit, then notified English Heritage about their discovery and were asked to submit a project design for an archaeological assessment and investigation of the structure.

This initial fieldwork took place between 19 October and 6 November 1998. The timber circle was only exposed during periods of low tide, for between one and four hours. To make matters more difficult the sea had eroded a bowl shape in and around the timber so that it sat in a shallow pool of water at low tide which had to be pumped out to make investigation possible (and further limiting the time available each day for recording). The timber circle proved to be an oval shape, aligned north-west–south-east, made up of fifty-five oak timbers around an inverted oak bole, slightly off-centre with its severed roots in the air (pl.19.1). The maximum diameter of the timber circle was 6.78m and the posts, placed closely side-by-side to form a continuous palisade, had diameters ranging from 0.2m to 0.6m. The oak trunk was from a substantial tree with a maximum diameter of 1.20m.

Preliminary radiocarbon dating indicated that the timber circle belonged to the Late Bronze Age. Earlier speculation had proposed various interpretations including medieval or early modern water tanks and fish traps. Some horizontal timbers on the surface also proved to have come from an early modern ship, probably from the Vicuna whose wreck lies about 150m north north-west of the circle. There was a variety of other timber structures in the immediate area of the circle to the east, west and south east, belonging to medieval fish traps.

In January 1999 an evocative picture of the timber circle appeared on the front page of *The Independent* newspaper with the by-line 'Shifting sands yield Stonehenge of the Sea'. This generated widespread interest in the media and many thousands of people were attracted to the remote beach to see and experience the timber circle, now dubbed 'Seahenge', for themselves (fig.19.3). The visitors brought some financial benefit to the businesses of the local area but they also caused serious alarm among environmentalists.

The beach at Holme-next-the-Sea site is part of the Holme Dunes National Nature Reserve, 270 hectares with the status of a Site of Special Scientific Interest, a wetland of international importance under the Ramsar Convention, a Special Protection Area and Special Area for Conservation. The timber circle had no legal protection but formally belonged to the le Strange Estate. Unusually the beach here is in private ownership (not the Crown's) and is managed as a Nature Reserve by the Norfolk Wildlife Trust. The Nature Reserve was established in 1926.

The particular importance of the Holme Dunes Reserve is that it is home to some hundred thousand migratory birds. Because it is a safe and relatively secluded area, with easy access to the feeding grounds of the Wash, Britain's largest marine bay, (which lacks dry shingle bars) Holme is one of the most important sites in Britain for over-wintering waterfowl, ducks, lapwing and curlew, sanderling, dunlin and oyster catchers. The north Norfolk coast is, in fact, Europe's finest soft coast in terms of its extent and accessibility for birds. The key species, in conservation terms, are the Bar-tailed Godwits, (*Limosa lapponica*) Grey Plovers (*Pluvialis squatarola*) and Knot (*Calidris canutus*). The importance of the nature reserve can be seen from some of the statistics. The highest ever roost count of the Knot in Britain has been recorded at Holme, 220,000 birds in November, virtually the entire migratory population of Greenland. These birds fly 3,000km non-stop from Greenland to Holme travelling about 40 miles per hour, burning off most of their body fat in the effort. Most of these migratory birds arrive in September and remain until February or March. Normally in the winter months humans are themselves a rare species on this beach with the exception of reasonably well-informed birdwatchers. Later in the season, from April to early summer, other breeding shore birds utilise the shingle bars at Holme, particularly Little Tern (*Terne albifrous*) and Ringed Plover (*Charadrius hiaticula*). They roost on the sand and shingle where their eggs are very vulnerable to the feet of unobservant humans, dogs, horse riders and sand buggies.

There are few places in Britain where waders can be seen in such numbers. The sudden appearance of large numbers of human visitors, anxious to see the timber circle, but ignorant of the sensitivities of the Nature Reserve and its inhabitants, was an important factor in considering the future of the archaeological site.

Following the completion of the archaeological assessment report a number of meetings were held in Hunstanton, Norfolk, attended by representatives of

English Heritage, Norfolk Landscape Archaeology, the Norfolk Wildlife Trust, the le Strange Estate, West Norfolk and Kings Lynn Borough Council, Norfolk County Council, and the Norfolk Coastal Project.

The assessment clarified a number of issues: the timber circle was an early Bronze Age monument now in the inter-tidal zone, but originally built on a relatively dry area inland, surrounded by freshwater marsh. The Holme timber circle now lies on a stretch of dune coastline where studies by specialists at Newcastle and Portsmouth Universities showed long term lowering of beach profiles and associated dune recession. The *North Norfolk Coastline Management Plan* proposes a policy of allowing the dunes to roll back ('retreat the existing defence line'), combined with habitat recreation further inland. There was no doubt that the coast is eroding at Holme with the lowering and steepening of the beach increasing wave energy. It appears that over the past decade layers of sand and protective peat had almost completely disappeared, revealing the circle and inverted tree bole more clearly and exposing the timbers to mechanical, chemical and biological damage. The height of the outer circle of timbers may have been reduced over the past decade by about a metre. Norfolk County Archaeologist Brian Ayers describes the process as 'like a stick of rock, no matter how long you suck it, the rock looks the same until you get to the end of the eroding vertical post'.

It was clear from the assessment that sea boring snails called piddocks had drilled the timbers, increasing the impact of chemical and mechanical erosion. The waves were also scouring out a bowl shape inside the timber circle. However, it was not possible to provide a simple answer to the question 'how long can the circle be left before destruction is so complete that its archaeological or forensic value will be lost?'

At other sites such as Rolls Farm, in the Blackwater Estuary, Essex, the decision had been taken to monitor the erosion of exposed archaeological features and record Neolithic land surfaces, Bronze Age wooden structures and Roman salterns over a two-year period as they appeared. Similar strategies have been adopted in the Humber Estuary, at Whitby, Yorks, and Coverhithe, Suffolk, where the *Suffolk Shoreline Management Plan* predicts the loss of a late medieval church and several medieval and post-medieval buildings as the cliff line recedes by an estimated 600m.

At Holme there was a fear that particularly fierce water conditions might rapidly destroy the increasingly exposed timber circle. In addition, the large number of visitors attracted by the media publicity were a threat to the

Fig.19.3: Media coverage of the Seahenge find and excavation, which culminated in the broadcasting of the Time Team television programme, attracted many people to the site and surrounding National Nature Reserve and Ramsar site (English Heritage).

roosting birds and to the fragile remains of the peat beds which still survived on the beach.

The 'Hunstanton' forum therefore recommended to English Heritage that the timber circle should be fully recorded, excavated and removed for detailed study. This proposal was then considered by the Ancient Monuments Advisory Committee (the Government's statutory committee which advises English Heritage Commissioners and the Secretary of State at the Department of Culture, Media and Sport).

Alternative proposals were also considered. Longer term monitoring was felt to be too risky in view of the threat to the site. In-situ preservation was not recommended because the process of internal timber deterioration was actively underway; any engineered construction such as a cofferdam would be environmentally intrusive and would neither preserve the timbers nor the sands around it.

In the circumstances it was decided to proceed with the excavation option. The Norfolk Archaeological Trust team, led by Dr Bill Boismier and Mark Brennand, began work on 26 May 1999 (fig.19.4 & fig.19.5). The physical difficulties of working in the inter-tidal zone were exacerbated by the additional pressures of the media and public interest on an open site. As many as sixteen thousand people visited during the excavation. More of a problem were the protestors, mostly neo-Pagans/Druids who occupied the timber circle, objecting to its excavation.

Although the 'Hunstanton' group was broadly based it did not specifically involve people from the local Holme community. With the tremendous amount of publicity and the large number of visitors to the village attracted by 'Seahenge', some local people had begun to see the circle as 'their' monument. Rumours abounded that the circle had been known for years and that it was perfectly safe where it was. Neither was true but it did not stop many people believing them. Long-term antagonisms about the limitation of local peoples' activities in the Nature Reserve fuelled the concerns that the 'authorities' were deciding on Holme matters without taking local opinion into account. Even though the archaeologists carrying out the work were from Norfolk County Council there was a strong local sense that outsiders were making the important decisions.

As soon as the strength of local feeling became apparent, two well-attended meetings were held in the village hall at which the County Archaeologist, the Norfolk Wildlife Trust, English Heritage's Inspector of Ancient Monuments, the President of the Council for British Archaeology, Dr Francis Pryor, and a member of the Ancient Monuments Advisory Committee, and the present author, spoke and answered questions. Some local people, nevertheless, felt that they had not been consulted before decisions were made about the circle's future.

Objectors to the excavation fell essentially into two camps: local people who argued that there was no threat to the circle and that it should be left alone; and Pagans or New-agers who also felt that the circle should be left alone for religious or aesthetic reasons regardless of whether it was under threat or not. Archaeologists were seen as brutally intrusive scientists, failing to appreciate the sensitivity of the timber circle. This was not the opinion of all Pagans. About three hundred signed a petition asking for the circle to be excavated. Nevertheless, a small number continued to occupy the timber circle, destroying sandbags and preventing the excavation from continuing. A meeting was held in Hunstanton between English Heritage, Norfolk archaeologists, the Norfolk Wildlife Trust, and Pagans, including some of the protestors. As a result all except one protestor signed a concordat that the excavation should continue. Unfortunately this did not prevent about six people from continuing to occupy the site. This resulted in English Heritage being awarded an injunction in the High Court against the protestors. The excavation then continued without further interruption. The broadcasting of the *Time Team* television programme about the project over the Christmas holiday and viewed by about 4.5 million people, resulted in about forty e-mails (and a few letters) to English Heritage objecting to the intrusiveness and insensitivity of the archaeologists. Much of the correspondence was anti-scientific, ecological in flavour and concerned about the world's loss of trees and forest (but not particularly sensitive to the problem of the birds which was largely ignored by the *Time Team* programme). Considerable concern was caused by archaeologists taking a slice of timber out of the central tree bole with a chain saw. This was thought by some people to be crass and unnecessary, the despoliation of a sacred, almost living object.

For the archaeologists, the large timber sample was required to date the tree trunk. Less intrusive coring, of the kind normally taken from timbers in churches or other medieval buildings, would not have been effective in timbers which were so sodden and damaged. Thanks to the large sample slice both radiocarbon dating and dendrochronology were possible. Alex Bayliss was able, by manipulating the results with Bayesian statistics, for the first time, to produce a remarkably accurate result from such damaged timber. The central tree bole had fallen over or been cut down in the spring/early summer of 2050 BC, while the sampled timbers in the outer ring died exactly a year later in 2049 BC (Bayliss *et al.* 1999).

Dr Maisie Taylor's study of the timber has revealed that some three dozen copper alloy tools, such as broad bladed axes and adzes, were used to cut and trim the timber. These are the earliest timbers which we have in England cut by metal tools. Only in the lowest levels, where the timbers were protected by silt and where the piddocks had not bored holes, did these remarkable surface tool-marks survive. Surprisingly the central tree bole was cut and trimmed horizontally, and there was no

pointed end in the ground. A rope of honeysuckle had been threaded through a hole cut in the trunk to drag the timber and the flattened end was placed in a pit just off-centre in the timber circle. There was no evidence of formal deposits, offerings or burials in the pit. Rather the whole circle appears itself to be a 'tree monument'. The outer timbers were placed hard by each other to form a continuous wall, with the bark intact on the outer surface. A forked branch may have provided a small cavity through which initiates could pass through the timber wall. Inside, the timber ring had been cut and worked to give the appearance and smell of living wood. The height of the circle is uncertain but the wall can be estimated from the depth of the sections in the ground at between 2m and 3m.

The most unusual feature of the timber circle is, of course, the inverted oak bole with its roots in the air. This has not been recognised before in British archaeology, though central pits in henges and stone circles are not uncommon.

The circle was built in a location between freshwater marsh, the beach and the sea. In this area of Norfolk no one can fail to be impressed by the huge skies. This is a liminal position between the circular cosmos of the sea and earth below and the sky above. In this cosmos the Holme tree monument, perhaps, formed a gateway into these several worlds. Many writers on shamanism have commented on the importance of inversion, the concept that this world is inverted in the underworld, or that in dreams the future is foretold in inverted form. (For example, Sitting Bull's dream of inverted US cavalrymen was taken to predict the Battle of Little Big Horn) (Bradley 2000, p.12). Among the Sami of Lapland offerings of blood and alcohol are made at shrines of inverted trees and 'Siberian shamans also use inverted trees, that is trees planted with their roots in the air, which, as is well-known, are among the most archaic symbols of the World Tree' (Eliade 1964). In the Altai mountains the chosen tree is used to make the shaman's drum, which he or she beats while climbing the tree and ascending to the sky. To the Yakut the chosen inverted tree is ideally one struck by lightning. In many traditions the mythical ancestor lives in the subterranean world, near the roots of the cosmic tree, whose top reaches the sky. By drumming the shaman can communicate between these worlds and abolish space and time. The tree is the hole through which the shaman ascends or descends. (Eliade 1964, p.181).

Hilda Ellis Davidson (1988) explains the importance of tree symbolism in the Viking World, connected with the movement of time and fate around a fixed centre 'which for the northern peoples was represented by the World Tree, the centre of the turning world'. In northern mythology the oak, in particular, is associated with the sky. The sacred groves described by Tacitus in *Germania* were dedicated to the sky god Tiwaz and the Celtic name

Fig.19.4: The careful removal of one of the 55 whole or split, large waterlogged oak timbers, which made up the monument circle (English Heritage).

for such places, 'nemeton', refers to a clearing in the wood open to the sky. Place-names such as Thundersley in Essex imply a similar configuration, a clearing dedicated to Thunor, the sky god.

Tacitus (XIII, 8) describes two tribes battling for possession of a sacred place beside a river which they believed was especially close to heaven, where men's prayers received ready access. The two tribes, who lived on either side of the river, were willing to offer huge sacrifices for possession of this ritual and symbolic centre, where communication with the gods was kept alive through ritual and sacrifice. The victorious group, the Hereundari, celebrated by disposing of gold, silver, clothing and horses in the river and hanging human sacrifices from adjacent trees. These events are some two thousand years later than the construction of Seahenge, but the sacrifices are reminiscent of the offerings found in several British rivers and watery places in the early Bronze Age, notably Flag Fen.

It would be naive to infer meaning directly from a hotch-potch of ethnographic examples of different times and places. Symbolic places need to be analysed in the local context (Bradley 2000, p.30). However 'what comes out of the ethnographies is that trees are used symbolically to make concrete and material the abstract notion of life, and that trees are ideal supports for such symbolic purpose precisely because their status as living organisms is ambiguous' (Rival 1998, p.3). Like us, the people who built Seahenge needed to find in the natural environment the physical or 'material manifestation of organic processes that can be recognised as similar to those characterising the human life cycle, or the continued existence of human groups' (Rival 1998, p.7).

Following the excavation of the circle, the timbers were transported to the Flag Fen Archaeological Centre near Peterborough for detailed study. The future of the timbers remains an important issue. In response to local public opinion the then Chairman of English Heritage, Sir Jocelyn Stevens, promised that the timbers would be returned to Norfolk. But there was some confusion about the motivation in excavating the timbers. Norfolk County Council and English Heritage regarded the project as a rescue excavation, in the jargon of *Planning Policy Guidance Note 16 (Archaeology and Planning)* the aim was 'preservation by record'. This was not an Aswan Dam-type project, intending to re-locate the monument.

Legally the timbers belong to the le Strange Estate, who have been exemplary in their co-operative attitude. Initially it appeared that Norfolk County Council and the Kings Lynn and West Norfolk District Council (the museum authorities) wished to create a permanent display of the timbers. English Heritage offered to finance conservation by impregnation with polythylene glycol and freeze-drying. At the time of writing, however, the museum authorities, the county and district local authorities, the Holme parish council, Pagan groups and the Timber Circle Forum, a body representing all interested parties, have agreed that they prefer to see the timbers reburied in a similar environment and close to the area from which they were removed.

This raises a number of issues. Is reburial a form of disposal or long-term conservation? If the latter, can the timbers be monitored and their survival in their present condition guaranteed with a reasonable degree of risk. The le Strange Estate is the legal owner, but who has legitimate rights in this matter, the people of Holme, the inhabitants of Norfolk, Pagans, archaeologists or the wider community? Some people feel strongly that, having been excavated, the circle should be conserved and displayed. A final decision has still to be made about the future of the timber circle. In the meantime the archaeological team will complete the excavation report.

For the most part, archaeologists' work in the UK is relatively uncontentious; archaeologists are usually seen as the good guys, rescuing the past from the bulldozer of development. Seahenge opened the Pandora's Box of public opinion. A marvellously evocative site attracted the attention of many people who do not trust or believe in the experts and scientists; people whose motivation

Fig.19.5: Seahenge: A few moments after the central tree bole was lifted from where it had sat for some 4,000 years (English Heritage).

ranged from the poetic and religious to the mercenary and the political. Archaeology takes place in the public area and increasingly archaeologists will have to debate with the public. Nowhere is this more the case than in the wetlands where local sensitivities and competing commercial, scientific and environmental interests will need to be reconciled and difficult decisions made.

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20: The cultural heritage of Mediterranean wetlands: a methodological proposal for an inventory

Jorge Cruz and María-José Viñals

Abstract: *Many of the wetlands of the Mediterranean region have been transformed from natural to cultural landscapes, and the resulting traditional agro-ecosystems are now threatened by the pace of modern development. The traditional uses of the wetlands are reviewed: agriculture (rice cultivation), grazing, fishing, harvesting of natural vegetation, hunting, and salt-making. The character and values of the cultural heritage of these wetlands are outlined, to indicate how and why a programme of study, recording and interpretation is required. The pioneering research project of the Museum of Prehistory and Cultures of Valencia is then described as a potential model for similar projects to preserve the cultural heritage of wetlands across the Mediterranean region.*

Mediterranean wetlands: characteristics, traditional uses and cultural heritage

Wetlands are among the most common and more ecologically valuable ecosystems to be found in the Mediterranean, and they can provide important bodies of water in arid landscapes. The important cultural heritage they hold, linked to the traditional use of their resources, must be highlighted.

The Mediterranean area has been settled for more than 8,000 years. Wetlands have not escaped this tendency toward territorial occupation. The saline wetlands were the first ones to be exploited. Already in Roman times they were used for obtaining salt. Freshwater wetlands remained pristine for a longer period of time, and until the eighteenth and nineteenth centuries, their only transformations came from traditional rice growing, a suitable crop for these lands and climate.

The difficulties for settlement and human exploitation derive from the physical and ecological features of the wetlands themselves, as has occurred in other latitudes: unhealthy conditions, uneasy transit and in certain cases such as brackish wetlands low productivity. In return, they offer some important resources. The first of all is water which represents an ever-present obsession in the Mediterranean area. Also, the characteristic vegetation allows certain uses, and abundant game and fish. The settlement of these areas has taken big efforts by the Mediterranean peoples who have always been prepared to pay a high price for exploiting the wetlands. Malaria and risks of flooding are two of the most common disasters that occur in this region. A further cost was the need to adapt techniques and tools to the physical conditions of these areas that require new methods of exploiting resources. In short, exploitation necessitated the generation of a specific culture that is particular to the wetlands. Below we summarise the main traditional uses of the Mediterranean wetlands and the cultural heritage that they have generated.

As happened in other Mediterranean ecosystems, the traditional use of natural resources with a certain economic importance (soil, water, fishing, etc.) has provoked a landscape transformation, that led to a harmonious agricultural ecosystem (agro-ecosystem), respectful towards the environment, thus adding a historical and cultural value to the territory. However, during the present century, and in a brief period of time (the last twenty years), these agricultural ecosystems have been so transformed, that their balance with nature has been broken. Resource over-exploitation and pollution has happened, together with the loss of traditional values. Today, the recovery and rescue of those wetlands that have not been irreversibly transformed is a common practice. This is because environmental and cultural resources, so rich and important for human kind, are now more appreciated.

Moreover, regarding the study of wetlands, earth scientists (geographers, geologists, etc.) and biologists (zoologists, botanists, ecologists, etc.) have played the main role in the first phases of the international conservation movement as well as in the scientific study of wetlands. The unique natural features of the wetlands together with their conservation needs have gained a prominent place in the efforts of these researchers. However, the study of the traditional human environment in the Mediterranean wetlands has a shorter history than the studies of its physical realm.

Together with the ethnological research, we shall highlight that Mediterranean wetlands house an interesting archaeological heritage, only detected in certain cases. This is due to the fact that most civilisations have used the wetland resources without directly inhabiting those

lands. They were rather located around the area. On the other hand, there are serious difficulties in prospecting and excavating such vast and uncomfortable places. The findings to date are a result of chance, rather than the fruit of systematic work, still, they are spectacular and encouraging. We should point out the Roman ship 'Fortuna maris', dating from the first century BC, found in Comacchio (South of the Po River Delta). It was found at 3.5m, perfectly conserved (Berti 1990). Numerous remains are found in the stratigraphic layers under the present city of Venice. That is the case of San Pietro di Castello where important building structures dating from the High Medieval era were found (Tuzzato *et al.* 1993). (Further aspects of the cultural heritage known from Mediterranean wetlands are discussed by Marzatico and by Marangou, this vol.)

Traditional uses in Mediterranean wetlands

Agriculture

The attempts to turn wetlands into agricultural lands are nearly as old as agriculture itself though they have not always been fruitful. Traditional wetland agriculture is based upon two main strategies: drainage to allow irrigation crops; and land division with water management in order to grow rice. In both cases, carefully designed hydraulic facilities are needed that in consequence regulate and geometrically parcel the landscape. Transformation processes demand mills, threshing floors, drying yards, warehouses and other agricultural facilities.

The traditional rice fields, with their annual flooding cycle and irrigation channel systems, represent the most typical agroecosystem of the Mediterranean wetlands. They involve other activities such as hunting and fishing, and host interesting fauna. The most representative infrastructures of these systems are the irrigation and draining channels. These last de-water the swampy area. In many Valencian wetlands, the first agricultural transformations took place in Roman and Muslim times. The Albufera de Valencia wetland, for instance, underwent centuriation in Roman times. However, rice fields did not spread until the seventeenth and eighteenth centuries. Rice cultivation has generated the most cultural heritage around the wetlands (typical houses, tools, traditions, typical dishes, etc.).

