

ENVIRONMENTAL STUDIES IN THE WELSH SEVERN LEVELS, PROPOSALS FOR A CO-ORDINATED RESEARCH STRATEGY

by Rick Turner

Introduction

Our knowledge of the extraordinarily diverse environmental potential of the Severn Levels has grown dramatically over the past ten years. Available for study is the whole history of the area, with traces of activity from the Lower Palaeolithic onwards and an almost unbroken sequence of geological deposits since the end of the last glaciation. The history of this area has been governed by the vast tidal range within the Severn Estuary. There have been major and minor fluctuations in the heights and range of the tides since the last glaciation caused by variations in both land and sea-level.

The accretion and erosion of the sediments carried by the tide and the development of peats within open fresh water trapped behind the estuarine clays and silts, has provided many opportunities for rich and diverse plant communities to colonise these areas. Each plant community has supported its own invertebrate and vertebrate fauna. Within the intertidal flats there are rock and gravel areas, mobile sands, silts and clays. At the tidal limit, salt marshes have formed, and the estuarine clays at periods of relatively low sea-level have supported developed oak woodlands and grasslands. Full peat sequences have developed along the dryland margins and on what are now tidal flats. Rivers and reens have their own particular plant communities.

Into this rich, diverse and ever-changing pattern of environments came man. His desire to exploit and husband the resources of the area has been an increasing factor in the development and character of the Severn Levels. The Levels fringe a densely settled area of lowland South Wales and

South-West England, whose population was well-placed to draw on the resources they offered. One of the most valuable resources has been fish, salmon and eels in particular, caught by a range of very long-standing forms of traps and weirs (see Green p. 69 and Godbold and Turner p. 45). Game animals grazing on the Levels were also of great importance in earlier periods. The skeletal evidence of deer and aurochs in particular shows that these animals were widespread into the Bronze Age if not later. During later periods, the salt marshes, peat fens and reclaimed grasslands supported seasonal and permanent grazing. Wildfowling would also have been a significant resource as well as perhaps trapping for furs (beavers are recorded at the Caldicot Lake Bronze Age site).

The plant communities also offered plenty of valuable resources. Woodland produced timber, withies for basketry and hurdling, and firewood, perhaps supplemented by peat for fuel. Reeds could be used for thatch, rushes for flooring and there was a variety of wild food and medicinal plants. Reclaimed pastures provided very rich grazing. Even the geological formations provided resources: clay for pottery, bog iron ore and in modern times gravels for construction.

The Severn Estuary and its associated rivers have long been a highway for trade. The discovery of part of a Middle Bronze Age boat at Caldicot and other boat fragments at Goldcliff (see p. 19) shows this to have been the case for over 3,500 years if not longer. Modern man is so conditioned to travelling by car we forget how easy communication would have been between the two long sea coasts on either side of the estuary.

Man's greatest impact on the landscape has been his success in reclaiming the Levels. Archaeological evidence shows that this was initiated and developed over wide areas by the Romans (see Allen *et al.* p. 31). The present pattern of settlement also reveals that this continued to grow throughout the Middle Ages with some setbacks and the existing system of sea defences probably originated in the sixteenth century and has been developed since. Even sea defences cannot hold back the most violent tides, as the famous inundation of A.D. 1606 showed. The drainage has grown more sophisticated in modern times when much of the existing pattern of reens behind the seawall was established and the Commissioners of Sewers and later the Drainage Boards took control.

The sea defences and drainage have not only changed the surface appearance of the reclaimed levels, they have caused the peatlands along the dryland margins to shrink and they now lie lower than the estuarine clays behind the seawalls. The security provided by the modern regime has also enabled large-scale industrial development on the Levels on areas where hitherto traditional farming only has been practised.

There are *c.* 8,600 ha of reclaimed land in the Gwent Levels. This area divides into two: the Wentlooge Level to the west of the Usk and the Caldicot Level to the east. A report prepared by the Nature Conservancy Council in 1991 identified that at 18 July 1990 there were pending or proposed developments affecting 663 ha of the Gwent Levels, representing the potential loss of 19% of the Wentlooge Level and 6% of the Caldicot Level. Subsequent to that date the construction of the Second Severn Crossing across the Caldicot Level will increase pressure to release further areas for industrial development. The initial planning stage for the M4-Newport Relief road has begun, which, if built, may have the same effect on the

Levels south of Newport.

The inter-tidal area is also threatened. The sea is actively eroding the low clay cliffs and the peat shelves in front of the seawall. This is revealing and destroying an extraordinary range of archaeological sites (see Bell p. 15, Allen *et al.* p. 31 and Godbold and Turner p. 45). The rising sea-level has also meant that a 10-year programme of raising the sea defences has been initiated and the extraction of the necessary clay may have archaeological and environmental consequences. There are barrage proposals at Cardiff and on the Usk at Newport. The construction of these barrages, the provision of alternative bird habitats and the possible change in outer river channels may have consequences. If the long-term plans for a Severn Tidal Barrage were carried out, the character of the whole region would change. Proposals have been floated for the siting of an international airport on the Welsh Grounds and Bedwin Sands, the largest expanse of inter-tidal flats in the estuary, with all its servicing sited on the Gwent Levels.

This accelerated pace of development within the levels area demands an accelerated response from those bodies concerned with the environment of this unique area. All areas of study and conservation in this area must be informed by a historical perspective. The landscape has always been transient and controlled by three powerful forces, the natural forces of the tide and sediments it carries, the plant and animal communities which colonise the area, and man's desire to influence and exploit the resources that it contains. The Levels also provide a unique opportunity to investigate the history of these forces as it preserves such a wide range of evidence within the sediments. The danger is that the pace of redevelopment is moving faster than the present capacity to properly judge and react to these developments.