The in-filling of rice fields to produce more profitable crops like vegetables and fruit started taking place as of the nineteenth century. Progressively, more aggressive agricultural techniques were introduced, such as the abundant use of pesticides, that have decisively contributed to the deterioration of environmental values, and lose of the traditional landscape and ethnological heritage.

Most of the agricultural transformation attempts in the North African wetlands date from colonial times. Certain grape plantations in Algeria and Tunisia were developed on areas that could be flooded. In these operations, we can see both the interest of introducing settlers and that of opening farmland. There is also an attempt to organise the territory, precisely in those places where it was at its pristine stage. After the independence of the African countries more transformations occurred, as in the coastal lagoons (merdjas), in the lower Sebou River basin, in Morocco.

Grazing

Mediterranean wetlands have high primary productivity, that occasionally draws little competition from agriculture for their use. The wetlands are, therefore, grazing areas of great interest for livestock. Many marshy areas of the Mediterranean littoral have been, and still are to some extent, winter pastures for livestock on the move. It is mainly the case of livestock that spends the summer in the highlands, and descends to the wetland pasture areas in winter. The study of the material and spiritual culture of the livestock farmers reveals their roots in the mountain regions, more than in the wetlands they use as wintertime pastures.

There is also settled livestock – that remains in the same area – usually bovine. A fine example of this is the massive introduction of beef cattle and fighting bulls in the Camargue, that took place in the mid nineteenth century. Diverse fighting bull farms take advantage of Spanish Mediterranean coastal wetlands, where horseback cattle herding it is not uncommon. The same happens in the Italian *Maremma grossetana*, on the Tyrhennian sea shores, where *butteri* (herders) always herd their cattle on horseback.

Fishing

Although movement around a wetland may be difficult, the waters (brackish and/or freshwater lagoons, irrigation channels or rivers) harbour plentiful fish. On one hand this offers a relevant source of protein, relatively scarce in most traditional diets. On the other, fishing in wetlands is not as risky as in the open sea and is made possible by their physical features. This was also a traditional activity in the Albufera, until the mid twentieth century, when fishing was the most important use of this wetland.

Anthropologists and ethnologists have noted that cultures linked to fishing are particularly rich, both in materials (boats and tools) and in spirit and social organisation. Together with the traditional use of fishing resources, there are others as peculiar as gathering leeches (*Hirudo medicinalis*) used in popular medicine, and freshwater crabs or frogs for food. Other traditional methods of exploitation are effectively real fish-nurseries and factories. A good example of this is the *vallicoltura* in the wetlands of the High Adriatic sea.

Natural vegetation harvesting

The singular flora of Mediterranean wetlands is suitable for certain uses. Brackish wetlands were subjected to selective collection of plants, that at a given time were

even sown. Until the late eighteenth century, when the production of soda carbonate from salt through industrial processes begun, the procedure was based on burning brackish plants (*Salicornia fruticosa* and *Mesambryathenum nodiflorum*). The caustic soda obtained from burning these plants was mainly used to produce glass, soap and some dyes. When overlapped, maps of wetlands and those of traditional glass fabrication centres reveal many coincidences: Elche (Alicante, Spain), S'Albufera d'Alcudia (Mallorca, Spain) or in Venice itself (Italy). Today, except in some cases as in Venice, these uses have been lost.

Phragmites australis and *P. maximus*, *Juncus*, *Typha latifolia*, *T. angustifolia* and *T. dominguesis*, *Carex riparia*, and reeds of the genus *Arundo* and *Erianthus ravennae* collected in freshwater wetlands were used to produce woven baskets and rugs, roof thatching, chair seats, stockades, etc. An extensive primitive production of *Cladium mariscus* has allowed using it as firewood in lime ovens, and of course, in domestic bread ovens.

Hunting

The abundant wetland fauna, especially waterfowl, is a very valued resource. From ancient times hunting has been a recreational activity and a complement to the diet, rather than a livelihood. In contrast to agriculture and fishing, hunting has played a secondary role, and it is adapted to them and uses part of the same tools. The hunting use of the Mediterranean wetlands was carried out even before firearms existed. It has been documented, for instance in l'Albufera de Valencia by Wijngaerde, a sixteenth century painter. Hunting with bow, crossbow or stones can be identified. The density of animals that populated the area can be therefore imagined.

Extractive Uses: saltpans

Ergo Hercules, vita humanior sine sale non quit degere. "Hercules!!, civilised existence cannot be conceived without salt", says Pliny in his *Natural History*.

Saltpans have been the most important activity carried out in the saline Mediterranean wetlands. Although their purpose is commercial they have allowed in many cases the survival of the wetlands. The is preferred wetlands for this use have been located in Southern coasts, where the climate is warmer and drier (Spanish South East, Sicily, Greek islands, North Africa, etc.), and there is seawater supply. Salt has always had a great strategic and economic value. Traditional salt exploitation in wetlands brings us back at least to the Roman times. Some of them are even linked to salt fish factories (Jávea and Calpe, Alicante, Spain). On the other hand, salt was so economically appreciated in medieval times, that even some freshwater wetlands were partly adapted to exploit this resource, as happened in the Prat de Peñiscola or l'Albufera de Valencia (Rossello 1987).

The basic procedure has not varied, since it cannot be improved but treatment, handling, storage and transportation have changed. Traditionally the Archimedes screw, the Ctesibio pump and windmills (The Crete type is an widespread example) were employed to introduce water in a saltpan system. The basic technique is common, but there are some differences in the building materials used for the heating and crystallisation pans: stone, wood, chalk, clay, lime mortar, etc. (Marin & Luengo 1994).

Another activity carried out has been peat extraction, although this product has not been so significant for the entirety of the Mediterranean wetlands, since the peats are of poor quality, having a low organic content.

Mediterranean wetlands cultural heritage

The Mediterranean wetlands are part of a privileged historical space, peopled from ancient times and home to ancient civilisations. These territories have been, more or less, acculturated by humankind through time, turning them into singular and fragile cultural landscapes where nature has a starring role. The words *cultivation* and *culture* have the same etymological root.

These cultural landscapes are structured and parcelled by irrigation and drainage systems, road networks and field boundaries sometimes emphasised by hedges to protect plantings from the wind. Cultural perceptions of these wetlands harbour apparently contradictory facets. They have been negatively regarded due to malaria but at the same time they are attractive as areas to be colonised with the promise of valuable crops.

The material cultural heritage – tools, buildings, objects, handicrafts, etc. – contributes to the economic value of the wetlands as a non-use value. Their existence is a value in itself that can be assessed by contingency methods. But day-to-day, the ethnological heritage becomes a value of direct use for recreation and tourist activities that should be approached with market research techniques. A serious and accurate work on cultural heritage would contribute to a range of relevant areas, beyond its own scientific aims.

Therefore, the study of cultural heritage should be considered, since it:

- contributes to the cultural development, assuring continuity of traditional practices or, at least, recognising that they are an essential part of the cultural heritage. It would, therefore, soften the strong contrast between traditional and modern ways of life, preventing ruptures.
- becomes a method of indirect participation for the local population to express their points of view, opinions and life experience in a respectful way. The study and the assessment of traditional activities is in itself a step forward towards citizen consensus and participation, two challenges often mentioned in wetland

conservation.

- implies demonstrating to the citizens that wetlands are attractive areas that can generate information feedback that, in fact, is a type of environmental education. This would help compensate for the excessive focus that environmental education policy usually places on children and youths.
- shows a solid common base of traditional techniques in the Mediterranean wetlands, and demonstrates the phenomena of diffusion and exchange among the eastern and western, northern and southern shorelines. This would contribute towards making the Mediterranean what it should always be: a sea and not a wall; a privileged transit area and not a boundary.

The project Analysis of the Traditional Population in the Wetlands of Valencia

The *Museo de Prehistoria y de las Culturas de Valencia* (MuPCVa) – Museum of Prehistory and Cultures of Valencia – belonging to the Valencian Regional Government Museum Network, is devoted to ethnological study and prehistoric cultures. The Museum started working on the research project of the Analysis of the Traditional Population in the Wetlands of Valencia in 1999. Within this field, the *Museu de Prehistòria i de les Cultures de València* has a strong commitment to the study and protection of wetlands exemplified by its research project on wetlands and water culture in collaboration with the Mediterranean Wetlands Project Unit (MedWet Initiative): Site for the Study of Mediterranean Wetlands (SEHUMED), dependent on the University of Valencia.

The project began in 1999 as a response to three challenges:

1. Massive social growth, and intense and multiple uses of land (urban, industrial, infrastructures, etc.) are responsible for the rapid disappearance of traditional uses. The radical transformation of the physical environment includes the loss of wetland features and surface.
2. Despite an abundance of studies on the physical environment of wetlands, social sciences issues, especially in cultural anthropology, have received much less attention. Wetlands have a relevant territorial, environmental and symbolic role in present society.
3. The last members of a generation of Valencian people who have known and participated in the traditional uses of wetlands can still be interviewed. The privileged information they have must be preserved as part of the cultural heritage of the region.

The general aim of the project is to carry out a global analysis of the traditional human environment in the Valencian wetlands and create three systematic bodies of information available to the specialised public (researchers, museums, institutions, etc.) for future research.

1. Materials: location, inventory and description of the materials linked to traditional wetland uses. Creation of a database and expansion of the material resources of the Museum. The Museum has nearly 8,000 objects in its collection. Some 500 of these are directly linked to traditional wetland uses. Work continues in the quest for other objects as well as in restoring the existing ones. The permanent collection of the Museum gives an important role to wetland materials. The inventory is included in the database system of the museum to make consulting by researchers and the public possible.

2. Ethnological description of the traditional uses and benefits of the wetlands through interviews with witnesses. Creation of a database in digital audio-video format. This part of the project is closely linked with another research project of the Museum: *el Museo de la Palabra* (Archive of Valencian Oral Memory: A Word Museum). This project is gathering the live history of 3,000 Valencians older than 65 years through interviews recorded in digital audio-visual format. Once transcribed the interviews will be included in a related database which will make it possible to search by subject matter, geography, chronology, etc. becoming, in this manner, a powerful research tool for social sciences, available to all specialists and to the interested public. The interviews have already begun in sites close to the Albufera de Valencia, and are revealing –in the voice of the main actors- interesting facts on the traditional uses of the wetlands.

3. Database: creation of a bibliographic, iconographic and phonographic database related to social environment and traditional uses in wetlands. The *database* has more than 1,000 entries mainly on bibliography relative to the Valencian wetlands. Work is presently underway towards completing it with the systematic transfer of newsletters and bibliographic sources on the Mediterranean wetlands. Work is also being done on the location and inventory of historical cartography, iconographic sources (photography, pictures, etc.); phonographic sources, such as recordings of traditional music close to the wetlands, etc. One of the main methodological contributions of the project, presently in process, is the elaboration of a *Thesaurus* allowing systematic classification of wetlands documents.

The area of analysis for the project is made up by the Valencian wetlands. Six of them have been granted already the category of Natural Parks and Special Protection Zone for Birds (European Birds Directive 79/409/CE). They are also included in the List of Wetlands of International Importance, drawn up by the Ramsar Convention. Together with these 6 wetlands, all the other Valencian Wetlands are protected by the Natural Protected Areas Act 11/1994. For this purpose, a Wetland Inventory has

been written. It is currently under approval phase, and it includes 45 wetlands with a total surface of 45,657 hectares. Around 30 wetlands located in 60 municipalities will be selected. The selection will include all types of existing wetlands in the Valencian region.

The results of the *Analysis of the Traditional Population in the Wetlands of Valencia* Project will provide a tool for the inventory of the cultural heritage of the Mediterranean wetlands (in CD format). It will be available to all the scientific and social institutions, both public and private, of the Mediterranean countries. The project aims to preserve the rich cultural heritage associated with wetlands through collaboration between all those interested in them.

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Section IV:
Reactions

21: Wetlands, archaeology and conservation at AD 2001

John Coles

Abstract: *This paper provides an assessment of the current state of archaeology and the cultural heritage in European wetlands. Much of the evidence of the past that survives in wetlands consists of organic material and is subject to degradation by both natural and human agencies. The archaeological community is faced with a number of problems ranging from an unfamiliarity with wetlands to the mass destruction of types of evidence that are only available on wet sites. The responses of archaeology have been mixed, and range from a number of reactive excavation projects to a very few intensive surveys to identify the resources; several proactive preservation projects have also been undertaken. But a great amount continues to be lost through an inability to cope with the pressures that now crowd upon wetlands both large and small. Recommendations are made which are designed to promote a greater knowledge and understanding of the wetland record, better communication with the discipline and the public, and new efforts at preservation of culturally-rich wetlands in collaboration with well-established and experienced environmental agencies.*

Introduction

The task set me by the organisers of this book has turned from a short summary with a few recommendations into a more convoluted discussion with myself about wetland archaeology at the onset of yet another millennium. The theme of the debate is archaeological, of course, but throughout the commentary that follows I have tried to make the point that everything that we do depends on the survival of evidence, and *that* evidence is needed to ensure that our interpretative frameworks are as strong as possible. So, what now follows is a mix of description and explanation, critical and approbatory comment, and above all else I hope sympathetic to our common aim, which is to conserve the evidence of

> a miserable waste of sodden grass, and dull trees, and squalid huts, whose aspect is forlorn and grievous in the last degree ... dank and noxious...

or so claimed an early traveller to the wetlands of North America (C. Dickens 1842). We can only hope things were not so unkind to the people whose lives we in Europe attempt to comprehend and whose abodes we hope to conserve.

It is difficult to attempt a summary of the interestingly variable reports in this book, in part because of their variability and in part because they represent only a fragment of the European scene. These matters receive comment below. There can be no doubt, however, about the importance of definitions, of wetlands themselves, of archaeology within and around wetlands, of other agencies and interests in wetlands, and of what we mean by the management of wetlands and the cultural heritage represented by and within them.

Definitions

Wetlands have been defined many times and by many agencies, and the Ramsar Convention of 1971 proposed a wide and embracing set of words: 'areas of marsh, fen, peatland and water ... permanent or temporary, with water that is static or flowing, fresh, brackish or salt....'. Those archaeologists who work in wetlands generally describe them as marsh, swamp, peatbog, pond, lake and estuary, all of which fit easily into the Ramsar definition, but we add a special category of overwhelmed dryland (Coles 1984), where a once-moderately firm base chosen for settlement became water-covered or waterlogged, thus preserving evidence in conditions for us approaching an ideal, even if the area today appears only as a damp and muddy expanse on the edge of an existing or long-dead lake. Archaeologists have been attracted to wetlands of these sorts ever since an interest in the ancient past was aroused by discoveries made by accident in the peats, muds and silts of Europe and elsewhere. Such discoveries have been well publicised in recent years and have served as the base from which wetland archaeologists operate, providing parameters to discoveries and cautionary tales about the fragility of the record.

Thus, one report of an encounter with a waterlogged archaeological site, where almost all objects were of organic material, a majority of wood, with many pieces of cordage, and less fragile shell, bone and horn:

> By far the greater number of them could not be kept intact. No matter how perfect they were at first, they warped, shrunk, split and even checked across the grain... it was distressing to feel that even by merely exposing and inspecting them, we

were dooming so many of them to destruction. The site itself was:

> like a thick sponge saturated with water holding a great quantity of salt and a large variety of smells. We had brought a crew of workmen up from the coast, but almost to a man they looked with absolute revolt upon the unpromising hole' (Cushing 1897).

So much for the early attraction of wetland archaeology in coastal Florida.

Other early reports were not quite so discouraging and many pages were spent on descriptions of the organic delicacies uncovered, and even, on occasion, of their context and their conservation. Of heritage management itself, the theme of this book of reports, rather little was ever acknowledged in these early days, with one or two notable exceptions.

The discipline of study, wetland archaeology, has itself not much of a history, being treated as a rather odd relation of mainstream archaeology, and not a separate sub-discipline like environmental archaeology, forensic archaeology and so on. Instead, wetland archaeologists are sometimes thought of as waterlogged freaks, devotees of the unusual, masochists even, who delight in the inhospitable conditions offered by wet sites and wet landscapes. No wonder they are shunned by their fellow dry-shod archaeologists, no surprise that they have their own organisation called WARP (Wetland Archaeology Research Project) and communicate through *NewsWARP*, unread by anyone except the converted. Matters can only get better when a wider acceptance is gained of the commonality of aims that wetland archaeology shares with the whole discipline.

The Ramsar prerogative is to promote on a world-wide basis 'the wise use of wetlands' and the word 'wise' implies sustainable; it involves provision for the designation and the management of internationally important wetlands on the basis of five disciplinary themes: ecology, botany, zoology, limnology and hydrology. This, by word definition, may be seen to omit the cultural heritage that a century of work has revealed in wetlands of almost every variety; the reports in this book make this point very clearly. The words 'social and cultural values' that also appear in Ramsar definitions refer in the main to local communities and indigenous peoples who inhabit or exploit wetlands today, and 'including the presence of archaeological sites' is about as close as we can expect to get within a well-established agency whose influence on the natural environment is felt throughout the world and whose strength of support lies in landscape and wildlife interests. It will only be through the archaeological demonstration of relevance, and opportunity, that we will be able to play a larger part in the significant decisions taken by this agency and the numerous more regional or specialised agencies that exist with similar aims. Such collaboration, yet to be more firmly established, is crucial for the future of our nominated and yet-to-be identified archaeological wetlands.

Wetlands and societies past and present

Pre-industrial societies almost everywhere in the world agreed the need to accept the prevailing landscape for what it was - they had no other choice. Their environment, whether dry or wet or seasonally changing, was a dynamic force in the life and existence of societies lacking the need, or technology, to change the landscape for human purposes. Parts of the landscape were sometimes venerated. Of course, minor diversions and amendments could be, and were, made through dams, ditches, banks and above all else, clearances of woodland. Many of these were small in scale and effect, but some had long-term repercussions. For these pre-industrial societies, the adaptation to local environments was the crucial element in the success, or failure, of economic pursuits, and through these the viability of the social system. Cultural responses to the environment had to be conformist and not confrontational, because human technology could not easily cope with substantial and sometimes abrupt environmental change, and adaptations of behaviour were the only way to ensure the maintenance of settlement and prosperity. Where communities were based within or near wetlands of whatever sort, the seasonal patterns of water levels, vegetation growth, animal husbandry or hunting were paramount in determining the pattern and evolution of behaviour.

Industrial societies are less tolerant and less understanding of the environment. Societies based less on the immediacy of the land and more on complex systems of resource acquisition are more demanding, and often more impatient, about the supply and demand of materials, as well as other matters. The European twentieth century was extraordinary even within the history of industrial societies, with both dramatic and imperceptible events that affected the environment, and particularly wetlands. Alterations and introductions of technology and materials, accelerated transport and movement, confrontational attitudes to environments considered to be socially imperfect, could lead to the imposition of ill-considered value judgements on landscapes that had their potential less easily recognised. Wetlands, once the acknowledged source of variety and abundance in wild resources and seasonally supplying the richest grazing of almost any environment, were little-understood, often derided, ignored, and became the expendable land, the dumping ground for waste, and the exploitable land, to be quarried away at will.

Much of this treatment was economically driven, of course, but general perceptions were reinforced by the

evocative descriptions produced by popular writers. Two examples will suffice, one a comment on wetlands and the other identifying one of the common archaeological structures found in bogland. Such descriptions had quite profound effects on public attitudes to wetlands.

> The air resounded in all directions with the loud chirping of the frogs ... Here and there we passed a log hut: but the wretched cabins were wide apart and thinly scattered, for though the soil is very rich in this place, few people can exist in such a deadly atmosphere ... everywhere was stagnant, slimy, rotten, filthy water.

> A great portion of the way was over what is called a corduroy road, which is made by throwing trunks of trees into a marsh, and leaving them to settle there. The very slightest of the jolts with which the ponderous carriage fell from log to log, was enough it seemed, to have dislocated all the bones in the human body (C. Dickens 1842).

Already by this time, in Europe, the most damaging of all technologies, that of drainage, was being perfected upon wetlands. There was little comprehension and less acceptance of the consequences of water extraction, in the thinning of the soils through shrinkage and erosion by wind. Nor was there any recognition of the value of natural barriers, to control water flow, nor of the (later) effects of pollutants both terrestrial and aerial. But many wetlands, only marginally submerged, permanently or seasonally, were seen as prime land for 'improving' by drainage, the purpose of which was to create rich pasture and then, in time, fertile arable land. We see all around us the results of the intensive flurries of activity and the continuous degradation of wetlands, whether that be in the Fenland of England or the flatlands of northern Germany. In a number of European countries, and elsewhere, wetlands that had survived were despised, and although intriguing discoveries were not uncommon - bog bodies, trackways, logboats, even precious metals - there was no attempt to see the wet environments as anything other than unusual, unrepresentative landscapes with lives of their own, misunderstood and there to be exploited if at all possible.

As is quite clearly shown in the national and regional papers in this book, the bleak picture presented above was not uniform either in darkness or in spirit. Industrial societies in Europe in the main did not have, and do not have, the strength of traditions and the tacit acceptance of nature as religion that are shown in other areas of the world, in Japan for example. In that country there are common problems, of course, in the speed and relentless growth of industry, but the strong traditions and value systems in Japan help in some ways to alleviate the effects of rapid change and to prevent some excesses of destruction. In Europe, nonetheless, the response of societies to the environment, to the cultural landscape and to the threats to their survival is varied. Perhaps some general patterns can be detected.

Some countries have for long possessed a strong centralised control over the cultural heritage as well as environmental concerns. Other nations have not had such centralised power and have relied upon regional controls over alterations to the land in particular. Neither circumstance has had an entirely successful effect upon wetland preservation, in responding to proposals that pose threats to this type of landscape and its potential or realised cultural content. Almost all of the national reports here bemoan the continuing drainage and pollution of wetlands. This question of control, whether centralised or regionalised, has a bearing on another element, that of the economic strength of the nations. Here the tremendous changes that have taken place in eastern Europe in particular, but also to some extent in the west, have created pressures on all aspects of society, and none more so than the environment. Wetlands are always the most fragile and easily affected element of the environments of Europe, so the impact of economic rise and fall, cyclical or long-term, is felt very severely. A strong central control and a relatively weak economy, with rather little innovative or burgeoning growth, tends to help conserve landscapes and prevent ill-considered and abruptly-delivered projects that seriously damage wetlands. A strong and strengthening economy, whether allied to central or regional control, has tended to have the reverse effect, in the imposition of projects designed to maximise profits at the expense of conservation. For wetlands, drainage schemes of large size have often been imposed upon delicate and fragile environments with little thought given to long-term effects both inside and outside the prescribed area. The evidence suggests that such major schemes demand firm central control if excess degradation is to be prevented. This assumes, of course, that the central authorities are sympathetic to the conservation of their national environment.

However, there is another factor in this generalised pattern of controls and economies, although there has been rather little note made of its presence in the reports. Difficult to quantify in terms of strength and thus effect, nonetheless, traditions of respect for the environment, and even for the cultural heritage, do exist in European countries, sometimes strong and often weak. The interest in matters environmental, insofar as they impinge upon woodlands, flowers, birds and butterflies, is well-known, unevenly spread, and often quite incomprehensible to those who live outside Europe. Within Europe the strength of emotional feeling as it affects environmental control is variable, and some of the reports touch upon the unevenness. Few countries acknowledge the latent and unrealised strength of feeling towards the cultural heritage as it relates to the non-visible, invisible, sites and monuments that often lie within the varied European

wetlands. But where there is a strong tradition of respect towards nature and all that it holds, most often in less-industrialised parts of countries, the concerns of the wetland cultural heritage are often addressed through local agencies rather than unseeing and un-understanding centralised authorities. Again, the effects can be seen in a country like Japan, where concentrations of population respect the built environment and its accompanying material culture, but ignore the natural landscapes beyond the urban conurbations. In contrast, those who still work and live upon the land itself have very firm and unyielding concerns for the natural world and its often revered and always respected elements of land, water and woodland.

In Europe as a whole there has been, and is, a very uneven recognition and comprehension of wetlands as repositories of environmental history and as treasure-houses of ancient human culture. This unevenness is a reflection of a lack of communication, of interest, of education within and between the many governments whose responsibilities include the establishment of priorities, and therefore resources, for the protection of the cultural heritage, and for support to undertake the tasks of recognition, interpretation and preservation. The reports in this book provide quite graphic detail of the individual successes, of course, and some mention of the more general failures, but few refer to the general lack of understanding about the cultural heritage as it is, may be, or was, represented in the variety of wet environments that we group within the term 'wetlands'.

Wetlands and archaeology

Turning now to archaeology itself, and the development of our discipline, a glance at any country's output of reports, its lists of protected sites, and the body of practising archaeologists, suggests the following: over 95% of archaeologists in Europe work only in lands and on sites that are, by our definition, dry, that is, they have lost most of their original cultural content through desiccation and other agencies of degradation. This high percentage reflects the widespread reluctance of people today to interest themselves in wetlands with their connotation of dampness, coldness and decay; at least the last of these three is unjustified. Yet, as a multitude of historic, and ethnographic, reports of pre-industrial peoples tell us, the material culture of such societies, wherever they lived, consisted of perhaps 95% organics and a small percentage of inorganics. Material culture in its widest sense is of course the basic element of our studies, the materials upon which we expend enormous efforts to retrieve and interpret. Even non-materialists have to acknowledge the presence of 'things' in their complex negotiations with models and concepts.

In effect, however, 95% of archaeological work is conducted on perhaps as little as 5% of the original material evidence; and in contrast, only about 5% of archaeological minds attempt to search for and address the variety of the whole 100% of the original, once-present, material evidence. Does this make sense in this age of 'total archaeology', and of serious degradation of the evidence of the past? Does this seem reasonable in the apportioning of restricted financial and other resources for archaeological work? Clearly it does not. And it follows that the conservation of that totality of the evidence, all the surviving evidence, must be a paramount concern.

Without labouring the point, we might glance at what we can see on a non-industrial food-producing settlement, and thereby infer what was in all likelihood present on prehistoric and early historic sites where people were engaged in the same pursuits - shelter, food, clothing, equipment for work and for social purposes. A brief list will surely be adequate, and I have already made an effort to organise the evidence in terms of archaeological enquiries rather than a mere listing of the elements (Coles 2001):

- Houses, sheds, barns, fences, gates, essentially of wood with some *clay*, *stone*, straw and reed.
- Carts, wagons, logboats, canoes where appropriate.
- Foodstuffs of plant and *animal* origin, of great variety both domestic and wild.
- Clothing and other coverings, mats and blankets of skin, hair and plant materials.
- Tools of wood: spades, hoes, poles, mallets; *stone or bone* or *metal* blades with wooden handles; *pottery,* basketry and wooden bowls, boxes, spoons, rope and twine.
- Artistry and artifacts relating to traditions and ritual, in wood, fabric, *stone*, *bone*, *clay* and *metal;* carvings, images, painting on wood, *stone*, and fabric.

(And we might add Environmental evidence relating to the natural and human landscapes, essentially of *soils*, *microscopic* and macroscopic plant and animal remains).

Words in *italics* denote those elements likely to survive on a dryland site.

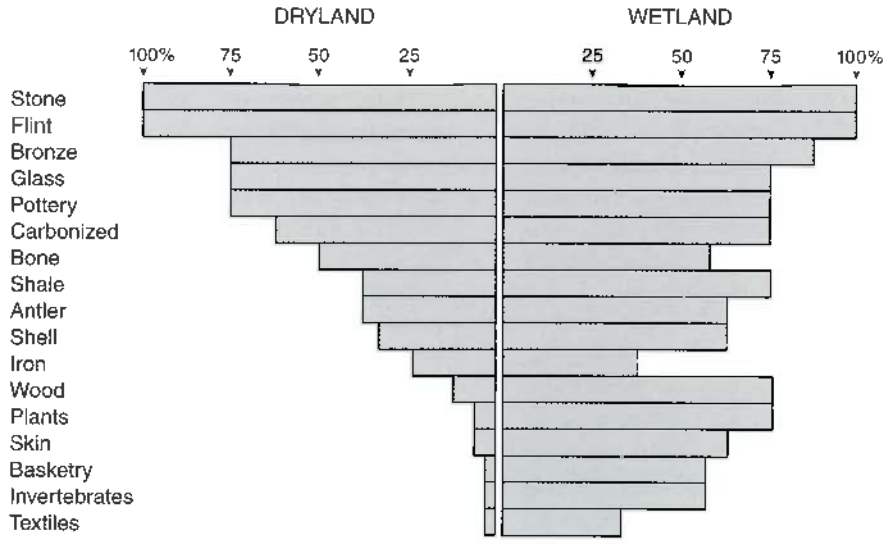
These pieces of material culture, representative of the demands for survival, prosperity and comfort are likely to be present on settlements wherever situated, on hills, in valleys, on lake edges, on open plains or in woodlands. People's needs were and are constant, the necessities of life and for life are uniform at basic levels. Of course there are variations, depending on tradition, location, social, economic and political factors. The idea that a wetland existence was somehow fundamentally different from a dryland life is quite widespread and is one of the reasons why wetlands are often deemed to be so divorced from the realities of a more 'normal' life in the drylands; there is no such thing as a 'normal' dryland life in any event. That many societies moved easily and logically between the extremes of wet and dry is generally conveniently forgotten. Archaeologists in reality have no

internal conflict with the aims of our discipline, to better understand the workings of the past, and should find no problem in utilising the evidence from one environment or another. The methodologies may differ, but the aims are similar. The same holds true for the management of the resource, both in the hope of long-term success and in the varying methods of accomplishment.

To comprehend the processes of degradation of the archaeological record is as important as the recognition of the likelihood that particular evidence once existed in the landscape. The abandonment of material, whether static or portable, because it was unsuitable, irrelevant, damaged or contaminated at once initiates the processes of decay. On a dryland, most of the organic elements degrade in a short time and are reduced to stains, smudges and smears, or are disintegrated beyond recognition; bone and antler alone have preservative powers that dispute the rapid reduction of organics, and textiles have little resistance. If, however, the settlement was within the compass of a wetland, or was overwhelmed by water, the rates of decay are substantially reduced, sometimes in effect to almost nothing; some of the ancient drowned villages of the Alpine lakeshores were preserved to a degree unmatched anywhere else in the world, except, as we now can see, in Japan, and in both east and west North America, where the conditions for preservation were benevolent. Not all wetlands are as sympathetic to survival of the cultural evidence, and preservation of some materials is very uneven; bone does not survive well in acidic peats, for example. The diagram below sets out a general scheme of survival and is based on a representative sample of prehistoric settlements from a variety of drylands and wetlands. Overall, there can be no dispute that wetland environments in general have the ability to preserve far more of the record of the past than do environments that have been subjected to the processes of degrading decay, by desiccation and by erosion.

The Ramsar convention identifies 29 wetland types, in three groups: marine and coastal, inland wetlands, and 'man-made' wetlands. Some of these represent environments where humans have made their impact, by altering the land and introducing exotic materials, and by creating new parameters and intensities within the wetland. Today the remaining traces of these ancient and historic occupations and activities lie in conditions that are extremely variable and often vulnerable. The agencies and conventions that attempt to protect wetlands are many and varied, but all are directed towards the suitable application of constraints upon the land, to prevent and mitigate and repair damage done to the wetland character of nominated landscapes. The variety of legislation that attempts to control and prevent deleterious activities is extensive and even a cursory glance will reveal the wide range of intensity, from mere recommendation and hope of special treatment to the full application of the law in protection and prosecution. The objectives of the European Archaeological Council are naturally enough more widespread and less legalistic, but among the commonality of goals and collaborative themes is the promotion, management, protection, interpretation, publication and presentation of the cultural heritage. In the application of these aims to wetlands and to wetland archaeology, it would seem that we have some way to go.

If the newly-established objectives of the Council meet with general approval, we might think that some of them, or all of them, will already be enshrined in existing schemes and operations. This book sets out an account



A comparison of the preservation of materials on European dryland and wetland sites, to show the increase in the variety of materials under waterlogged conditions. Individual dryland and wetland sites will vary from the norms, so that bone, for example, may survive on about half of the wetland sites (absent from acidic peats, present in muds and silts), and wood may be present as traces on a few dryland sites, but often survives in wetlands. Based on a wide range of European settlement sites (J. Coles).

of what has been done in many countries, and identifies some of the difficulties and some of the accomplishments. The reports have a number of common themes, and it must be said that the problems outweigh the achievements.

European problems

One of the main difficulties in trying to assess the state of wetland protection as it relates to the cultural heritage is that we do not yet have the full picture of the current position. This book of reports has a quite admirable coverage of about 15 countries, with brief outlines of work done, problems encountered and recent successes in protection. But a number of important areas are not included here, and several of the gaps are not due to any failure on the part of the editorial team's efforts to identify and recruit suitable authorities. It may be invidious to single out any particular countries and to lament their absence from this European survey, but it has clearly been difficult to obtain information about current work on the cultural heritage of wetlands in a number of regions. For example, an overview of the position in Sweden is not possible at the moment, nor do we yet have a full picture from Spain and Portugal, and here the matter is particularly apposite. The Doñana wetland is one of the largest areas of an uninterrupted wet landscape in all of Europe; seriously polluted in 1998 and now undergoing massive restorative measures, its cultural heritage has yet to be revealed in full. The same might be said of various Lagunas that Ramsar has identified; SEHUMED (Sede para el Estudio de los Humedales Mediterraneos) is one of the Ramsar-related centres for wetland research and protection that operates in Spain. A recent initiative with the Valencian museum authorities has collated the cultural evidence from the region's wetlands. Nonetheless, an overview of the relationship of the natural and cultural heritage in all of Spain, and Portugal, would be very welcome.

Another gap in the reports concerns the Baltic States of Estonia, Latvia and Lithuania; it will be interesting to learn in due time about the cultural heritage in and around the Matsalu-Kasari estuary, the Chernaya marshes, Engures Ezers and the Nemunas delta. Very important well-preserved settlement sites and other finds are known from the States, such as the Araisi island fortress.

Of course it is not always possible to obtain the full picture of heritage aspects of wetlands, in almost any country, because of the fragmented nature of the records, the multiplicity of agencies involved, and the general absorption of the wetland records *per se* within the general mass of cultural documentation. This is perhaps worth serious consideration by all European authorities who have a concern and responsibility for archival maintenance. Many members of the Council work in regions where wetlands have been under-estimated and overlooked in priorities for the protection of the heritage. Every report now published here identifies one or more of the major problems that we face today. They appear to demonstrate 10 themes that have created and perpetuated problems for the heritage:

1. An occasional *unfamiliarity* with the concept that wetlands might have a cultural element, or a view that the evidence that sometimes appears by accident is of low value, unimportant and disposable without much concern. Examples: Greece, Russia.

2. A lack of *political control* over wetland operations, an absence of a management policy concerned with the cultural heritage, or a lack of urgency in implementing any controlling mechanism that might exist. Examples: Poland, Finland, Spain, Italy, Sweden.

3. Related to the above are conditions where long-standing *permissions* to quarry or drain or pollute cannot now be withdrawn by existing legislation, so that water tables and organic deposits continue to deteriorate and ploughing dips ever deeper into the land. Examples: England, Ireland, the Netherlands.

4. A lack of adequate, standardised *surveys* of wetlands and their identifiable, and potential, cultural content, so that records can be assessed and implications gauged. This lack of objective and statistically-valid information is a major concern for heritage managers in many regions. Examples: Norway, Greece, Russia and others.

5. *Drainage* of particular wetlands is often done for local pressures, for the discouragement of malaria-bearing insects, for example, or for the prevention of localised flooding, or for local pond creation; rarely is the potential for discoveries, or mitigation of damage, recognised and applied. Examples: Greece, many countries. More widespread drainage for agricultural policies, already mentioned in 3 above, has had devastating effects on wetlands.

6. Many wetland areas of very high potential for the cultural heritage are now under the pressure of *'development'*, for motorways, industry, harbours, mining and the like, and even where surveys have been completed and sites of the highest importance have been identified, the pace of infrastructural work demands the loss, by last-resort excavation, of sites. Examples: Switzerland, Poland, Ireland.

7. The *pollution* of wetlands is a widespread problem, without boundaries and exerting the most destructive pressures on fragile buried remains. Environments rarely regain their integrity without the greatest expense and effort, and the contained cultural material is forever distorted and decayed. Pollution can take many forms, and widespread acid rain is often only

the most publicly-acknowledged form of destructive elements. Deteriorating water quality, flowing in and around wetlands with important cultural material, can be devastating to all fragile and some robust materials. Examples: widespread.

8. The character of a wetland can sometimes be maintained only by the presence of humans who control its plant and animal life, by retaining open meadows for example. The European trend towards the *depopulation* of rural areas has led in places to the abandonment of wetland, leading to the rapid invasion of woodland. The effects on buried cultural material have been shown to be serious. Example: Finland.

9a. Seemingly perverse but nonetheless serious, the *flooding* of valleys through various hydroelectric and water conservation schemes has damaged a number of discrete wetlands and their contained evidence for ancient human activity.

9b. In contrast, *erosion* by natural forces and by human alterations to natural regimes has caused much damage to known observable archaeological sites and important catchments. Examples: Russia, Poland, United Kingdom, Denmark.

9c. Relevant here is the problem of *re-wetting* of wetlands that have already begun to suffer the effects of desiccation. The results of work done to date do not suggest this as a uniformly successful procedure, and further experimental work is needed urgently. One problem of such experiments and such procedures is that a long-term view must be taken, yet time, always, presses upon those determined to halt the decline of wetland character.

In summary, the table below sets out an entirely personal opinion on the severity that various human and natural actions have had on the cultural heritage. Examples will be found in the reports in this book and doubtless there will be other opinions. Few countries will be suffering all of the effects of all of the listed activities, but every country will have experience of some.

10a. On a more strictly archaeological note, wetlands and their contained cultural material are subject to damage through uncontrolled *touristic* activities, trampling and illicit digging for example, but it behoves archaeologists to recognise the attraction of the material culture from wetlands, and thus to present their findings to both the academic world and the general public.

10b. *Presentations* that exploit to the full the great potential for display and education are rather few in Europe, with some very notable exceptions in the Alpine region, Poland and one or two other places. Because of their fragility both as exhibits themselves and their wetland bases, some of the presentations degrade rather rapidly, and end up looking bedraggled and neglected. Reconstructed trackways are potentially the worst, in rapid loss of attraction.

10c. And full *reports* on major excavations are sometimes

	Peatland, bogland	Marshland, fen, swamp, lake edge, river valley	Estuaries, coastlands
Drainage e.g. for agriculture	✦✦	✦✦	✧
Abstraction for water	✧	✦✦	✧
Extraction, quarry, mine	✦✦✦	✦	✦
Conversion for agriculture	✧	✦✦	✧
Overbuild, development, roads, industry	✦✦	✦✦✦	✦✦
Infill, dumping, disposal	✦	✦✦	✧
Pollution, aerial, aquatic, sedimentary	✦✦	✦✦	✦✦
Water control, dam, dredge	✧	✦	✦✦
Erosion, wind, water	✦✦	✦✦	✦✦
Drought	✦	✦✦	✦
Sea-level change	✧	✧	✦✦
Flood	✧	✦	✦

✦✦ *severe, occasionally very severe* ✦✦✦
✦ *less severe, occasionally severe*
✧ *little effect, occasionally severe*

The severity of damage to the cultural heritage in some wetland environments.

left uncompleted by archaeologists who have been overwhelmed by the quantity and variety of the evidence, and underwhelmed by their responsibility to publish it. Examples: too numerous to mention.

Responses

Some of these major problems have been addressed by archaeologists who have special responsibilities for management and it may be useful to pick out a few of the manoeuvres taken in the past decade, and to then assess if they provide an adequate response to the problems.

1. Few countries have been able to initiate and carry through large-scale *surveys* of wetlands for their cultural content. Where this has been possible, the results have been exceptionally rewarding. The quantity of sites identified has exceeded expectations, the character of the wetland itself has been detailed not only at its current state but back through time, and clear indications of conservation urgencies, and indications about the best methods of approach, have been revealed. Examples: English lowland wetlands, German Federsee. In addition, the result of long-term surveys, using standardised field techniques, aerial photographic survey, palaeo-environmental work and adequate documentary research, has been to cast some uncertainty over the partial, opportunistic recoveries that are sometimes claimed to represent the range and quality of the cultural heritage. It is not possible to deduce the character and full range of human responses in the wetlands of, for example, north-west Poland on the basis of the one well-studied site of Biskupin.

2. Surveys, both terrestrial and aerial, allow detailed *mapping* of present and former wetland extents, and this has proved to be an important tool for the planning and management processes. Mapping on a national or regional scale can provide benefits to many agencies, so long as the concept of 'site' as the focal point does not lead to neglect of the less-evident but significant areas both around a site and well away from the focus. Nonetheless, the mapping of potential archaeological areas of importance on the basis of full survey is an important tool. Example: the Netherlands. At a more basic level, but in greater scale, a number of countries have undertaken a full survey and mapping programme of natural wetlands, without assessment of the cultural component. The Swedish wetland survey is one example of a strategy to record, evaluate, manage and protect a wide range of wetlands, but so far as I am aware there has been no concerted effort to involve cultural heritage matters. The sheer scale of the wetlands involved, over 25,000 in number, identified mostly by aerial survey, militates against an ability to carry out field survey and assessment for archaeological sites.

3. It is quite obvious, and sometimes painfully so, that to attempt to control a wetland and maintain its unique character and quality can most easily be achieved when the land itself comes into the *legal ownership* of dedicated parties. Quite clearly this involves a wide intake of land rather than individual sites, and it is not often the case that the ideal area both in size and character will be available for acquisition. The method adopted in a few notable cases is to purchase as and when possible any relevant or adjacent land, gradually building up the holding, adding to the jigsaw, and exchanging less-important pieces for more-significant pieces. This is a long-term investment strategy, and time may operate against best practice for the maintenance of appropriate water quantity and quality, but the results of even imperfect schemes have been important in helping preserve the cultural heritage. Examples: Danish Åmose, German Federsee.

4. Protection by *legislation* is a tool used in many countries to prevent physical damage to known nationally important sites, and sometimes areas around sites. Where monitored and updated, and augmented by new surveys, the listing can serve as a warning to those who might exploit, and as a comfort to those who have general or specific concern for the heritage. But, as all will know, the legal protection of a wetland can have little real effect on the maintenance of its character and integrity, if steps are not taken to monitor and maintain its environmental status and purity. Most European countries operate some form of national or regional legislation that identifies important monuments and areas. These can sometimes prevent damage, of course, but almost always such prevention will refer only to the actual physical effect of whatever development is involved. The effects of work to be done may well be felt in areas adjacent to the proposed site especially in fragile wetland environments.

One of Europe's most important wetland regions is in Lower Saxony where bogland discoveries have been abundant and rewarding, although preservation controls have been very difficult to apply successfully. In the area of the coastal and inland terps (Wurten), matters are different, and the cultural resource is truly immense. Although not evaluated in the reports here, the terps provide a good example of the Responses noted above. All of the terps are protected by legislation; surveys and mapping have been completed, but in view of the number of monuments (about 3,500) it has not been possible to assess the condition of each terp. Nonetheless, where pressures for over-building on the mounds have been exerted, coring has been carried out and has generally shown that the quality of the cultural heritage has been such that permissions to over-build have not been granted. In this way, the cultural heritage of the region has been in effect sealed against development. The agencies involved in the work are both regional and local, and are aided by

the research carried out by the Niedersächsisches Institut für Historische Küstenforschung. The centralised system, for research and for protection, is augmented by a network of marshland archaeologists who continue to monitor the sites against illegal, ill-informed or accidental damage, as well as maintaining surveillance of the wetland conditions of the area. It is well worth comparing this example of rather tight archaeological control with the equally successful but more widely-spread authoritarian regime for the Federsee, as reported in this book. Both are stories of success.

5. *Physical protection* of sites in wetlands and of wetland areas is of crucial importance. There are relatively few wet sites *per se* that can be adequately preserved without engagement with lands adjacent, which provide the barriers and buffers against biological and chemical assault and against the effects of desiccation. Those sites that must remain as isolates, closely defended, within a damaged and irretrievable landscape, are rather sorry examples of the art and science of site preservation, disfigured by the lined trenches, bunds and other barriers that try to protect them from the outside world. As a last resort, however, such action must sometimes be limited to these narrow horizons. Far better visually and physically to contain the cultural heritage as an integrated body - site and surrounds - within a single system of protection. There seems to be no consensus of opinion about the size of wetland needed to restrain the effects of outside pollution, drainage, vegetation inflow, and the like. As a rule of thumb, the larger the better, but only if the resources to manage can cope. There have been a number of successes in the physical protection of sites and important areas of wetland, by geotextile barriers, blocking of drains, bunding, pumping, flooding and in restricted cases re-burying or maintaining unexamined a well-sealed site or part of a site. Monitoring in all cases is essential (see below). Examples: Corlea, Ireland; Biskupin, Poland; various Alpine lake settlements; Åmose, Denmark.

Archaeologists do not always have the vision or the experience to comprehend the many factors that affect wetlands. A lack of technological expertise is understandable, given the few opportunities for experiment and assessment that have so far arisen. A lack of vision, of the various factors for and against preservation, and of the responsibilities both local and national, can only be overcome by knowledge, experience and response - what are the interests at stake, how flexible are they, what are the long-term effects of proposed action, who is to evaluate progress and stability, and who are the likely beneficiaries and supporters of the demands and courses of action? I expect all heritage managers have had their successes, and failures, along the way, and sometimes it is difficult to judge if it is success or failure that will stare you in the face at the final assessment. Examples of both pessimism and guarded optimism: Sweet Track, Flag Fen, Sutton Common, Seahenge, all in England and noted elsewhere in this book. Examples of ambitious projects where the decision has been taken to re-wet a large but drying landscape are not so common, and the flooding of former wetlands has sometimes achieved good results, in the Federsee for example, but always with the essential condition of good quality water and constant evaluation. There is no consensus of opinion on the likely effects of re-wetting an archaeological site directly, where the organic components have partially dried-out; some claim success, others demonstrate failure.

6. One of the solid achievements of wetland archaeology has been made by those who have built upon the results of exposure of cultural materials. However initiated, whether by research programme or rescue-driven, whether partial or entire, sites and their surrounds have been *presented* to the public in extensive, expensive and targeted ways. Dramatic and refreshing, innovative and educational, these projects have done much to show the public the rich potential of wetlands for the cultural heritage, the need to conserve and the value of wetlands in the widest sense, as part of a nation's experience. Examples: Biskupin, Poland; Chalain-Clairvaux complex, France; Lake Neuchâtel sites, Switzerland; Fiavé, Italy; Flag Fen, England. One ever-present danger in all of these is the tendency for wetland displays of whatever kind to grow tired, eroded at the edges, wrinkled at the public face (a bit like wetland archaeologists), and this can be depressing for those who come to view and those who stay to struggle against deterioration and the need to keep abreast with both innovative and mature presentational techniques.

7. In the various reports presented here there is much reference made to evidence recovered from *excavations* and from *field surveys*. Large-scale excavations of many settlement sites, smaller-scale work on a variety of wetland structures, including trackways, platforms, landing stages, boats, bog bodies, ritual deposits, bridges etc, have been the catalysts for increased funding and other support for wetland work of all kinds. Without the quite astonishing display of results from the Alpine lakeside settlement investigations, late prehistoric fortresses in Poland, immense roadways in Danish and Irish bogs, crannogs and lake settlements in various countries, sensational ritual deposits here and there, boats and waterside structures, and of course the phenomenon of bog burials in a number of countries, we, and the whole archaeological world, and the viewing public, might not feel so committed to wetlands. These are but a part of the cultural heritage of European wetlands, and are immensely augmented by a multitude of smaller finds and observations that combine to create a truly inspiring picture of the past, through long-time,

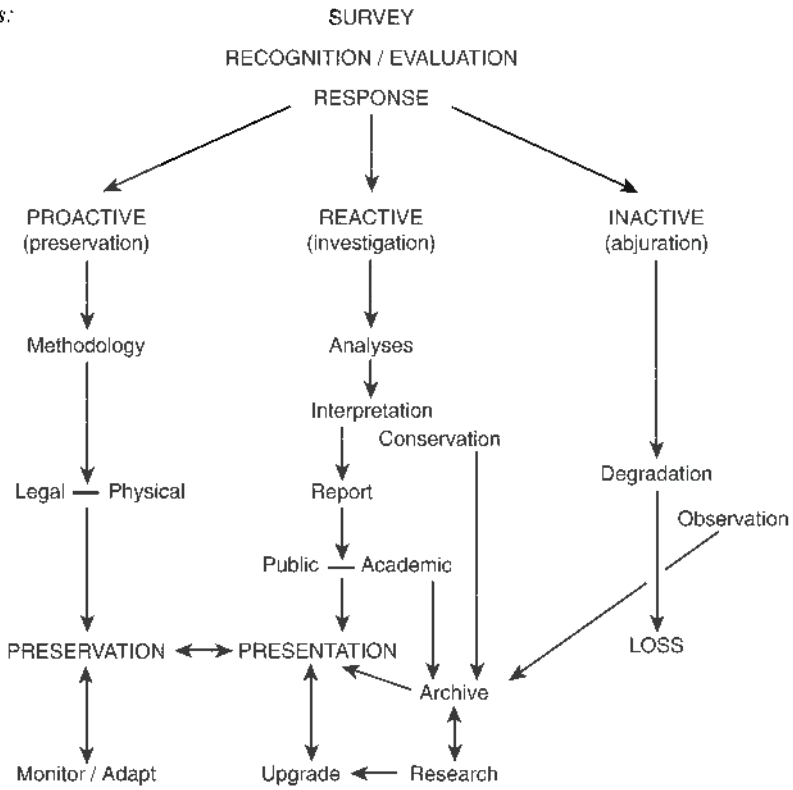
when culture and environment were as one and when respect for nature was as observed as it was demanding.

8. A final achievement to note is particularly appropriate in this volume, and has received comment from many of the authors. At its simplest, we can all see that archaeology, the recovery and interpretation of the evidence of past lives, has an all-important base in the *environment*, both that of the present day and that of the past - the present day for the survival of the evidence and the past for the context of cultural material. Most archaeologists of wetlands collaborate wherever possible with those who protect and study the environment, and I have little doubt that the former learn more from the latter than the reverse; rather often the environmentalist will look with amused tolerance upon the archaeologist beaming over some small sherd of the human past. So there has developed over time an acceptance of the value of combined studies and common approaches to wetlands both natural and altered by human activities.

Where some tension can develop is not with the palaeoenvironmentalist, whatever may be his or her specialisation, but with those whose primary interest lies in the re-creation of wetlands, for the purposes of wildlife alone. Many wetlands once fertile and attractive to varieties of plants and animals are now reduced by drainage, containment and other pressures to pale shadows of their former selves. Their contained cultural material is equally reduced yet still may survive as degraded evidence, unseen. To re-create a wetland, that may or may not represent what was once there but that will at the least attract back some of the varieties of wetland life, involves too often a degree of physical alteration of the land that archaeologists fear and deplore. 'We have now purchased the XX wetland, and our machines are at work to re-shape the reserve'; this is a comment seen and heard by me too often, and once is too often. A wetland can indeed be created, but the cultural heritage cannot be brought back to life; once degraded, its value is diminished and no amount of re-shaping the landscape will help; destruction will be promoted. Contact and debate between all interested parties is essential, always accepted by archaeologists, sometimes neglected by environmental interests through ignorance, pressure for action or through the fear that the cultural heritage will come to dominate decisions. Some of us may think it should but at the very least it should achieve recognition as a factor in the promotion of wetlands. Too much is being lost from one part of the equation, not from wilfulness but from ignorance of the potential. Examples: The Doñana wetland of Spain, and perhaps the Skhoinias marshes of Greece. Both are currently at risk, from emergency restoration measures on the one hand and from potential re-shaping development on the other.

But there are many smaller less politicised difficulties that arise from time to time. The harmonious association of archaeology and conservation in some wetlands must encourage all who must face up to the pressures of sustainability in social, economic, cultural and political terms on our fragile wetlands. Example: the Federsee,

Approaches to wetlands: Proactive, Reactive and Inactive.



Germany. If we as managers of the cultural heritage seek long-term survivals of the landscapes and the evidence of ancient lives that once occupied them, it is imperative that we associate our aims and our work with those who have had longer experience and who possess greater influence for environmental protection.

Recommendations

It may seem that the commentary above concerning Responses is sufficient to show that there are a number of ways by which heritage managers can react to the Problems of wetlands at the present time. Nonetheless it will I hope be useful to arrange and prioritise the general approaches and strategies that we must take if we are to ensure the survival of the wetland heritage beyond the present decade. There are four main fields of debate.

1. Knowledge

There is a serious lack of information about a number of potentially important wetlands, about their character, time-frame, fragility and contribution to national and local identities. The most urgent need presented by the reports is that of survey, a physical, aerial and desk-based compilation of the cultural heritage that exists in wetlands. Allied to a mapping programme, this would place managers in a strong position to identify the character, significance and robustness of the evidence, and to evaluate the priorities for passive or active management alongside environmental agencies. The recommendation must be that wetlands of acknowledged or potential importance for the cultural heritage are somehow signalled in the records so that particular attention can be paid when threats arise both on and near the wet deposits. Managers in possession of full survey records would be able to respond to external pressures and to take appropriate action. The flow-diagram is an attempt to indicate possible lines of approach to wetlands once surveys have been adequately completed.

Heritage managers will be faced by wetlands in whole or in part, intact or damaged, threatened in total or in segments, characterised or of unknown quality, with a cultural content on surface or beneath surface and mostly of unclear context and variety. The time needed for survey and evaluation may be short but much can be achieved under pressure if adequate preparations have been made. The response to survey results and recognition of the potential that is housed in and adjacent to wetlands will have to be dramatic whatever the choice. *Proactive* response needs both legal and physical measures to be put in place, the former hopefully well enshrined already in national or regional statutes, the latter devised case-by-case but with the aid of environmental specialists and the experience of other heritage managers. The physical methodology to be imposed need not be a sophisticated event, there are plenty of examples both good and bad, and the key to success lies in the monitoring regime to be imposed and in the flexibility of action to be taken as and when the need arises. *Reactive* investigation comes into play when preservation is not possible or desired. The standard course of action follows, excavation, analyses, interpretation and report. There is always an element of conservation involved, collaboration with an archival facility, and opportunity to engage with both public and academic interests. The third course open to decision is an *Inactive* abjuration of responsibility, abandonment of the problem in effect, and the rapid or gradual loss of the resource, and all its potential.

2. Understanding

In order that heritage managers can reach positions where wetlands can be defended against the pressures of economic development, political ideologies and misconceptions, public inertia and the like, the knowledge gained by survey and response must be transformed into understanding. The intimate details of wetland lives in the past are not easily acquired, those of the present are under severe pressures for change, and those of the future can barely be imagined. But all have been, are or will be profoundly influenced and directed by environment and environmental change, and it is likely that the work of broadly-disciplined catholic agencies concerned with wetland conservation will be able to add to the evidence of the wetland heritage. Historical studies can provide much-needed detail of life and social reasons for change. Environmental agencies can provide detail about the nature of landscapes and the changes that affect the productivity and hospitality of particular conditions. All of these can inform heritage managers and will aid the emergence of academic and public opinions and priorities for wetlands. They may also allow a closer identification of the potential of individual wetlands for special attention.

Countries with little or no tradition of wetland work, or which lack an understanding of the concept of wet lands, should initiate a curve of learning that will have to be steep, and involve a battery of inter-disciplinary studies. Only in this way will the opportunities for the dissemination of knowledge and understanding be made possible.

3. Communication

In all areas of Europe there is a need for presentation of values, potential and achievements in wetlands. At basic level, publication of results of investigations for academic and public consumption will be self-evident as a fundamental requirement. The presentation of results, whether that be of survey of intact wetlands or of exploration of threatened or damaged wetlands, is ideally suited for re-creations, physical displays, guided walks, and media events. These will help develop the possibilities for education and here the potential recipients are many and varied: a) the general public by which I mean the educated and responsive tourist, the local adult population, and school children studying, or encouraged to study, subjects such as biology, history and related subjects; b)

a special category, legislators, demands equal care, often a more simplified instant educational presentation that is designed for specific purposes; c) certain presentational aspects might be tailored to inform archaeologists of dryland traditions (always an interesting exercise), and it would be useful in all cases to make clear the complementary aims of archaeology and wetland conservation. As a final comment, the opportunities for education at all levels are very great and demand specialist advice and application.

4. Preservation

Much of what has been written in the national reports, and in this summary, is directly concerned with the preservation and management of the cultural heritage. Some of the specific problems and responses have been noted already, but their ordering, in terms of strength and application, is probably worth comment here. The proactive and reactive responses to opportunities presented by wetland survey and threatened wetlands, and their associated information-gathering and augmented understanding, have been charted. From these can come the wise application of legislation, the paper-thin protective shields, the reserved areas under special notification and the particular problems of assertion, of application and acceptance of the rule of law. There are many such policies and their imposition by both central agencies and local authorities, and the monitoring of their effects, are always likely to be imperfect and rather indistinct at the edges. It is a perfect analogy with wetlands, deeply and clearly distinct at the centre but fading into something less obvious at the margins. It may well be that the control and application of legal requirements are best dealt with by local agencies better able to identify and respond to unforeseen events or a diminution of constraints.

There remain the physical measures that can be devised and applied to important areas within wetlands, or to encompass entire wetlands of relatively small extent. The parameters and tolerances of such work are of crucial importance, of course, and heritage managers should be made aware of the rather limited success of current projects as well as the numerous problems that can arise both during construction and as components wear thin or incur catastrophic failure. Perhaps in due time a manual of best practice might be produced by the Council. Sites in wetlands, and wetlands themselves, are by definition associated with water, and its quality as well as its quantity need to be assured. One of the major problems that imperfect reservations face is the buffer zone, that area between the significant heritage location and the grossly unsuitable outer world. We still lack adequate information about drift, and flow, both in and out, in ground and in air. One of the principal ways to control at least some of these real difficulties is through land acquisition, both of the heritage zone and its buffering area.

Perhaps the most important lesson learned over the past 50 years or so, indeed in some cases the past 100 years, is that managers of the cultural heritage as we are now called (formerly known as dedicated antiquarians?) cannot hope to operate successful regimes without the involvement of agencies whose specialised knowledge of the wetland environments is uniquely appropriate. Whether this be generalised knowledge, both of legislation and in-ground practices, or localised information, appropriate to the time and place of heritage projects, archaeologists ignore at the peril of their cultural heritage the accumulated wisdom of decades of research and application.

Whether we deal with prehistoric, classical, industrial, urban or rural wetlands in Europe, each with its own opportunities and problems, we must surely agree that a partnership with agencies concerned with the natural heritage of wetlands is the only way forward. To do otherwise is to perpetuate the general neglect of wetlands as repositories of unique information about the past, to ignore the accumulated experience of decades, and to weaken the strength that comes from a combination of forces. This rather charming appeal comes not from Europe but is nonetheless appropriate:

> Let the rich variety of this wee globe live and thrive... Let our aged ... ecosystems preserve their waterlogged cedar chests of antiquities for another 10,000 years' (Jan Worsley, conservationist, Maine USA).

Acknowledgements

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Note

For the past 15 years, an informal exchange of views about wetlands and archaeology in wetlands has taken place through the agency of *NewsWARP*, the newsletter of the Wetland Archaeology Research Project at the University of Exeter, England. In 2001, a new avenue for information will be available in the new *Journal of Wetland Archaeology*, which will expand the possibilities for wide academic circulation of matters concerning the cultural heritage of wetlands.

Relevant publications

1. Defining wetlands, conservation and restoration

Parkyn, L., Stoneman, R. & Ingram, H. (eds) 1997: *Conserving Peatlands*. CAB, Wallingford. (definitions, legislation, surveys and monitoring)

Prince, H. 1997: *Wetlands of the American Midwest. A Historical Geography of Changing Attitudes*. University of Chicago, Chicago. (wastelands, values and conservation)

O'Riordan, T. (ed.) 1995: *Environmental Science for Environmental Management*. Longman, Harlow. (sea-levels, pollution, erosion)

Wheeler, B., Shaw, S., Fojt, W. & Robertson, R.A. (eds) 1995: *Restoration of Temperate Wetlands*. Wiley, Chichester. (processes of damage, restoration feasibility)

2. Wetland threats

Dugan, P. (ed.) 1993: *Wetlands in Danger*. Beazley World Conservation Atlas, London. (definitions, review of threats)

Foss, P. (ed.) 1991: *Irish Peatlands, the Critical Decade*. Irish Peatland Conservation Council, Dublin. (problems, European strategies)

Williams, M. (ed.) 1990: *Wetlands: a Threatened Landscape*. Blackwell, Oxford. (review of threats, protection)

3. Management of wetland archaeological sites and areas

Coles, B. 1995: *Wetland Management. A survey for English Heritage*. WARP Occasional Paper 9, Exeter. (threats, legislation, techniques, case studies)

Corfield, M., Hinton, T., Nixon, T. & Pollard, M. (eds) 1996: *Preserving Archaeological Remains in Situ*. Museum of London Archaeology Service, London. (monitoring, protection)

Cox, M., Straker, V. & Taylor, D. (eds) 1995: *Wetlands, Archaeology and Nature Conservation*. HMSO, London. (problems, management of United Kingdom wetlands)

Falconer, R. & Goodwin, P. (eds) 1994: *Wetland Management*. Institution of Civil Engineers, London. (definitions, pressures, water levels, restoration)

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Schlichtherle, H. & Strobel, M. (eds) 1999: *Archaeology and Protection of Nature in the Federsee Bog*. Landesdenkmalamt Baden-Württemberg, Stuttgart. (case study)

4. Wetland archaeology, sites and conservation.

Bernick, K. (ed.) 1998: *Hidden Dimensions. The cultural significance of wetland archaeology*. UBC Press, WARP Occasional Paper 11, Vancouver. (conservation, monitoring, organic preservation)

Coles, B., Coles, J. & Schou Jørgensen, M. (eds) 1999: *Bog Bodies, Sacred Sites and Wetland Archaeology*. WARP Occasional Paper 12, Exeter. (wetland surveys and sites)

Coles, J. 1984: *The Archaeology of Wetlands*. University Press, Edinburgh. (first principles),

Coles, J. 2001: Energetic activities of commoners. The Europa Lecture 2000. *Proc. Prehistoric Society* 66. (contribution of wetland archaeology to prehistory)

Coles, J. & B. 1996: *Enlarging the Past. The Contribution of Wetland Archaeology*. WARP Occasional Paper 10, Soc. Antiquaries Scotland Monograph 11, Edinburgh. (wetland archaeology values)

Cushing, F. 1897: Exploration of ancient key-dweller remains on the Gulf Coast of Florida. *Proc. American Philosophical Society* 35 (153). (pioneering antiquarian)

Dickens, C. 1842: *American Notes*. (a subjective highly-readable non-archaeological account of the discomforts of early America, written as a superior Englishman...)

Raftery, B. (ed.) 2001: *Recent Advances in Wetland Archaeology*. WARP Occasional Paper 14, Dublin.

22: *Europae Archaeologiae Consilium*

A STRATEGY FOR THE HERITAGE MANAGEMENT OF WETLANDS

Statement of intent

1. Wetlands of all sorts were valuable resources and retreats for human populations, and carry the continuous record of human activity throughout the ages; human activity of some sort should be assumed in any and all wetlands. The cultural heritage is one of the diverse reasons why wetlands require active protection, and the cultural heritage component of wetlands requires active (rather than passive) management.

2. **The EAC intends to make a positive contribution to the sustainable management of wetlands. We will work to ensure that the needs of the cultural heritage are properly considered in the management and wise use of wetlands, and that cultural heritage values are recognised alongside those of the natural heritage, by all organisations and agencies concerned with the protection and preservation of wetland environments.**

Background

3. Wetlands are a precious, bio-diverse environment with unique natural habitat and cultural heritage properties. In some European countries the loss of this environment has reached critical proportions. In the UK, for example, 90 per cent of blanket bogs and 94 per cent of raised bogs have already been lost to agriculture, forestry, landfill, and peat extraction for horticulture; it is thought unlikely that there are any raised bogs in England that have not been damaged by human activities and only *c.*3,845 hectares of raised bog survive in 'near natural' condition. Across Europe, raised bogs are considered so scarce that the European Union has declared it a priority habitat for international conservation [*Wise Use and Conservation of Wetlands*, Commission Communication to the Council and the European Parliament, 3 December 1999].

4. These increasingly destructive trends have resulted in the inevitable loss of a great deal of cultural heritage data. Nevertheless, a very large body of information about the archaeology and ancient environment of wetland landscapes has been gathered all over Europe throughout the last century, often by protracted campaigns of survey and excavation led by archaeologists specialising in the wetland environment. It is only recently, however, that the archaeological discipline has begun to consider the extremely complex issue of the long-term protection and management of wetland sites and landscapes for their cultural heritage values.

5. Organisations concerned with nature conservation, on the other hand, have a much longer and wider experience of protecting and preserving the flora and fauna of wetlands, and have amassed considerable experience and expertise in the management of wetland landscapes. Cultural heritage managers must not only make use of this experience and apply it directly to archaeological sites when appropriate, but must also ensure that the interests of the cultural heritage are properly taken into account in schemes aimed at the preservation and protection of the natural heritage of wetlands.

6. It is sometimes perceived that the interests of the cultural heritage and archaeology are at odds with the interests of nature conservation. Nature conservation measures which are beneficial to the natural environment (such as managed coastal retreat) can inadvertently damage archaeological remains but these problems can be avoided (or mitigated) if cultural heritage and nature conservation organisations work closely together. Such co-operation is essential if we are to protect and manage wetlands to our mutual benefit.

7. Public support for wetland conservation is a precondition for the long term preservation of what remains of these ecosystems, and for securing the significant resources that are required to restore wetlands that have been destroyed or severely damaged. Cultural components of wetlands in general, and archaeological aspects in particular, are an important feature, which attracts the interest, and support of sectors of society not necessarily engaged with nature conservation values.

8. Two recent news items demonstrate the complexity of these issues as well as some of the tensions that result from trying to reconcile the different needs of society in relation to wetlands, and further emphasise the critical importance of working to integrate cultural heritage and nature conservation, not just with each other, but also with wider interests and concerns.

9. In England, a 1,500 hectare farm, part of the North Kent marshes on the Isle of Sheppey, has ceased agricultural activity entirely and the farmer now derives his income solely from government conservation subsidies to manage the land for wildlife. This move to 'grow' wildlife won praise from nature conservation organisations, but caused concern among other farmers, and was not reported positively in much of England's press. In Greece, classical history and archaeology societies have joined environmental protesters to condemn the threat posed by plans to develop part of the Skhoinias marshes as an Olympic rowing complex; managers of the scheme claim that the development is environmentally positive and would actually halt the degradation of the marsh.

10. Examples of good practice in wetland management illustrate the mutual benefits and opportunities for nature conservation and heritage management and how it can be integrated in a broader socio-economic context. At the Federsee (Baden-Württemberg), for example, a multi-disciplinary approach unites the work of the state agencies for nature and monument conservation, agriculture, forestry, land, and property administration, and is supported by the European Union (LIFE and LEADER programmes).

11. This very successful project shows just how much can be achieved to protect and conserve all aspects of this internationally important bog where intensive agricultural use and lowering of ground water levels threaten the unique flora and fauna just as much the archaeological monuments. Measures adopted since 1990 at the Federsee include the expansion of nature reserves and the creation of archaeological reserves (by land purchase), stabilising the water balance and restoring groundwater levels in dried out areas of the bog, and the adoption and maintenance of more suitable agricultural practices which are compatible with the needs of conservation.

12. Successful long-term conservation of this sort also requires considerable popular and political support. A central concept which underpins work at the Federsee, is to encourage (rather than discourage) visitors, and provide them with a controlled opportunity to learn about the whole conservation process at first hand, but without damaging the intrinsic value of the bog. The combination of archaeology with the natural environment, as a single integrated resource, has proved to be a powerful and increasingly popular attraction to visitors, and tourist-related income derived from this now makes an important contribution to the local economy.

13. The purpose of this volume is to help raise the profile and importance of cultural heritage issues in the management of wetlands, particularly (but not exclusively) with regard to the Convention on Wetlands (Ramsar, Iran, 1971). By illustrating successful examples of good practice, we hope to show just how much can be achieved by the close and co-operative working of cultural heritage, nature conservation, and other state agencies, and we also hope that these examples may provide useful models which can be used (or adapted) by colleagues in other regions and countries. This volume is focussed on the European context, but we hope that it will also be valuable in helping address the same issues in other parts of the world.

EAC Strategy

14. The EAC Strategy for the heritage management of wetlands is based on four main principles:

14.1 promoting cultural heritage interests of wetlands in the work of international and intergovernmental agencies;

14.2 promoting practical mechanisms to conserve and protect the cultural heritage by developing guidance and best practice for the integration of cultural heritage and nature conservation in wetland management;

14.3 promoting applied research to underpin and inform the management of wetlands;

14.4 promoting and disseminating understanding of the cultural heritage of wetlands through continued programmes of survey and excavation as an essential precondition for the development of successful management policies.

International networks
(Ramsar Convention, UNESCO, World Bank)

15. The EAC will develop closer contacts with relevant international and inter-governmental agencies, including the Ramsar Convention, the Convention on natural and cultural heritage, UNESCO, the World Bank, and the Regional Activity Centres for Specially Protected Areas (RAC/SPA).

16. The EAC will encourage other cultural heritage bodies to establish a close working relationship with the Ramsar Bureau and organisations working in the natural environment.

17. Wetlands are a very significant (and in some places still rapidly diminishing) international resource. It is extremely important to ensure that the long-term promotion and implementation of important conservation measures in one country (such as more effective peat extraction controls) does not have a negative impact by inadvertently adding to the commercial pressure in countries where the economic situation is less favourable, and where controls may not be so advanced or effective.

18. The EAC will work to co-ordinate national initiatives by its members to promote a more holistic international context to their work.

The Ramsar Convention

19. The Ramsar Convention now groups 123 countries. It promotes the conservation and wise use of wetlands, and requires participating governments to adopt policies reviewing existing national protective legislation, organisations, and systems of wetland management, and the development of wetland monitoring programmes, research, and public awareness. Ramsar's system of designation by its Contracting Parties of Wetlands of International Importance for the Ramsar List should be particularly valuable to cultural heritage and archaeological interests in countries where wetland archaeological values are underfunded, or generally lack support. Ramsar designation could prove to be a useful tool for advancing cultural heritage interests in countries which for a variety of reasons make little or no investment in their wetland archaeological resource.

20. The EAC will work to foster partnerships between nature conservation and cultural heritage organisations and groups.

21. One of the problems consistently experienced by the Ramsar Bureau in working with countries at the national level is the lack of lateral communication between different government ministries and departments. Intra-national horizontal connections are encouraged through decisions taken at the regular meeting of the Conference of Parties to the Ramsar Convention (COP), especially in relation to establishing National Ramsar (or Wetlands) Committees.

22. The EAC will help to ensure that relevant Ramsar Contracting Parties (or rather the part of the government that acts as the Administrative Authority for the Ramsar Contracting Parties) are fully aware of cultural heritage issues in their country. As a first step, we will distribute this volume to each Administrative Authority for the Ramsar Contracting Parties in Europe.

Memorandum of Co-operation between the EAC and the Ramsar Convention

23. The EAC will explore with the Ramsar Bureau the possibility of a Memorandum of Co-operation between the two bodies concerning wetlands and cultural heritage issues.

24. The Ramsar Bureau has indicated its interest in developing this. A draft Memorandum of Co-operation will be placed before the EAC for consideration at the next full meeting of the Consilium in March 2002, so that it may be presented to the next Conference of Parties to the Ramsar Conventions (COP8) in November 2002.

Eighth Meeting of the Conference of the Parties to the Ramsar Convention

25. The most appropriate mechanism for gaining recognition of the importance of cultural/heritage issues in the management of wetlands is through decisions (resolutions) adopted by each meeting of the Conference of the Parties to the Convention (COP). The next Ramsar COP will take place on 18–26 November 2002 in Valencia, Spain, and will include a technical session which will focus further attention on cultural issues.

26. The EAC will seek to play an active role in this technical session, and will work with the Ramsar Bureau to draft a resolution on cultural issues to place before COP8 through the Ramsar Standing Committee or a Contracting Party supportive of this initiative.

27. We will press for:

27.1 links between Ramsar and national governments to include the part of government responsible for archaeology;
27.2 inclusion of cultural heritage issues in reviews of existing national protective legislation, organisations, and systems of wetland management, and the development of national wetland monitoring and other research programmes;
27.3 formal mechanisms such as a specialised working group of Ramsar's Scientific and Technical Review Panel (STRP) to examine and report on the cultural heritage aspects of wetlands and their contribution to the sustainable use of wetland resources.

UNESCO World Heritage Convention

28. Ramsar has a Memorandum of Co-operation with the World Heritage Convention, and both Conventions are now turning to its practical implementation. One aspect of this that is now being explored is an evaluation of the management of sites that that have been listed both as Ramsar and World Heritage sites (some are wholly natural heritage sites, but others are both cultural and natural heritage).

29. The EAC will work with the Ramsar Bureau to explore how the management of cultural heritage sites is dealt with through the WHC in relation to natural environment issues.

The World Bank

30. The World Bank recognises the importance of the cultural heritage to communities, and that the conservation of important cultural heritage is a part of the sustainable development process. The Environmental Assessment Sourcebook Update of The World Bank (September 1994) sets out clear procedures for integrating the cultural heritage in environmental assessment to ensure that development projects supported by the World Bank do not result in unacceptable damage to the cultural heritage. These procedures include a range of inputs directly related to the cultural heritage which must be included in all assessment planning (and subsequent mitigation). It is essential that in addition to the direct handling of cultural heritage issues, the World Bank is also fully aware of the hidden cultural heritage potential of wetlands, and of appropriate ways to avoid, minimise, and mitigate damage to the heritage component of this natural resource.

31. The EAC will seek to enter into a dialogue with the Environment Department of the World Bank to highlight the particular problems of wetlands, and the inadvertent impact on the wetland heritage of development works which may include drainage or other changes to groundwater levels.

32. The EAC will seek to contribute to training in heritage conservation and management for projects with wetland and heritage issues, and will explore with the World Bank ways of assessing and monitoring relevant management plans.

Conservation and management

33. Legislation at the national or state level protects cultural heritage sites, either directly, in the case of specific sites, or more generally through land management, planning, or zoning measures which may provide other forms of protection and mitigation. Entirely different legislation also protects and conserves natural areas in which cultural heritage sites may coincidentally be located.

34. It is important to recognise, however, that natural heritage designations may not in practice always offer cast iron protection. Although they may be supportive of other measures, such designations do not, by themselves, guarantee the intact survival of designated wetlands, but must be supplemented by realistic management schemes. It is in the implementation of such management schemes that it is essential to integrate cultural heritage values and concerns with nature conservation and management practices.

35. In recent years, there has been considerable debate in meetings of the Ramsar Convention (and those of its subsidiary bodies) about how best to address cultural aspects of wetlands within the framework of the Convention. The Ramsar Convention is now working to promote better awareness of cultural and historical issues in wetland management.

36. The EAC and its constituent members will work closely with the Ramsar Bureau (the Convention's secretariat) and other partners to ensure that cultural heritage issues are fully incorporated into guidelines for wetland management through whatever means may be most practical and appropriate.

37. The International Peat Society and International Mires Conservation Group have recently collaborated to produce a draft Global Action Plan for Peatlands and are currently developing substantive 'Wise use guidelines for peatlands'.

38. The EAC will work with the Ramsar Bureau to incorporate cultural heritage management issues in both these important documents.

Research initiatives

39. An understanding of cultural aspects of wetlands is an essential element in the sustainable management of wetland resources, but there is apparently little recognition by decision-makers and wetland managers of the importance of cultural issues in sustainable wetland management. There is a pressing need to establish consistent information on the extent to which cultural heritage issues have been taken into account in wetland conservation programmes throughout Europe, and then to develop practical means to encourage further integration where appropriate.

40. The EAC will develop proposals for a trans-European programme of applied research - to be jointly funded by its own membership, the European Union, and other appropriate agencies - to support the integration of cultural heritage and natural environmental concerns in wetland management strategies and to establish adequate baseline information about cultural heritage components of existing wetland management plans.

41. This should include a number of complementary components:

41.1 cross-sector mechanisms to ensure shared understanding by all relevant institutions and decision-makers of the significance of cultural heritage issues. A great deal of ground work has already been done in some countries by EAC member organisations, but the results need to be more effectively disseminated and shared with the nature conservation community, so that it can be better integrated with the management process. It is hoped that the publication and dissemination of this volume is a first step in achieving this goal;

41.2 a review of frameworks for the protection of the cultural heritage of wetlands (including policy and planning regulations). It is necessary to consider how to make existing frameworks and measures act more effectively and whether there is a need for specific designations for the protection of wetland cultural heritage sites. As a first step, Marsden's review (this volume) needs to be supplemented with relevant information from the constituent membership of the EAC;

41.3 a review of legal and institutional frameworks for the management of wetlands to ensure that national policies, strategies, and plans incorporate cultural heritage as well as socio-cultural issues at a national and site level;

41.4 the continued development by EAC members of survey programmes and local databases of cultural heritage information for incorporation into conservation management plans for wetland resources. This will provide an easily accessible inventory of heritage components related to wetlands in member countries, and also identify wetlands with the greatest archaeological potential that may be suitable for additional protection;

41.5 the development of an inter-disciplinary approach which brings together natural science, cultural heritage, and conservation and management interests with those of local communities, and which can be used as an educational resource to broaden popular and political support for wetland conservation.

Specific mechanisms

42. Mechanisms to improve the integration of heritage management issues with the concerns of the natural environment in the conservation and management of wetlands will include:

42.1 the creation of formal links and on-going liaison between EAC members and institutions responsible for the management of the wetland resource (nationally and locally); it is important to ensure that heritage management organisations are aware of plans for projects related to sustainable development of wetlands, and conversely to ensure that plans for engineering and socio-economic projects that impact on wetlands incorporate heritage as well as natural environment and biodiversity issues from the outset;

42.2 the development of mechanisms to ensure that the results of cultural heritage wetlands research is incorporated into good management guidelines and practices;
42.3 the inclusion of heritage considerations in all impact assessments of wetland development and management projects;
42.4 the development of guidelines for heritage aspects of wetland management;
42.5 the development of an agreed methodology to identify the different values of wetland sites and to help prioritise the application of appropriate management techniques to the protection of significant or designated areas;
42.6 the provision of guidance to the Ramsar Contracting Parties for the inclusion of cultural heritage aspects in the conservation and wise use of wetlands through the preparation of guidelines supported by a draft decision to be adopted at Ramsar COP8 in 2002;
42.7 the development of appropriate procedures to monitor and maintain the environmental status of wetlands and to monitor illegal or accidental damage to the wetland cultural heritage;
42.8 the development of a manual (in the form of model site management plans) for the conservation and enhancement of the cultural heritage of wetlands, which will include practical conservation solutions which identify and minimise possible conflicts of interest at an early stage in the management cycle; this manual could form part of the additional management planning guidelines (in the Ramsar handbook series).

Applied research projects

43.There is a fundamental need throughout Europe for co-ordinated research, into a number of specific topics to inform the management of the wetland cultural heritage resource. Potential topics include:

43.1 research into historic models of wetland exploitation which might contribute to their sustainable management in the future, and inform management issues related to drainage, agricultural intensification etc, so that evidence from the past can be used to avoid irreversible change in the future;
43.2 research into the effects of rewetting on organic archaeological and palaeoenvironmental evidence which has dried out enough to cause damage, but not enough to lead to the total decay of the evidence; this includes issues of water quality, and the need for further experimental work;
43.3 research into the hydrology of cultural heritage sites in wetlands, and techniques to evaluate the impact on their hydrology of proposed developments;
43.4 research into developing new methods and techniques to identify cultural heritage sites in wetlands, so that the cultural heritage component of wetlands can be more effectively assessed and evaluated in advance of proposed developments;
43.5 research into the preservation of archaeological remains *in situ* in order to gather and analyse reliable information about the changing burial environment of wetland sites;
43.6 research into appropriate mechanisms to balance educational and recreational access to wetlands with the need to protect and preserve the intrinsic values of their flora, fauna, and cultural heritage;
43.7 commissioned research into social attitudes towards wetlands across Europe to help quantify and qualify the hitherto undefined strength of feeling towards this environment, and to determine and encourage levels of public support towards wetland conservation as a basis for the promotion, management, protection, interpretation, and presentation of the cultural and natural heritage of wetlands.

44.The EAC will seek to facilitate the establishment of such international multidisciplinary research projects funded from appropriate sources (including the European Union) and will encourage its members to attach a high priority to participating in work of this nature.

Understanding

45.Continued programmes of survey and excavation are essential in order to identify and understand the cultural heritage of wetlands, and to underpin the work of heritage management agencies. Central authorities must be aware of the extent and potential of their cultural heritage wetland resource if they are to be persuaded of the need for firm control to prevent its continued erosion and degradation.

46.The EAC, with its partners, will help co-ordinate wetlands research programmes and disseminate the results to heritage managers. We will develop a directory of recent and current programmes, projects, and activities, to help ensure that our members can provide relevant and well-informed professional input into management plans.

47. This volume provides a starting point to give cultural heritage managers across Europe access to the considerable experience of wetland archaeologists, and to highlight the potential of different approaches to the cultural heritage of wetlands.

48. The EAC will encourage the development of a pan-European research framework for the cultural heritage of the wetlands.

49. The EAC will continue to work to ensure that all European heritage agencies are fully aware of the nature and values of wetland archaeology and the critically important contribution of wetland studies to an understanding of the past, and to help continue to develop the technical expertise that is necessary to underpin the heritage management of wetlands.

50. There is a need to communicate effectively to the public the excitement and significance of the cultural heritage of wetlands and its important role in integrating approaches to the cultural heritage and the natural environment.

51. The EAC will explore the possibility of sponsoring (with other partners) a major international travelling exhibition on the cultural heritage of wetlands.

Adrian Olivier
President, *Europae Archaeologiae Consilium*
February 2001

Abstracts

1. Bryony Coles: A past less foreign: wetland archaeology and its survival in European perspective

Abstract: The heritage value of European wetlands is outstanding, and relevant to wetland management for ecology as well as archaeology. In dryland contexts, much organic archaeological evidence perishes, whereas in wetlands much of it is preserved, having survived in undisturbed waterlogged contexts. Natural remains, of plant and animal origin, supply evidence for wetland histories. Cultural remains provide much of our evidence for the material aspects of the human past, which were predominantly of organic origin until recent times. Evidence for dating is also available, notably high-quality radiocarbon dating and dendrochronology. Putting these different strands together, a detailed understanding can be achieved of wetland development and the associated human activity. Wetland archaeology is equally significant for understanding or the wider context, in as much that the evidence relates to wetland and dryland alike, and can be used at different levels of interpretation. Finally, wetland archaeology engages the public, and through its qualities of good preservation and good contextual information, lends itself to reconstruction and experimentation. The heritage component of wetlands is relevant to management of the habitat, it has great potential for enlarging our understanding of the past and it is extremely vulnerable. The present EAC initiative to promote positive, informed management is therefore timely and welcome.

1. Un passé moins inconnu: l'archéologie des sites humides et leur survie dans une perspective européenne

Résumé: La valeur exceptionnelle du patrimoine des sites humides européens est significative pour la gestion des sites humides tant du point de vue écologique que du point de vue archéologique. Dans un contexte de sites secs, les vestiges archéologiques en matières organiques sont pour la plupart détruits, tandis que dans les sites humides ils sont en grande partie préservés, parcequ'ils ont survécu dans des contextes gorgés d'eau non perturbés. Des vestiges naturels, d'origine végétale et animale, fournissent des indices pour reconstruire des histoires de sites humides. Des vestiges culturels fournissent une grande partie de nos témoignages concernant les aspects matériels du passé humain, qui furent de façon prédominante d'origine organique jusqu'à des époques récentes. Des indices de datation sont également disponibles, en particulier la datation de haute qualité au radiocarbone et la dendrochronologie. Si l'on rapproche ces différents fils, on peut arriver à une compréhension détaillée du développement des sites humides et de l'activité humaine qui y fût associée. L'archéologie des sites humides est également importante pour la compréhension du contexte élargi, puisque plusieurs témoignages sont liés aussi bien aux sites humides qu'aux sites secs et peuvent être utilisés à des niveaux d'interprétation différents. Enfin, l'archéologie des sites humides engage le public et, par ses qualités de bonne conservation et bonne information contextuelle, se prête à la reconstruction et à l'expérimentation. Le patrimoine des sites humides est significatif pour la gestion de l'habitat, présente des possibilités importantes pour élargir notre compréhension du passé et est extrêmement vulnérable. L'initiative actuelle de l'EAC d'en promouvoir une gestion positive et avisée est par conséquent opportune et bienvenue.

1. Das Vergangene weniger fremd: Feuchtbodenarchäologie und ihr Überleben unter einer europäischen Perspektive

Abstrakt: Der Wert des kulturellen Erbes aus europäischen Feuchtgebieten ist hervorragend und sowohl aus ökologischer als auch archäologischer Sicht bedeutend für die Feuchtbodenverwaltung. Auf dem trockenen Land vergeht der größte Anteil organischer archäologischer Spuren, wohingegen in Feuchtgebieten das meiste davon erhalten bleibt, wenn es in ungestörten luftabgeschlossenen Zusammenhängen die Zeiten überdauert hat. Natürliche Hinterlassenschaften von pflanzlichem oder tierischem Ursprung bieten Hinweise auf die Geschichte der Feuchtböden. Kulturelle Hinterlassenschaften liefern viele Hinweise auf den materiellen Aspekt der menschlichen Vergangenheit, die bis in die jüngste Vergangenheit hauptsächlich organischer Natur war. Auch Zeugnisse für Datierungen sind verfügbar, besonders für hochqualitätvolle Radiokarbondatierung und für die Dendrochronologie. Bringt man die verschiedenen Forschungsstränge zusammen, kann ein detailliertes Verständnis der Feuchtbodenentwicklung und der damit assoziierten menschlichen Aktivität erreicht werden. Feuchtbodenarchäologie ist gleichermaßen signifikant für das Verständnis

eines weitaus größeren Kontextes, in dem sich ein Großteil der Zeugnisse sowohl auf Feuchtböden als auch auf trockenes Land beziehen, und kann so auch zu verschiedenen Ebenen der Interpretation herangezogen werden. Schließlich beschäftigt Feuchtbodenarchäologie auch die Öffentlichkeit und führt infolge der Qualität guter Funderhaltung und hervorragenden Begleitinformationen zur Rekonstruktion und wissenschaftlichen Experimenten. Die Komponente des kulturellen Erbes von Feuchtböden ist bedeutend für die Verwaltung des Habitats, es hat größtes Potential zur Erweiterung unseres Verständnisses der Geschichte und ist darüber hinaus sehr empfindlich. Die gegenwärtige Initiative des EAC zur Unterstützung positiver und informierter Verwaltungen kommt daher gerade rechtzeitig und ist sehr willkommen.

2. Simon Marsden: The heritage management of wetlands: legislative designation and protection, a viewpoint from England and Wales

Abstract: This paper provides an overview of the legislation that is intended to designate and protect the archaeological heritage values of wetlands, or that relates to those values. It focuses on a full description of the most significant primary legal source materials at international, European and national levels and provides a description of other primary sources at each of these levels. The paper begins by describing international law, goes on to describe European law, and continues with a description of legal provisions in England and Wales. A comprehensive outline is provided of all the laws pertaining to the designation and protection of the archaeological heritage values of wetlands. This is important because although some of the laws relate to one another, others do not. Finally, a brief discussion and analysis of the application of the legislation to a hypothetical development is provided, and conclusions are drawn. The paper therefore contributes to an understanding of the entire range of legislative requirements and their relationship to one another, in theory and in practice.

2. La gestion du patrimoine en milieu humide: législation, désignation et protection en Angleterre et le pays de Galles

Résumé: Cet article vise à passer en revue la législation qui est destinée à désigner et à protéger le patrimoine archéologique en milieu humide, ou qui se rapporte à ce sujet. L'article se concentre sur une description complète de la documentation des sources légales primaires les plus significatives, en plus d'expliquer d'autres sources primaires à chacun de ces niveaux. L'article présente la loi internationale, la loi européenne, et les dispositions légales en Angleterre et aux pays de Galles. Toutes les lois qui se rattachent à la désignation et à la protection du patrimoine archéologique en milieu humide sont expliquées à travers un plan détaillé, ce qui est essentiel parce que, bien que quelques-unes des lois soient rattachées les unes aux autres, il y en a d'autres qui ne le sont pas. Finalement, il y a une brève discussion et un bref analyse de l'application de la législation à un développement hypothétique, et des conclusions y sont tirées. Donc, l'article contribue à développer une compréhension de toute l'étendue des conditions législatives et de leur rapport les unes aux autres, tant en théorie que dans la pratique.

2. Die Verwaltung des Archäologischen Erbes aus Feuchtgebieten: Gesetzliche Ziele und Schutz, ein Blick aus England und Wales

Abstrakt: Der Beitrag gibt einen Überblick über die Gesetzgebung, die sich mit den Zielen und dem Schutz der Werte des archäologischen Erbes aus Feuchtgebieten sich beschäftigt oder sich auf derartige Werte bezieht. Der Beitrag fokussiert auf einer umfassenden Beschreibung der signifikantesten Grundlagengesetze im internationalen, europäischen und nationalen Recht und gibt eine Beschreibung anderer primärer Quellen. Der Beitrag beginnt mit der Beschreibung von internationalem Recht, führt über die Beschreibung von europäischen Gesetzen zu einer Beschreibung der Gesetzgebung Englands und Wales. Schließlich wird eine umfassende Beschreibung aller Gesetze mit den Zielen und dem Schutz von Werten des archäologischen Erbes in Feuchtgebieten gegeben. Gerade dieses ist wichtig, da zwar einige Gesetze Bezüge zueinander haben, andere jedoch nicht. Zuletzt folgt eine Diskussion und Analyse zur Anwendung der geltenden Gesetzgebung auf eine hypothetische Entwicklung und es werden Schlüsse daraus gezogen. Insgesamt trägt der Beitrag zu einem Verständnis des gesamten Spektrums legislativer Anforderungen und ihrer Beziehung untereinander, sowohl in Theorie als auch in Praxis bei.

3. Gill Walters: Threats and pressures on wetland environments in England and Wales and the response of the Environment Agency

Abstract: This paper describes the work of the Environment Agency, an independent government body covering England and Wales, which aims to provide a comprehensive approach to the protection and management of the environment by combining the regulation of land, air and water. The paper considers problems such as climatic change, water abstraction, water pollution and erosion and their effects on the natural and the archaeological wetland environment, and it considers the reaction of the Environment Agency in tackling these issues.

3. Menaces et pressions sur les environnements humides en Angleterre et au pays de Galles et la réponse du Environment Agency

Résumé: Cet article décrit le travail de Environment Agency, un organisme de gestion indépendant qui couvre l'Angleterre et le pays de Galles et dont l'objectif consiste à assurer une approche globale de la protection et de la gestion de l'environnement à travers une régulation alliée de la terre, de l'air et de l'eau. L'article examine des problèmes tels que le changement climatique, la soustraction de l'eau, la pollution de l'eau et l'érosion et leurs effets sur l'environnement humide naturel et archéologique, ainsi que la réaction de Environment Agency pour résoudre ces questions.

3. Bedrohungen und Druck auf die Feuchtbodenumwelt in England und Wales und die Verantwortung der Umweltschutzbehörden

Abstrakt: Dieser Beitrag beschreibt die Arbeit von Umweltagenturen, einer unabhängigen Verwaltungsebene in England und Wales, deren Ziel es ist, durch Kombination von gesetzlichen Regelungen für Land, Luft und Wasser einen gebündelten Zugang zum Schutz und zur Verwaltung der Umwelt zu leisten. In dem Beitrag werden Probleme untersucht, wie etwa Klimawechsel, Wasserentnahme und Wasserverschmutzung sowie Erosion und deren Auswirkungen auf die Natur und die Archäologie der Feuchtgebiete und es zieht dabei die Reaktion der für die Umwelt zuständigen Behörden und deren Umgang mit diesen Themen in Betracht.

4. Bryony Coles: Britain and Ireland

Abstract: The varied wetlands of Britain and Ireland contribute significantly to their archaeology, but they face both natural and humanly caused threats. These include sea level rise and coastal erosion, while inland the greatest threat comes from drainage, carried out for a variety of reasons, including drainage in the English Fens for agriculture and drainage of the Irish peat for extraction. Drainage for development is common, for industry, housing and roads. Survey and evaluation of wetland archaeology is next examined. In England, there have been major surveys in the Somerset Levels, the Fens, the North West and the Humber Wetlands, and this programme is nearing completion. In Ireland, survey has focussed on the midland peat bogs and the Shannon estuary, with work now underway on lake settlement. In Northern Ireland, scarce resources have limited work to seasonal bog surveys. In Scotland, initial survey of crannogs and of the palaeoenvironmental archive has been followed by limited, project-specific field survey, and current discussion of how the next stages should develop. In Wales, work has concentrated in the south east, where wetlands are most at risk, from development and coastal erosion. Examples of management of wetland archaeological sites are then given. Finally, the potential for co-operation with wetland conservation agencies is explored through the case study of West Sedgemoor, managed by the Royal Society for the Protection of Birds.

4. La Grande Bretagne et l'Irlande

Résumé: Les divers milieux humides de la Grande Bretagne et de l'Irlande, contribuent dans une grande mesure à leur archéologie, mais ces milieux doivent faire face à des menaces, tant des menaces naturelles que celles causées par la race humaine. Ces menaces comprennent l'augmentation du niveau de la mer et l'érosion littorale, tandis qu'à l'intérieur la plus grande menace est celle du drainage, ce qui est entrepris pour plusieurs raisons, y compris le drainage pour l'agriculture dans les Fens anglais, et le drainage pour l'extraction de la tourbe en Irlande. L'assèchement qui se fait en raison du développement est commun, pour l'industrie, pour le logement, et pour la route. Une deuxième partie examine les évaluations systématiques de l'archéologie en milieu humide. En Angleterre, il y a eu des evaluations importantes des Somerset Levels, des Fens, et des zones humides du nord-ouest et du Humber, des programmes qui arrivent à leur conclusion. En Irlande, les evaluations se concentrent sur les tourbières des régions centrales et sur l'estuaire de la Shannon, et actuellement on fait des évaluations des habitation lacustres. En Irlande du Nord, des ressources éparses ont limité de tels travaux à des évaluations saisonnières des tourbières. En Écosse, des évaluations initiales des crannogs et de l'archive paléoécologique ont été suivi par des évaluations limitées à certains projets, et également par la discussion actuelle à propos du développement des prochaines étapes. Aux pays de Galles, le travail s'est concentré sur le sud-est, la région où les zones humides sont les plus ménacées du développement et de l'érosion littorale. Des exemples de la gestion des sites archéologiques en milieu humide sont présentés. Finalement, les possibilités de la coopération avec des agences pour la conservation des sites humides sont évaluées à travers un cas d'étude de West Sedgemoor, un site humide géré par l'RSPB (la Société Britannique de Protection des Oiseaux).

4. Britannien und Irland

Abstrakt: Die unterschiedlichen Feuchtbodengebiete Britanniens und Irlands tragen sehr signifikant zu ihrer Archäologie bei, aber beide stehen Bedrohungen gegenüber, die sowohl auf natürliche wie auch auf anthropogene Einflüsse zurückzuführen sind. Diese schließen den Meeresspiegelanstieg sowie die Küstenerosion ein, während im Inland die größte Bedrohung durch Drainagemaßnahmen verursacht wird, die wegen einer ganzen Anzahl von Gründen verursacht wurden, zu denen die Trockenlegung der englischen Niederungen zum Zwecke der Landwirtschaft und die Trockenlegung der irischen Moore zum Torfabbau zählen. Trockenlegungen im Zuge der Landentwicklung werden für Industriegebiete, Wohnbebauung oder Verkehrswege durchgeführt. In England hat es drei bedeutende Landesaufnahmen in den Somerset Levels, den Feuchtbodengebieten (the Fens), im Nordwesten und in den Humber

Feuchtgebieten gegeben und dieses Programm ist nahezu abgeschlossen. In Irland hat sich die Landesaufnahme auf die Torfmoore im Landesinneren (midland) und auf das Mündungsgebiet des Shannon mit laufenden Arbeiten auf Seesiedlungen konzentriert. In Nordirland waren infolge spärlicher Ressourcen die Arbeiten auf saisonale Landesaufnahmen an Mooren begrenzt. In Schottland folgte auf die Landesaufnahme der crannogs und des paläoökologischen Archivs eine begrenzte, projektspezifische Fluraufnahme verbunden mit laufenden Diskussion darüber, welche folgenden Schritte zu unternehmen sein werden. In Wales war die Arbeit im Südosten des Landes konzentriert, wo Feuchtgebiete am stärksten von potentiellem Baubedarf und Küstenerosion bedroht sind. Beispiele vom Umgang mit Feuchtbodenfundplätzen werden dann gegeben. Am Schluß wird das Potential für eine Kooperation von Organisationen, die sich mit der Konservierung von Feuchtböden beschäftigen, dargestellt an der Fallstudie von West Sedgemoor, das durch die Royal Society für Vogelschutz geleitet wird.

5. Saskia van Dockum, Daan Hallewas, Robert van Heeringen & Erick Jungerius: The Netherlands

Abstract: This paper describes the changing role of ROB, The National Service for Archaeological Heritage, and its main objective, the preservation of sites and monuments in their historically developed landscape. The Netherlands long association with wetland environments and the current instruments used for managing the archaeological heritage of those environments are considered. The paper describes ROB's current policy of sustainable preservation and the problems of the current policy of passive protection and the resultant loss of wetland sites. A number of case studies of recent proactive and reactive projects in specific regional contexts are described.

5. Les Pays-Bas

Résumé: Cet article décrit le changement du rôle du ROB - le service national pour le patrimoine archéologique -, et son principal objectif, la protection des sites et des monuments dans leur paysage historique. Sont ici considérés l'engagement de longue durée des Pays-Bas avec les milieux humides, et les moyens actuels utilisés pour gérer le patrimoine archéologique de ces environnements. Cet article examine la politique actuelle du ROB en ce qui concerne une protection viable et les problèmes d'une protection passive qui a eu pour conséquence la perte de sites d'ambiance humide. Cet article décrit plusieurs projets concrets et récents, réactifs et proactifs, dans des contextes régionaux spécifiques.

5. Die Niederlande

Abstrakt: Der Aufsatz beschreibt die sich verändernde Rolle des ROB (Staatliches Amt für archäologischen Denkmalschutz) und seines Hauptzieles, der Erhaltung von archäologischen Denkmälern in ihrer historischen Kulturlandschaft. Es wird die lange Verbindung der Niederlande mit ihrer Feuchtboden-Umwelt bedacht und es werden die derzeitigen Mittel beschrieben, die bei der Verwaltung des archäologischen Erbes benutzt werden. Der Aufsatz beschreibt die derzeit von der ROB verfolgte Politik der nachhaltigen Sicherung, die Probleme einer anhaltenden Politik passiven Schutzes sowie die daraus resultierenden Verluste von Feuchtbodenfundplätzen. Außerdem werden eine Anzahl von Fallstudien in ihrem spezifischen regionalen Kontext beschrieben.

6. Anders Fischer: Scandinavia

Abstract: This paper deals with wetland heritage management projects that have already been undertaken and the potential for similar projects in the future in Scandinavia. The examples used represent various kinds of wetland areas and various prehistoric periods and have been chosen to give an impression of the variety of wetlands in Scandinavia a consequence of the highly varying landscape and climate. The paper initially summarises the present situation in Sweden and Norway, with a brief presentation of a selection of specific examples from Denmark. The core of the paper focuses on the largest wetland archaeological heritage management project accomplished so far in Scandinavia, the Åmose. The projects presented here are mainly in their early stages. The main focus will be on sites in need of change, for instance to affect water table and agricultural management strategies.

6. La Scandinavie

Résumé: Dans cet article il s'agit des projets de la gestion du patrimoine en milieu humide qui ont déjà été entrepris, et des possibilités de réaliser de comparables projets à l'avenir en Scandinavie. Les exemples donnés représentent des zones humides différentes, et des époques préhistoriques variées, choisis pour donner une idée de la grande variété de zones humides en Scandinavie, ce qui résulte venant du paysage et du climat variés. Premièrement, l'article résume la situation actuelle en Suède et en Norvège, en plus de présenter un échantillon d'exemples spécifiques du Danemark. La partie principale de l'article se concentre sur le plus grand projet de la gestion du patrimoine archéologique en milieu humide qui ait jamais été réalisé jusqu'à présent en Scandinavie, l'Åmose. Les projets discutés sont, pour la plupart, vers le début de leur mise en place. Cet exposé examine surtout les sites qui ont besoin de changement – par exemple, changements de niveaux hydrostatiques et de stratégies pour la gestion agricole.

6. Skandinavien

Abstrakt: Dieser Aufsatz handelt von der Verwaltung von Feuchtbodenprojekten, die bislang durchgeführt wurden und dem Potential vergleichbarer Projekte, die zukünftig in Skandinavien unternommen werden können. Die dargestellten Beispiele repräsentieren verschiedene Arten von Feuchtbodengebieten und beschäftigen sich mit verschiedenen vorgeschichtlichen Perioden; sie wurden ausgewählt, um einen Eindruck der Variabilität der Feuchtbodengebiete in Skandinavien zu geben, die ein Abbild der stark variierenden Landschaften und klimatischen Bedingungen sind. In dem Aufsatz wird eingangs die gegenwärtige Situation in Schweden und Norwegen zusammengefaßt, die auch eine knappe Präsentation von Einzelbeispielen aus Dänemark enthält. Der zentrale Teil des Aufsatzes fokussiert das Åmose, das bislang größte Projekt zur Verwaltung von archäologischem Erbe in Feuchtgebieten, das in Skandinavien bislang begonnen wurde. Die behandelten Projekte befinden sich in der Mehrzahl an ihren Anfängen. Das Hauptaugenmerk richtet sich auf Fundplätze die einer Veränderung entgegensehen, die vor allem auf eine Veränderung des Wasserstandes oder der Strategien für die landwirtschaftliche Nutzung beziehen.

7. Bernard Gramsch: North-east Germany

Abstract: Large areas of the North-east German plain can be described as wetlands. The preservation of organic archaeological remains in this area is excellent and archaeological wetland sites from all prehistoric and historic periods can be found within this natural archive. Draining and cultivation during the 1970s and 1980s and road and pipeline construction in the last decade have endangered the archaeological heritage values of wetlands in the region. This article describes several excavated wetland sites from the Stone Age and the Middle Ages, the problems associated with protecting an often-undeniable resource, the need for the identification of wetland sites and the responsibility for the protection and excavation of wetland sites on or near construction operations.

7. Le nord-est de l'Allemagne

Résumé: De grandes régions de la plaine du nord-est d'Allemagne peuvent se classifier en tant que sites humides. La préservation des vestiges archéologiques organiques est excellente, et des sites archéologiques de toutes les époques préhistoriques et historiques peuvent se trouver dans ces archives naturelles des milieux humides. L'assèchement et la cultivation pendant les années 70 et 80, et la construction des rues et des pipelines pendant cette dernière décennie ont mis en danger la valeur archéologique du patrimoine en milieu humide dans cette région. Cet exposé examine plusieurs des sites fouillés en milieu humide, datant de l'Age du Pierre et du Moyen Age, suivid'une considération des problèmes associés à la protection de ressources souvent incontestables, du besoin de l'identification des sites et de la gestion ou bien les fouilles des sites en milieu humide qui se trouvent près des opérations de construction.

7. Nordostdeutschland

Abstrakt: Ausgedehnte Flächen des nordostdeutschen Tieflands sind Feuchtbodengebiete. Archäologische Überreste aus organischen Stoffen sind hier vorzüglich erhalten, und aus allen prähistorischen und historischen Perioden sind in diesen natürlichen Archiven archäologische Feuchtbodenplätze anzutreffen. Entwässerungen und kultivierungen in den 1970er und 1980er Jahren sowie Strassen- und Leitungsbaumassnahmen in den letzten zehn Jahren haben das archäologische Erbe in den Feuchtböden der Region erheblich gefährdet. Der Artikel beschreibt eine Anzahl ausgegrabener Feuchtbodenplätze. Zugleich behandelt er die Probleme, die mit dem Schutz dieses hochbedeutenden Quellenbestands verbunden sind, sowie die Notwendigkeit der Ermittlung und Identifizierung der Feuchtbodenplätze, ferner die Verantwortlichkeit für den Schutz und die Ausgrabung von Feuchtbodenfundstätten in oder nahe Bauflächen.

8. Wojciech Brzezinski: Poland

Abstract: Wetland archaeology in Poland has been an active discipline since the 1930s and the celebrated excavations at Biskupin. This paper illustrates the changing attitudes and functions of wetland heritage management in Poland and the effect on wetland archaeology of Poland's change from a state-run to a free market economy. Polish environmental and archaeological protective legislation and the system and strategies for the heritage management of wetland archaeological sites are highlighted with examples of the current form that wetland protection takes. The paper also considers the social context of heritage management in Poland as well as describing a number of important Polish sites.

8. La Pologne

Résumé: L'archéologie des sites humides en Pologne est une discipline active depuis les années 30 et les fouilles célèbres à Biskupin. Cet article présente les attitudes et les fonctions qui évoluent couramment en Pologne an sujet de la gestion du patrimoine en milieu humide et considére l'effect de la progression du la Pologne d'une économie d'état á une économie de marché libre. Tant la législation protective archéologique et écologique de la Pologne, que le système et les stratégies de la gestion du patrimoine des sites archéologiques en milieu humide, seront soulignés par des exemples de la forme que prend actuellement la protection des sites en milieu humide. L'article considère en plus le contexte social de la gestion du patrimoine en Pologne, et présente un bon nombre d'importants sites polonais.

8. Polen

Abstrakt: Feuchtbodenarchäologie in Polen ist seit den 1930er Jahren und den Ausgrabungen in Biskupin eine aktive Disziplin. Der Aufsatz illustriert die sich ändernden Ziele und Funktionen der Verwaltung des kulturellen Erbes in Feuchtgebieten Polens und die Auswirkungen auf die Veränderungen in der Feuchtbodenarchäologie Polens durch eine staatsgetragene, freie Marktwirtschaft. Die Gesetzgebung zum Umweltschutz und zum Denkmalschutz in Polen und das System sowie die Strategien für die Verwaltung des archäologischen Erbes in Feuchtbodenfundplätzen werden an einigen Beispielen laufender Schutzmaßnahmen an Feuchtbodenplätzen dargestellt. Der Aufsatz bedenkt auch den sozialen Kontext der Denkmalverwaltung in Polen und beschreibt eine Anzahl bedeutender polnischer Fundplätze.

9. Jussi-Pekka Taavitsainen: Finland

Abstract: This paper presents a short history of wetland archaeological studies in Finland, which have concentrated mainly on stray finds revealed by ditching and the cultivation of peatlands and marsh meadows. The largest groups of finds represent means of water and winter transport including dugouts, boats, skis and sledges and fishing tackle. Larger finds of bog cemeteries or offering sites, roadways and trackways, medieval defensive structures and ritual offerings have also been uncovered. The number of scientific wetland archaeological excavations undertaken in Finland has been very limited and due to this and the apparent lack of lake-dwellings there has not been any official wetland heritage management policy in Finland. The paper recognises the need for areas surrounding previously identified find spots to be surveyed, leading to a new and richer picture of what wetlands have so far offered archaeology in Finland.

9. La Finlande

Résumé: Cet article présente une courte histoire des études de l'archéologie en milieu humide en Finlande, qui ce concentre surtout sur des découvertes arbitraires qui ont été révélées au cours du creusement de fossés et de la cultivation des tourbières et des prairies marécageuses. Les plus importants des groupes de découvertes représentent des moyens de transport nautique et de transport en hiver, y compris des pirogues monoxyles, des barques, des skis, des traîneaux et du matériel de pêche. On a fait de plus grandes découvertes, de cimetiéres ou de sites d'offrandes en tourbières, de chemins, de structures de défence médiévales et d'offrandes rituelles. Le nombre de fouilles scientifiques de gisements archéologiques en milieu humide a été très limité et, à cause de ces restrictions et du manque apparent d'habitations lacustres, aucun politique officiel n'a été adopté en Finlande à propos de la gestion du patrimoine en milieu humide. L'article reconnait le besoin d'une évaluation systématique des alentours de sites déjá identifiés, pour arriver à une nouvelle et plus riche idée de ce que les sites en milieux humides ont déjà apporté à l'archéologie en Finlande.

9. Finnland

Abstrakt: Dieser Aufsatz gibt einen kurzen historischen Überblick zur Entwicklung der Feuchtbodenarchäologie in Finnland, die sich hauptsächlich auf Streufunde konzentriert hat, die bei der Anlage von Entwässerungsgräben und Kultivierungen von Marschen und Mooren entdeckt wurden. Unter den Funden befinden sich vor allem Gegenstände für den Transport im Winter oder auf dem Wasser, darunter Einbäume, Boote, Skier, Schlitten und Angelgeräte. Außerdem wurden größere Funde entdeckt z.B. Friedhöfe im Sumpf oder Opferplätze, Verkehrswege, mittelalterliche Verteidigungsstrukturen und rituelle Opferfunde. Die Anzahl an wissenschaftlichen Ausgrabungen im Feuchtbodengebiet, die in Finnland unternommen wurden, ist sehr begrenzt. Deswegen und wegen des Fehlens von Seesiedlungen gibt es in Finnland noch keine offizielle Verwaltung des kulturellen Erbes in Feuchtbodengebieten. Im Aufsatz wird der Bedarf erkannt, solche Gebiete, in denen früher entsprechende Funde gemacht wurden, intensiver zu begehen mit dem Ziel, ein neues und reicheres Abbild dessen zu bekommen, als das Feuchtbodenarchäologie bislang in Finnland angeboten hat.

10. Grigori Burov: European Russia

Abstract: Wetland archaeological sites in European Russia are predominantly prehistoric habitation sites, Neolithic fishing structures and medieval towns. The excavation and study of some of these are described in this paper including Nizhneyé Veretye a Mesolithic habitation site, Marmugino where Neolithic fishing structures were identified and the medieval town of Novgorod. In Russia, governmental institutions such as the Academy of Sciences and the Academical Institute of Archaeology and a public society are responsible for archaeological heritage management. The present structure and function of these bodies and the present management and protection of wetland sites in European Russia, including the current archaeological site legislation with particular reference to wetland, areas are discussed. This paper also gives examples of the management of a number of excavated wetland sites and three possible strategies to benefit the heritage management of wetland archaeology in European Russia.

10. La Russie Européenne

Résumé: Les sites archéologiques en milieu humide de la Russie européenne sont, pour la plupart, des sites d'habitation préhistorique, des structures de pêche néolithiques et des villes médiévales. Les fouilles et l'étude de quelques-uns

d'entre eux sont décrites au cours de cet article, y compris Nizhneyé Veretye (site d'habitation mésolithique), Marmugino (structures de pêche), et la ville médiévale de Novgorod. En Russie, des institutions gouvernementales – comme, par exemple, l'Académie des Sciences et l'Institut Académique de l'Archéologie – et une société publique sont chargés de la gestion du patrimoine archéologique. Cet exposé examine la structure et la fonction actuelles de ces organisations, aussi que la gestion et la protection de l'archéologie en milieu humide dans la Russie européenne – y compris la législation qui porte sur les sites archéologiques. Cet article donne aussi des exemples de la gestion de sites fouilles en milieu humides, en plus de trois stratégies éventuelles dont profiteraient la gestion du patrimoine archéologique en milieu humide de la Russie européenne.

10. Die europäischen Gebiete Rußlands

Abstrakt: Unter den archäologischen Fundplätzen aus Feuchtgebieten im europäischen Teil Rußlands dominieren vorgeschichtliche Siedlungen, neolithische Fischfangbefunde und mittelalterliche Städte. Die Ausgrabung und Erforschung einiger der in diesem Beitrag beschriebenen Plätze schließt Nizhnee Veretye, eine mesolithische Wohnstation, Marmugino, wo neolithische Fischfangstrukturen identifiziert werden konnten, und die mittelalterliche Stadt von Novgorod ein. In Rußland sind die Akademie der Wissenschaften und das Akademische Archäologische Institut, beide als Regierungseinrichtungen, sowie eine öffentliche Gesellschaft verantwortlich für die Verwaltung des archäologischen Erbes. Die gegenwärtige Struktur und Funktion dieser Körperschaften und die gegenwärtige Verwaltung und der Schutz von Feuchtbodenfundplätzen im europäischen Teil Rußlands -einschließlich der derzeit aktuellen Denkmalschutzgesetzgebung für archäologische Fundplätze- werden unter dem besonderen Blickwinkel der Feuchtbodengebiete diskutiert. Der Aufsatz gibt Beispiele für die Verwaltung einer Anzahl von ausgegrabenen Feuchtbodensiedlungen und drei mögliche Strategien, mit denen die Verwaltung des Erbes von archäologischen Feuchtbodenfundplätzen im europäischen Rußland profitieren können.

11. Franco Marzatico: Mediterranean Europe

Abstract: In the countries which face onto the Mediterranean basin the attention reserved for the rich cultural and natural heritage found within wetlands is a far more restricted phenomenon than in the rest of Europe. One reason for this lack of continuity is the variation between the north and south in terms of the impact of these fragile ecosystems. The greatest density of archaeologically interesting wetlands is in Northern Italy where there is a long tradition of research, conservation and exploitation of these resources more so than in other areas of the Mediterranean basin, where the concentration of wetland is smaller. The gap in experience between the north and the south also results from other factors, as well as the profound morphological and climatic-environmental differences and hence the number of sites. As far as these are concerned, motivations which are in part historical, such as the diversity of the archaeological heritage, the conditions of socio-economic development and a differing availability of resources can be cited.

11. L'Europe méditerranéenne

Résumé: Dans les pays qui sont orientés au bassin méditerranéen, l'attention réservée au riche patrimoine culturel et naturel qui se trouve dans les milieux humides est un phénomène très restreint par rapport au reste de l'Europe. Une des raisons qui expliquent ce manque de continuité est la variation entre le nord et le sud en ce qui concerne l'impression faite par ces écosystèmes fragiles. La plus grande densité de milieux humides d'une portée d'intérêt archéologique est dans l'Italie du Nord, où il y a une longue tradition de recherches, de la conservation, et de l'exploitation de ces ressources – plus longue que dans d'autres régions du bassin méditerranéen, où la concentration des zones humides est notamment réduite. L'écart qui existe entre l'expérience du nord et celle du sud est aussi le résultat de divers éléments, en plus des profondes différences morphologiques et climatiques-écologiques, d'où le nombre de sites. En ce qui concerne ces divers éléments, on pourrait également citer les motivations qui sont d'une part historiques – comme la diversité du patrimoine archéologique – les conditions du développement socio-économique, et une disponibilité variée de ressources.

11. Mediterranes Europa

Abstrakt: In den mediterranen Ländern ist die Aufmerksamkeit für das reiche kulturelle und ökologische Erbe, das in den Feuchtgebieten gefunden werden kann, sehr viel beschränkter, verglichen mit dem Rest von Europa. Ein Grund für diesen Mangel an Kontinuität ist die unterschiedliche Dichte dieses empfindlichen Ökosystems zwischen dem Norden und dem Süden. Die größte Dichte an archäologisch interessanten Feuchtgebieten liegt in Norditalien, wo es auch eine lange Tradition in der Forschung, Erhaltung und Ausbeutung dieser Ressourcen gibt, die größer ist als in anderen mediterranen Gebieten, wo die Konzentration von Feuchtgebieten geringer ist. Die Erkenntnislücke zwischen dem Norden und dem Süden resultiert auch von anderen Faktoren, sowohl den grundsätzlichen morphologischen, als auch den umweltklimatischen Unterschieden und den daraus resultierenden Anzahlen an Fundplätzen. Soweit es diese betrifft, können Beweggründe angeführt werden, die teilweise historisch bedingt sind, wie z.B. die Unterschiede im archäologischen Erbe, den Bedingungen für die sozio-ökonomische Entwicklung und die unterschiedliche Erreichbarkeit der Ressourcen.

12. Christina Marangou: Greece

Abstract: Greek Wetlands belong to a variety of types and are of different dimensions and importance. They are not preserved to the same degree, nor do they confront the same difficulties. Prehistoric to last century vestiges have been found in relationship to wetlands. As there is no global system concerning their management for the moment, it was considered preferable to describe representative situations in a variety of wetland types under dissimilar regimes, confronting different problems. Monuments of several archaeological periods, categories and areas were selected. The choice was necessarily guided by availability of information and involvement in the issue, as sometimes, there may be scarcely any management or monuments may remain unidentified. Attitudes to deal with challenges reflect a diversity of conceptions and possibilities.

12. La Grèce

Résumé: Les sites humides grecs appartiennent à de types variés et sont de dimensions et d'importance inégales. Ils ne sont pas preservés au même degré, et n'affrontent pas les mêmes difficultés. Des vestiges datant de la préhistoire jusqu'au siècle passé ont été découverts en relation avec des sites humides. Comme il n'existe pas de système global concernant leur gestion pour le moment, il a été considéré préférable de décrire des situations représentatives dans des sites humides de types variés sous différents régimes, faisant face à des problèmes divers. Des monuments appartenant à plusieurs périodes archéologiques, catégories et régions ont été selectionnés. Le choix a été nécessairement dirigé également par les informations disponibles et par l'implication dans le sujet, puisque, parfois, il peut ne pas y avoir de gestion ou des monuments peuvent ne pas avoir été identifiés. Les attitudes pour traiter les défis reflètent des conceptions et des possibilités diverses.

12. Griechenland

Abstrakt: Griechische Feuchtbodengebiete gehören unterschiedlichen Typen an und unterscheiden sich in Dimensionen und Bedeutung. Sie sind weder gleich gut erhalten, noch stehen sie denselben Schwierigkeiten gegenüber. Überbleibsel von der Urgeschichte bis ins letzte Jahrhundert konnten in Verbindung mit Feuchtbodengebieten gefunden werden. Da es derzeit kein weltweit gültiges System zur Verwaltung derartiger Fundplätze gibt, wurde als sinnvoll erachtet, die gegenwärtige Situation in einer unterschiedlichen Anzahl von Feuchtbodentypen unter verschiedenen Einflüssen und den daraus resultierenden Problemen zu beschreiben. Monumente verschiedener archäologischer Perioden, Kategorien und aus verschiedenen Gebieten wurden ausgesucht. Die Auswahl war notwendigerweise durch die Verfügbarkeit von Informationen und den Forschungsstand bedingt, da zum einen keinerlei Verwaltung vorhanden sein kann oder die entsprechenden Fundplätze bislang unentdeckt geblieben sind. Das Verhalten gegenüber diesen Herausforderungen reflektiert unterschiedliche Konzeptionen und Möglichkeiten.

13. Denis Ramseyer: Switzerland

Abstract: Management of the wetland heritage in Central Europe is described here through a docus on one particularly rich region, that of the lakes of the Swiss plateau. Since 1960, Swiss archaeology has expanded thanks to motorway building. In the context of these major works, upwards of 100 million Euros has already been spent on archaeology. However, although the construction work has undoubtedly increase our knowledge of the past, we should also note that today only a few scarce archaeological sites remain intact for the future. It is only recently that we have come to appreciate the fragility of our archaeological heritage, and to protect and manage archaeological remains in wetland areas. In 1983 the first site protection work on Lake Neuchâtel was carried out, followed by other projects on Lake Morat and Bienne in the 1990s. These protection schemes are vital, but the actual measures taken so far are insufficient and unsustainable. There is an urgent need to protect some of the most vulnerable archaeological zones. Two examples are described here; Montilier and Greng, on the shores of Lake Morat. We cannot halt the touristic and economic development of a region, but this should be done with due consideration for the natural environment and for the archaeological sites which occur in the same areas. Discussions are underway to save the two aforementioned archaeological sites, which are of European significance. The first results are very positive and encouraging, but there is still a long way to go before the sites can be declared safe.

13. La Suisse

Résumé: Pour évoquer la gestion et la protection du patrimoine en Europe centrale, nous avons choisi une région particulièrement riche en vestiges préhistoriques, celle des lacs du Plateau suisse. La Suisse a connu à partir de 1960 une période particulièrement féconde dans le domaine de l'archéologie grâce à la construction des autoroutes. Près de 100 millions d'Euros ont déjà été dépensés depuis cette date pour l'archéologie dans le cadre de ces grands travaux. Si ces derniers ont incontestablement permis de décupler les connaissances sur notre passé, on doit aussi constater qu'il ne reste aujourd'hui que de rares parcelles archéologiques intactes pour les générations futures. La prise de conscience de la fragilité de notre patrimoine archéologique et de la nécessité de sauvegarder et de gérer les vestiges en milieu humide est un phénomène récent. Il a fallu attendre en effet 1983 pour voir se concrétiser le premier ouvrage de

protection sur le lac de Neuchâtel, suivi par d'autres dans les années 1990 sur les lacs de Morat et de Bienne. Les mesures de protection sont certes indispensables, mais les réalisations effectuées jusqu'à ce jour sont insuffisantes et fragiles, sans garantie sur le long terme. Il est urgent de mettre sous protection quelques unes des zones archéologiques les plus riches. Deux exemples significatifs sont évoqués ici: ceux de Montilier et de Greng, sur les rives du lac de Morat. On ne peut éviter le développement touristique et économique d'une région, mais celui-ci doit se faire en respectant les milieux naturels et par la même occasion les sites archéologiques qui sont situés dans les mêmes secteurs. Des discussions sont en cours pour sauver notamment ces deux zones archéologiques de valeur européenne. Des premiers résultats tout à fait positifs et encourageants ont pu être obtenus depuis peu, mais il reste encore beaucoup à faire pour les mettre définitivement hors de danger.

13. Die Schweiz

Abstrakt: Die Verwaltung des Feuchtbodenerbes in Zentraleuropa wird hier durch einen Fokus auf eine besonders reiche Region beschrieben, der Seenlandschaft auf dem Schweizer Plateau. Seit 1960 expandierte die Schweizer Archäologie Dank des Autobahnbaues. Im Zusammenhang mit diesen Großprojekten sind mehr als 100 Millionen Euro für Archäologie ausgegeben worden. Obwohl unsere Erkenntnisse über die Vergangenheit Dank der wegen Baumaßnahmen durchgeführten Arbeit zweifelsfrei gewachsen ist, müssen wir dennoch feststellen, daß heute nur noch eine geringe Zahl archäologischer Fundplätze intakt für die Zukunft erhalten geblieben sind. Erst seit kurzer Zeit haben wir es gelernt, die Vergänglichkeit unseres archäologischen Erbes richtig einzuschätzen und die archäologischen Überreste in Feuchtbodengebieten zu schützen und zu verwalten. 1983 wurde das erste Unterschutzstellungsvorhaben am Neuburger See durchgeführt, dem andere Projekte am Morater und Bienner See in den 1990er Jahren folgten. Die Liste der Schutzvorhaben ist hochwichtig, aber die bislang durchgeführten Maßnahmen sind unzureichend und unhaltbar. Es ist dringend erforderlich, einige der empfindlichsten archäologischen Zonen zu schützen. Zwei Beispiele werden hier beschrieben: Montilier und Greng, an den Ufern des Moratsees. Wir können zwar der touristischen und ökonomischen Entwicklung der Region keinen Einhalt gebieten, aber die Entwicklung sollte unter Beachtung der natürlichen Umwelt und der archäologischen Fundplätze einhergehen, die in den gleichen Arealen vorkommen. Derzeit laufen Diskussion mit dem Ziel, gerade diese beiden archäologischen Plätze zu schützen, die von europäischer Bedeutung sind. Die ersten Ergebnisse sind positiv und ermutigend, aber es muß noch ein langer Weg gegangen werden, bevor die Plätze als gesichert deklariert werden können.

14. Pétrequin: Heritage management of wetlands: Lakes Chalain and Clairvaux, an example from France

Abstract: Other than in the Jura and north east of the Alps, where work on lake-side archaeology began in the late nineteenth century and revived in the 1970s, survey of wetlands in France has only just begun, in the Mediterranean coastal lagoons and the Marshlands of the Atlantic coast. Despite major rescue excavations and systematic survey, the evaluation and protection of wetlands is still more or less unknown in France, where the legal framework, although in place, is rarely applied. So far, the small lakes of Chalain and Clairvaux, in the Jura, provide the only exception in being considered in national policy for the heritage management of wetlands. The lakes have 15–34 sites respectively, the largest concentration of human settlement in a small lakeland area, and a unique aspect of European heritage for the thirty first and thirtieth centuries BC. Scientific investigation since 1970 has added to the legal protection of those two zones, alongside full archaeological evaluation and physical protection against erosion of the lake shorts. But, economic demands are pressing and responsibility diffuse, and there is pressure to allow a reasonable number of visitors along guided walks through the marsh. There are also problems, with maintenance, and management of the vegetation, and there is no regular forum for the interested parties to meet. Moreover, environmental and landscape conservationists are not interested in this project to protect what is a natural and archaeological environment, which they have already written off.

14. Gestion du patrimoine archéologique en milieu humide: le cas de la France et des lacs de Chalain et de Clairvaux

Résumé: Hormis dans le Jura et au nord-ouest des Alpes, où l'intérêt pour l'archéologie des milieux lacustres a été développé dès la fin du XIXe siècle et a repris dans les années 1970, l'exploration des zones humides commence tout juste en France dans les lagunes du littoral méditerranéen et dans les marais qui bordent la côte atlantique. En dépit de grosses opérations de fouille engendrées par la notion de sauvetage, les évaluations systématiques et les mises en réserve des milieux humides sont encore à peu près absentes du territoire français, dans un cadre juridique pourtant fort, mais rarement mis en application. A ce jour, les petits lacs de Chalain et de Clairvaux, dans le Jura, constituent l'unique exception à être prise en compte dans la politique nationale de gestion du patrimoine en milieu humide. On y compte respectivement 15 et 34 sites d'habitat, qui représentent la plus importante concentration humaine néolithique dans un petit bassin lacustre et un patrimoine unique en Europe pour les 31e et 30e siècles av. J.-C. Les programmes scientifiques développés dès 1970 ont permis la protection juridique de ces deux zones lacustres (classement ou

inscription au titre des Monuments Historiques, achat de terrains gérés par les collectivités locales), parallèlement à des procédures d'évaluation archéologique globale et de protection physique contre l'érosion des rivages (pose de géotextiles, apports de terre et reconstitution massive des ceintures littorales de végétation). Mais, dans une situation où les intérêts économiques sont forts et les responsabilités très diluées, la pression touristique semble devoir conduire à l'introduction d'un flux raisonnable de visiteurs sur des circuits aménagés dans les bas marais; se posent également des problèmes d'entretien et de gestion de la couverture végétale, tandis qu'il n'existe aucune forme de concertation régulière entre les partenaires. Enfin, les défenseurs de l'environnement et des paysages sont absents du projet de conservation d'un environnement naturel et archéologique, qu'ils ont d'ores et déjà laissé condamner.

14. Schutz und management von Feuchtböden: die Seen Chalain und Clairvaux ein Beispiel aus Frankreich

Abstrakt: Anders als im Jura und nordöstlich der Alpen, wo die Arbeit der Seeuferarchäologie im späten 19. Jahrhundert begann und in den späten 1970er Jahre wieder auflebte, hat die Landesaufnahme der Feuchtböden in Frankreich in den mediterranen Küstenlagunen und Marschengebieten der Atlantikküste gerade erst begonnen. Abgesehen von größeren Rettungsgrabungen und systematischer Landesaufnahme ist die Evaluation und der Schutz von Feuchtgebieten immer noch mehr oder weniger unbekannt in Frankreich, wo das entsprechende Gesetzeswerk, obwohl in Kraft getreten, selten angewendet wird. Bislang sind die kleinen Seen Chalain und Clairvaux im Jura die einzigen Ausnahmen nationaler Politik zur Verwaltung des kulturellen Erbes in Feuchtgebieten. Die Seen haben 15 - 34 Fundplätze, und damit die größte Konzentration menschlicher Siedlungen in einem kleinen Seenareal, und sie bieten damit einen einzigartigen Aspekt für europäisches Erbe aus dem 31. und 30. Jahrhundert vor Christus. Wissenschaftliche Untersuchungen seit 1970 haben zum gesetzlichen Schutz von zwei Zonen geführt, die eine vollständige archäologische Evaluation und einen physischen Schutz gegen die Erosion des Seeufers beinhaltete. Dennoch drücken ökonomische Forderungen, die Verantwortung zerstreut sich und es entwickelt sich ein Druck, der eine beschränke Anzahl von Besuchern mit Führungen durch die Marschen bringen will. Es gibt auch Probleme bei der Erhaltung und der Verwaltung der Vegetation, und es gibt kein reguläres Forum, auf dem die unterschiedlichen Interessenparteien zusammentreffen. Darüber hinaus sind Umwelt- und Landschaftsschützer innerhalb dieses Projektes nicht daran interessiert, natürliche und archäologische Umwelt zu erhalten, sondern haben dieses bereits abgeschrieben.

15. Helmut Schlichtherle: Protection and management of the archaeology of the Bodensee and the Federsee

Abstract: Since 1979, the Baden-Württemberg Office for the Protection of Ancient Monuments has carried out systematic survey and rescue of many wetland sites, located in the Alpine Foreland of south-eastern Germany, and the significance of the many prehistoric lake dwellings should be noted. Conditions for the preservation of sites differ markedly between the Bodensee (Lake Constance) and the Federsee, leading to different strategies for the management and protection of the sites. Management depends on co-operation between the archaeological, water and wildlife services. Around the Bodensee, the main problems arise from the demands for public use of the shores and inshore waters, for leisure activities and navigation. Changes in the environment are leading to severe erosion, which poses a real threat to the prehistoric sites. In addition to rescue excavation, made possible through underwater archaeology, work is undertaken to protect the sites from erosion. As for the desiccated Federsee, which today is a large marshy expanse, drainage and modern agricultural techniques have led to severe drying out and decay of waterlogged sites. There are conflicts with many landowners, and with the aims of local communities to expand the road network and the land available for development. A strategy for large-scale archaeological reserves has been developed in close collaboration with the nature conservation agencies. The aim is to transform the whole marshland zone into a nature reserve. Acquisition of land and re-organisation of land-holdings, together with local raising of the water table, will enable a re-wetting of the main archaeological areas. In collaboration with other administrative bodies, and programmes of the European Union, part of the region has already been transformed into a reserve. The creation of archaeological and wildlife trails through the marsh, and development of an open-air archaeological museum, ensure acceptance of these moves at the same time as controlling the influx of visitors.

15. Protection et gestion de l'archéologie du Lac de Constance et du Federsee

Résumé: Depuis 1979, l'Office des Monuments du Bade-Wurtemberg effectue un recensement systématique et une sauvegarde de nombreux gisements en milieu humide situés dans l'avant-pays des Alpes dans le Sud-ouest de l'Allemagne. Il faut avant tout mentionner l'importance de nombreux palafittes préhistoriques. Au Lac de Constance et au Federsee, les conditions pour leur existence sont fortement différentes, ce qui conduit à des stratégies différentes dans l'entretien pratique et préventive des sites. La gestion des gisements repose sur la coopération entre des services d'archéologie, des eaux et de la protection de la nature. Au Lac de Constance, les problèmes se situent surtout dans les demandes d'utilisation publique des rives et des zones d'eau peu profonde pour les loisirs et les besoins de la navigation. D'autre côté, les différents changements dans l'environnement provoquent une érosion forte qui constitue un danger

réel pour la conservation de ces gisements. A part des fouilles d'urgence, rendues possibles grâce aux différentes possibilités de l'archéologie sousmarine, des mesures de protection contre l'érosion sont entreprises. En ce qui concerne le Federsee desséché, qui constitue aujourd'hui un grand terrain marécageux, le drainage et les méthodes modernes de l'agriculture provoquent un assèchement avancé et une décomposition des sites en milieu humide. Des conflits existent avec de nombreux propriétaires et l'intérêt des communes porté sur la construction routière et l'agrandissement des surfaces constructibles. Une stratégie pour la formation de réserves archéologiques à grande échelle à été développé en étroite collaboration avec les services de la protection de la nature. Le but est la transformation de toute la zone marécageuse en réserve naturelle. L'acquisition et le remembrement en surface homogène des terrains ainsi qu'une augmentation locale du niveau d'eau de la tourbière permettra la réhumidification des principales zones archéologiques. En collaboration avec d'autres services administratifs et les communes et avec le soutien des programmes LIFE et LEADER de l'Union Européenne, une partie de la région a été déjà transformée en réserve. L'aménagement de sentiers didactiques (archéologie et sciences naturelles) dans le marais et la création d'un musée archéologique de plein air garantissent l'acceptation des mesures et la canalisation de l'affluence de visiteurs.

15. Schutz und Management archäologischer Denkmale im Bodensee und Federsee

Abstrakt: Das Landesdenkmalamt Baden-Württemberg führt seit 1979 eine systematische Erfassung und Betreuung der zahlreichen Feuchtbodenfundplätze, insbesondere der prähistorischen "Pfahlbausiedlungen" im südwestdeutschen Alpenvorland durch. Die Voraussetzungen sind am Bodensee und Federsee sehr unterschiedlich und bedingen verschiedene Strategien der praktischen und präventiven Denkmalpflege. Das Management der Fundstellen wird von den Denkmalbehörden in Verbindung mit den Wasserbehörden und Naturschutzorganisationen vorgenommen. Am Bodensee liegen die Probleme vor allem in den Ansprüchen öffentlicher und privater Nutzung der Ufer- und Flachwasserzone für Freizeit- und Schiffahrtseinrichtungen. Andererseits bewirken verschiedene Umweltveränderungen starke Erosionsvorgänge. Neben Rettungsgrabungen mit verschiedenen Methoden der Unterwasserarchäologie werden Projekte zur Einbringung von Erosionsschutz durchgeführt. Am verlandeten Federsee, der heute eine große Moorlandschaft bildet, verursachen vor allem die Entwässerung und Methoden moderner Landwirtschaft eine fortlaufende Austrocknung und Zersetzung der Feuchtbodendenkmale. Konflikte bestehen mit zahlreichen Grundeigentümern und dem Interesse der Kommunen an Straßenbau und Ausweitung der Baugebiete. Hier wird in enger Verbindung mit Naturschutzorganisationen eine Strategie großflächiger Reservatbildung verfolgt. Das Ziel ist die Verwandlung nahezu des gesamten Moores in ein Naturschutzgebiet, in dem durch Flächenerwerb, Flächenumlegung und stellenweise Wiederanhebung des Moorwasserpegels archäologische Kernzonen besonders berücksichtigt werden. Ein Teil des Gebietes ist, unterstützt durch EU-Programme (LIFE und LEADER), bereits in ein Reservat verwandelt. Archäologische und naturkundliche Moorlehrpfade und ein Freilichtmuseum sorgen für Akzeptanz und Besucherlenkung.

16. Robert Van de Noort: Thorne Moors: a contested wetland in north-eastern England

Abstract: This paper explores the past, present and future of Thorne Moors. First, the paper addresses the landscape context of the Moors within the Humberhead Levels, and the archaeological and palaeoenvironmental resource. It also examins the management and protection of the archaeological and palaeoenvironmental resources of the Moors. Finally, it looks at the future of the wetland, with reference to the opportunities provided by its possible designation as a Ramsar site.

16. Les avantages archéologiques de l'inscription Ramsar: un cas d'étude du nord-est de L'Angleterre

Résumé: Cet article examine le passé, le présent et l'avenir de Thorne Moors. Premièrement, l'article s'adresse au contexte du paysage des landes à l'intérieur des Humberhead Levels, et les ressources archéologiques et paléoécologiques. Deuxièmement, il examine la gestion et la protection des ressources archéologiques et paléoécologiques des landes. Finalement, il examine l'avenir du milieu humide, en faisant référence aux opportunités fournies par son inscription éventuelle en tant que site Ramsar.

16. Die Vorteile für die Archäologie durch Ziele der Ramsar-Konvention: Eine Fallstudie aus Nordostengland

Abstrakt: Dieser Aufsatz untersucht die Vergangenheit, die Gegenwart und die Zukunft von Thorne Moors. Zunächst zeigt der Aufsatz den landschaftlichen Zusammenhang der Moore mit den Humberhead Levels und ihren archäologischen und paläoökologischen Ressourcen. Es stellt dabei die Verwaltung und den Schutz der archäologischen und paläoökologischen Ressourcen der Moors heraus. Schließlich gibt es einen Ausblick auf die Zukunft des Feuchtgebietes mit einer Referenz zu den günstigen Bedingungen, die durch die möglich Designation als Ramsar-Fundplatz daraus erwachsen.

17. John Stewart: Wetland birds in the archaeological and recent palaeontological record of Britain and Europe

Abstract: Archaeologists, using faunal remains, have been able to identify a number of bird species within the archaeological and palaeontological record, within which wetland birds are represented. This paper presents a taxonomic review of known wetland bird species within this record including species, now extinct, no longer breeding in Britain or northern Europe, or which have in recent years begun to return, or to appear for the first time. Information gained through this record illustrates the past history and development of wetland species and the effects which wetland changes have had on them. The paper demonstrates what this evidence can tell us about the response of wetland bird species to past and therefore possibly future environmental change.

17. Les oiseaux des marais dans la documentation de la paléontologie récente et de l'archéologie en Grande Bretagne et en Europe

Résumé: A partir des restes fauniques les archéologues ont pu identifier un certain nombre d'espèces d'oiseaux au sein de sources archéologiques et paléontologiques, dans lesquelles sont représentés des oiseaux de marais. Cet article présente un bilan taxonomique des espèces d'oiseaux de marais identifiés dans cette documentation, comprenant des espèces disparues, des espèces qui ne se reproduisent plus en Grande Bretagne ou en Europe du nord, ou bien encore celles qui depuis quelques années commencent à réapparaître, ou même apparaître pour la première fois. L'information acquise à partir de ces données illustre le passé et l'évolution des espèces des marais et les effets résultant des modifications des marécages. Cet article démontre ce que ces témoignages peuvent nous apprendre sur la réponse des espèces d'oiseaux de marais aux changements passés et, par conséquence peut être futurs, de l'environnement.

17. Vögel aus Feuchtgebieten in archäologischen und rezentpaläontologischen Zusammenhängen aus Nordwesteuropa, mit besonderem Bezug zu Britannien

Abstrakt: Archäologen, die sich mit zoologischen Funden beschäftigen, konnten eine Anzahl von Vogelarten im archäologischen und paläontologischen Material identifizieren, unter denen auch Vögel aus Feuchtbiotopen repräsentiert sind. Der Aufsatz führt eine taxonomische Analyse von bekannten Vogelarten aus Feuchtbiotopen aus diesen Analysen vor, die auch solche Arten enthält, die heute nicht mehr in Britannien oder Nordeuropa brüten, die in den letzten Jahren begonnen haben, sich wieder anzusiedeln, oder die zum ersten Mal auftreten. Die durch diese Analyse erreichten Informationen illustrieren die Geschichte und Entwicklung der Feuchtboden- Spezies und die Auswirkungen, die Veränderungen der Feuchtgebiete auf sie haben. Der Aufsatz zeigt, wie die Vogelarten aus Feuchtgebieten auf Umweltveränderungen aus der Vergangenheit reagiert haben und können so zu Vorhersagen bei zukünftigen Umweltveränderungen führen.

18. David Bull and Bryony Coles: Archaeology and Ramsar in England

Abstract: Following a consideration of the common ground between the aims of the Ramsar convention and the needs of wetland archaeology, the workings of Ramsar in England are outlined. Five case studies are then examined to explore the position of archaeology within a range of Ramsar sites in England. These are the Cambridgeshire Fens, the Nene Washes, the Midland Meres and Mosses, the New Forest Valley Mires and the Thames and Medway Estuaries and Marshes, and the extent to which archaeology is incorporated into management plans for these sites is found to vary. The paper concludes with a short description of the major differences in the requirements of archaeology and nature conservation, and the prospects for co-operation in protection and management.

18. L'Archéologie et le Ramsar en Angleterre

Résumé: A partir d'une considération des points communs entre les objectifs de la convention Ramsar et les besoins de l'archéologie en milieu humide, cet articl donne un aperçu du travail de la convention Ramsar en Angleterre. Dans une deuxième partie, cinq cas d'études sont examinés, pour étudier la position de l'archéologie parmi divers sites Ramsar en Angleterre. Ceux-ci sont les Cambridgeshire Fens, les Nene Washes, les Midland Meres and Mosses, les New Forest Valley Mires, et les Thames and Medway Estuaries and Marshes .La mesure dans laquelle l'archéologie est incorporée dans les plans de gestion de ces sites se montre variée. Dans un dernier lieu, il y a une courte description des principales différences entre les besoins de l'archéologie et de la protection de nature, et des possibilités de la coopération, tant dans la protection que dans la gestion.

18. Archäologie und Ramsar in England

Abstrakt: Nach einer Betrachtung der Gemeinsamkeiten zwischen den Zielen der Ramsarkonvention und den Bedürfnissen der Feuchtbodenarchäologie werden die Auswirkungen von Ramsar in England umrissen. Dann wird an 5 Fallstudien versucht, die Position der Archäologie in einer ganzen Anzahl von Ramsarfundplätzen in England herauszustellen. Diese sind die Cambrideshire Fens, die Nene Washes, die Midland Meres und Mosses, die Mündungen und Flußmarschen Thames und Medway, und schließlich wird herausgestellt, in welchem Umfange die Integration von Archäologie in Verwaltungspläne für solche Plätze variiert. Der Aufsatz schließt mit einer kurzen Beschreibung

der Hauptunterschiede in den Bedürfnissen von archäologischer und ökologischer Konservierung und in der Aussicht für eine Kooperation beim Schutz und der Verwaltung.

19. David Miles: Ramsar designation and the case of 'Seahenge'

Abstract: This paper considers the effects of sea level change, with particular reference to the British coast and the effects of increased erosion on the inter-tidal zone, revealing previously hidden archaeological features. The case study considers the lessons learnt from the discovery and excavation of 'Seahenge', an Early Bronze Age timber circle, and illustrates some of the predictable and less predictable problems of working in the inter-tidal wetland zone. The monument's location, within the internationally important wetland bird reserve of Holme Dunes, Norfolk, among other designations is a National Nature Reserve and Ramsar site, presented a number of issues described in the case study. The 'Seahenge' problem, provides a good example of where archaeologists and nature conservation representatives have co-operated successfully for the benefit of both archaeology and nature conservation.

19. L'inscription Ramsar: le cas de 'Seahenge'

Résumé: Cet article examine les effets du changement du niveau de la mer, en faisant plus particulièrement référence à la côte britannique et aux effets de l'intensification de l'érosion sur l'estran, révélant des vestiges archéologiques jusqu'ici recouverts. Une étude de cas prend en compte les leçons apprises par la découverte et la fouille de 'Seahenge', un cercle de poteaux du début de l'âge du Bronze. Cet exemple illustre quelques uns des problèmes prévisibles et moins prévisibles concernant le travail sur l'estran. La localisation du monument, à l'intérieur de la réserve d'oiseaux de marais d'importance internationale de Holme Dunes, Norfolk, parmi d'autres appellations une Réserve Naturelle Nationale, et site Ramsar, présente un certain nombre de questions qui sont examinées dans cette étude. Le problème de 'Seahenge' fournit un bon exemple de coopération fructueuse entre archéologues et environnementalistes aussi bien pour le bénéfice de l'archéologie que pour celui de la protection de la nature.

19. Ramsar-Ziele und der Fall des 'Seahenge'

Abstrakt: Dieser Aufsatz betrachtet die Auswirkungen von Veränderungen des Meeresspiegels mit besonderem Bezug zur britischen Küste und den Auswirkungen auf ansteigende Erosionen in der Gezeitenzone, durch die einst verborgene archäologische Strukturen freigespült werden. Die Fallstudie zeigt die Lektion, die die Entdeckung und Ausgrabung eines Sea-Henge lehrt, einer frühbronzezeitlichen hölzernen Kreisanlage, und illustriert einige vorhersehbare und unvorhersehbare Probleme bei der Arbeit in der Gezeitenzone. Die Lage des Monumentes innerhalb des international bedeutenden Vogelschutzreservates von Holme Dunes in Norfolk, das neben anderen Funktionen ein nationales Naturreservat und ein Ramsarplatz ist, hat eine Anzahl von Ergebnissen gebracht, die in dieser Fallstudie beschrieben werden. Das 'Seahenge' Problem gibt aber auch ein gutes Beispiel dafür, wie Archäologen und Umweltschützer erfolgreich zum Vorteil von Archäologie und Umweltschutz kooperiert haben.

20. Jorge Cruz and María-José Viñals: The cultural heritage of Mediterranean Wetlands: a methodological proposal for an inventory

Abstract: Many of the wetlands of the Mediterranean region have been transformed from natural to cultural landscapes, and the resulting traditional agro-ecosystems are now threatened by the pace of modern development. The traditional uses of the wetlands are reviewed: agriculture (rice cultivation), grazing, fishing, harvesting of natural vegetation, hunting, and salt-making. The character and values of the cultural heritage of these wetlands are outlined, to indicate how and why a programme of study, recording and interpretation is required. The pioneering research project of the Museum of Prehistory and Cultures of Valencia is then described as a potential model for similar projects to preserve the cultural heritage of wetlands across the Mediterranean region.

20. L'heritage culturel des sites humides méditerranéeens: une proposition méthodologique pour un inventaire

Résumé: Plusieurs sites humides de la région méditerranéenne ont été transformés de paysages naturels en des paysages culturels, et les agro-écosystèmes qui en résultent sont maintenant menacés par la rapidité du développement moderne. Les utilisations traditionnelles des sites humides sont passées en revue: agriculture (culture du riz), pâture, pêche, récolte de la végétation naturelle, chasse, et fabrication du sel. Un aperçu du caractère et des valeurs de l'heritage culturel de ces sites humides est donné, pour indiquer comment et pourquoi un programme d'étude, d'enregistrement et d'interprétation est nécessaire. Par la suite, le projet de recherche pionnier du Musée de Préhistoire et des Cultures de Valencia est décrit comme un modèle éventuel de projets similaires pour la préservation de l'heritage culturel des sites humides à travers la région méditerranéenne.

20. Das Kulturerbe der mediterranen Feuchtgebiete: ein methodologischer Vorschlag für ein Inventar

Abstrakt: Viele Feuchtgebiete des Mittelmeerraumes wurden von Natur- in Kulturlandschaften verwandelt und die

daraus hervorgegangenen traditionellen agrar-ökologischen Systeme sind nun durch die Geschwindigkeit der modernen Entwicklung bedroht. Die traditionellen Nutzungen der Feuchtgebiete werden betrachtet: Getreideanbau (Reisanbau), Weide, Fischfang, Ernte von Wildpflanzen, Jagd und Salzgewinnung. Eigenart und Wert des Kulturerbes dieser Feuchtgebiete werden dargestellt, um zu zeigen, weshalb in welcher Form ein Forschungs-, Dokumentations- und Diskussionsprogramm benötigt werden. Daran anschließend wird das wegweisende Forschungsprojekt des Museums für Vorgeschichte und Kultur von Valencia als mögliches Modell für ähnliche Projekte zur Bewahrung des Kulturerbes der Feuchtgebiete im Mittelmeerraum vorgestellt.

21. John Coles: Wetlands, archaeology and conservation at AD2001

Abstract: This paper provides an assessment of the current state of archaeology and the cultural heritage in European wetlands. Much of the evidence of the past that survives in wetlands consists of organic material and is subject to degradation by both natural and human agencies. The archaeological community is faced with a number of problems ranging from an unfamiliarity with wetlands to the mass destruction of evidence of the past that is only available on wet sites. The responses of archaeology have been mixed, and range from a number of reactive excavation projects to a very few intensive surveys to identify the resource; several proactive preservation projects have also been undertaken. But a great amount continues to be lost through an inability to cope with the pressures that now crowd upon wetlands both large and small. Recommendations are made which are designed to promote a greater knowledge and understanding of the wetland record, better communication with the discipline and the public, and new efforts at preserving of culturally-rich wetlands in collaboration with well-established and experienced environmental agencies.

21. Les milieux humides, l'archéologie et la conservation en 2001 ap. J-C

Résumé: Cet article donne un analyse de l'état actuel de l'archéologie et du patrimoine culturel en milieu humide en Europe. Beaucoup des témoignages du passé qui subsistent en milieu humide consistent en matériel organique, sujet à la dégradation, tant par les menaces naturels que les menaces humains. La communauté archéologique doit faire face à de nombreux problèmes qui rangent d'un manque de connaissance des milieux humides à la destruction en masse des témoignages du passé qui n'est disponible que dans ces milieux. Les réponses des archéologyes ont été variées, et rangent d'un nombre de projets réactifs de fouilles à quelques peu de recensements intensives pour identifier les ressources; plusieurs projets de gestion proactifs ont également été entrepris. Cependant, une grande perte du patrimoine continue, pour raison de l'impuissance en face des menaces qui pèsent sur les milieux humides, qu'ils soient grands on petits. Des recommandations sont présentées qui visent à encourager une plus grande connaissance et une plus grande compréhension de l'histoire que nous offre les milieux humides, une meilleure communication avec la discipline de l'archéologie et avec le public, et de nouveaux efforts pour la protection des milieux humides, d'une telle richesse culturelle, en collaboration avec les agences écologiques bien établies et expérimentées.

21. Feuchtbodengebiete, Archäologie und Konservierung AD 2001

Abstrakt: Dieser Aufsatz gibt eine Einschätzung des derzeitigen Status von Archäologie und kulturellem Erbe in europäischen Feuchtgebieten. Die meisten Zeugnisse der Vergangenheit, die in Feuchtböden überdauern, bestehen aus organischen Material, das der Verwitterung durch natürliche oder menschliche Einwirkungen ausgesetzt ist. Die Gemeinschaft der Archäologen ist mit einer Zahl von Problemen konfrontiert, die von dem ungewohnten Umgang mit Feuchtbodengebieten reicht, bis zu dem Umfang an Zerstörung von Relikten der Vergangenheit, die nur auf Feuchtbodenfundplätzen gefunden werden können. Die Antworten der Archäologie waren gemischt, und reichen von einer Anzahl von Ausgrabungsprojekten bis hin zu einer kleinen Zahl intensiver Landesaufnahmen mit dem Ziel, die Ressourcen festzustellen; auch eine Anzahl von Projekten zur Sicherung wurden durchgeführt. Aber eine große Anzahl geht ständig wegen des Unvermögens verloren, dem Druck, der jetzt auf die Feuchtbodengebiete ausgreift, zu widerstehen. Es werden Vorschläge gemacht, wie eine größere Kenntnis und größeres Verständnis für das Feuchtbodenarchiv, eine bessere Kommunikation zwischen der Fachdisziplin und der Öffentlichkeit erreicht werden kann, und wie neue Anstrengungen bei der Konservierung kulturreicher Feuchtgebiete in Zusammenarbeit mit gut entwickelten und erfahrenen Umweltagenturen erreicht werden können.

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The Heritage Management of Wetlands in Europe

Edited by Bryony Coles and Adrian Olivier
Assistant Editor David Bull

In November 1999, at the inaugural meeting of the *Europae Archaeologiae Consilium*, a symposium was held on the Archaeological Heritage Management of Wetlands in Europe. In the discussion, delegates emphasised the urgent need to forge much closer links with nature conservation interests, and especially with the international Ramsar Convention on Wetlands. This volume brings the two aspects together through papers on concepts and legislation relating to archaeology and nature conservation in Wetlands, and with papers presenting regional reviews, case studies and related topics. The volume concludes with an overview and recommendations for future action, and a response by the EAC setting out a broad strategy for the heritage management of wetlands in Europe.

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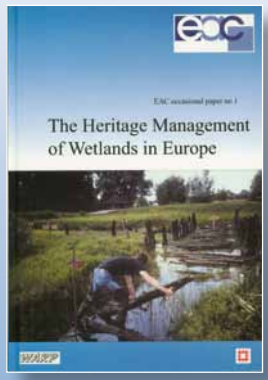

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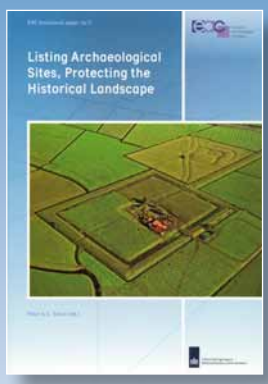

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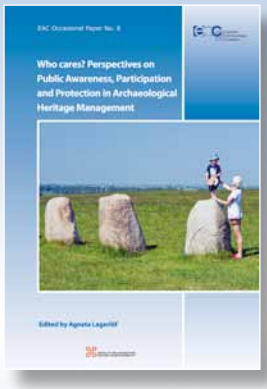

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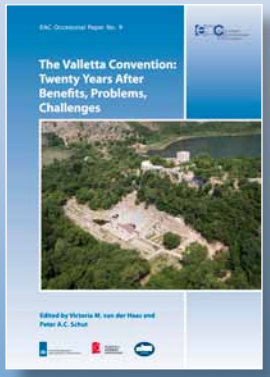

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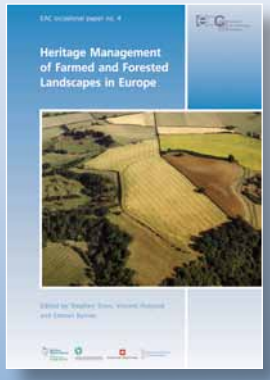

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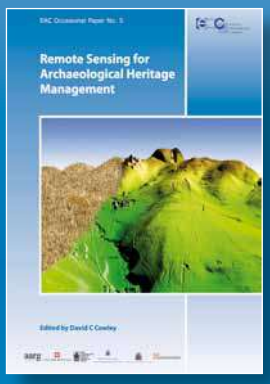

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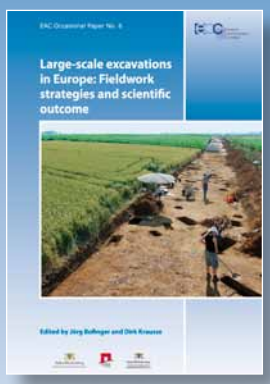

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