The Conservation Agencies

There are three broad areas into which the responsibility of the different conservation agencies can be divided: the natural environment, the historical environment, and water management and sea defences. These will be briefly examined individually.

(1) Natural Environment

Within Wales most of the Gwent Levels is designated or proposed as an SSSI (c. 6,000 of the 9,000 ha). This will be the largest SSSI in Wales. The Nature Conservancy Council produced two reports on nature conservation on the Gwent Levels in 1977 and 1982 which led to the proposal of the SSSI. Notification began in 1987 in the Nash and Goldcliff areas and had moved eastwards to cover the whole of the Caldicot Level. Notification has only just begun on the Wentlooge Levels, west of Usk. The main aim of the SSSI is to maintain and enhance the plant communities of the reens and their banks. This is governed by three main factors: the management of the water levels, the management of the reens and their banks, and the water quality and how this is influenced by the use of the surrounding land.

The inter-tidal area of Welsh Severn Levels all lies within the Severn Estuary SSSI which is also proposed as a Ramsar site. The main interests here are the migratory wader and wildfowl populations which are of international importance, and the plant and invertebrate communities on which they feed. There are also restrictions aimed at preserving the fish stocks within the estuary.

The Countryside Council for Wales are responsible for managing all the statutory functions relating to these SSSIs. Their policies and aims are put forward in a report 'Nature Conservation and Physical Development on the Gwent Levels', published in 1991.

The Gwent Wildlife Trust own and

manage the Magor Marsh Nature Reserve, the last relic of the unimproved landscape of the Gwent Levels. They are also responsible for wardening much of the area of the two SSSIs and undertaking systematic botanical recording within the area.

The Royal Society for the Protection of Birds has been particularly active in promoting the interest of the bird population within the estuary. Should the Cardiff Bay and Usk Barrages be constructed, they will be responsible for managing the alternative feeding grounds to be excavated within the Gwent Levels.

(2) Historic Environment

Cadw: Welsh Historic Monuments is responsible for the scheduling of ancient monuments and the listing of historic buildings. It is only within the last ten years that the extraordinary richness of the archaeological remains has been realised. Sites have been revealed by the tide in the estuary and by chance during construction in the reclaimed areas. Statutory protection through scheduling is very hard to apply in these circumstances. There are only two scheduled ancient monuments protected within the Gwent Levels, both Medieval moated sites, typically of thirteenth and fourteenth century date. The dryland margins of the levels have a very high concentration of scheduled ancient monuments, where the sites are more visible and easier to define. This high concentration is a reflection of the extent and wide range in period of the sites now being identified out on the Levels themselves. Cadw has been heavily committed to the grant-aiding of rescue excavations in this area, particularly over the past five years at the Caldicot Lake Bronze Age site and more recently through the auspices of the Severn Estuary Levels Research Committee at a number of sites in the inter-tidal area. Cadw has also advised and partly undertaken work on behalf of

the Welsh Office Highways Directorate in advance of the Second Severn Crossing. Within the villages and farms on the Gwent Levels are a number of listed buildings, though the last survey of these areas was over 30 years ago.

The Glamorgan-Gwent Archaeological Trust are responsible for maintaining the Sites and Monuments Record for the area, which aims to include all records of archaeological sites and finds known from the Levels. They have also undertaken much of the practical fieldwork in the area on, for example, Caldicot Lake Bronze Age site, and assessments for the Second Severn Crossing and the Alternative Bird Feeding Grounds, Rumney.

The National Museum of Wales, Newport Museum and Monmouth Museums all hold collections from the area and have grant-aided excavations and undertaken fieldwork themselves on different aspects of the Levels.

The Severn Estuary Levels Research Committee provides a forum for all those interested in the investigation of the history and archaeology of the Severn Estuary as a whole. Their membership includes universities, museums, statutory bodies, local authorities and private researchers. Projects organised under their umbrella on the Welsh side have included excavations and surveys at Goldcliff, Chapel Tump, Uskmouth and Rumney Great Wharf, and assessment work for the Severn Tidal Power Group.

(3) Water Management and Sea-Defences

The National Rivers Authority are now responsible for all the main rivers entering the estuary and the sea-defences which protect the Gwent Levels. They also monitor water quality and prosecute those who fail to maintain that quality. In the light of the threat of steadily rising sea-level, they have just embarked upon a 10-year, ten million pound programme to raise the sea-defences all along the Welsh side

of the estuary.

The drains, reens and smaller watercourses which serve the Gwent Levels are maintained and managed by the Caldicot and Wentlooge Levels Drainage Board who have inherited the responsibility of the earlier Commissioners of Sewers. The records of these bodies contain much vital information on the evolution of the landscape in the Levels.

Standing above those with specific interests and responsibilities are two other important groups. Firstly, and most importantly, are the farming community and other landowners who maintain the landscape of the Gwent Levels. Secondly, there are the local planning authorities (Gwent and South Glamorgan County Councils, Newport and Monmouth Borough Councils, and Cardiff City Council) responsible for overseeing the future development of the region.

Research Priorities

Such is the pace of redevelopment in the Welsh Severn Levels, there is now an urgent need to develop a unified research strategy for the region. The following is an initial attempt to define the main priorities. It lists four main areas of mutual interest for the conservation agencies described above. It also attempts to identify lines of enquiry that could be encouraged or initiated and outlines their expected outcomes. These lines of enquiry are not given to the exclusion of others, or in any order of priority, and comments would be welcome from members of the Severn Estuary Levels Research Committee and others.

(1) Sea-level Change and Land Reclamation

- (a) Greater refinement and mapping of the sedimentary sequences defined by Allen and peat sequences defined by Smith and others.

- (b) The continued identification of Romano-British exploitation of the Levels and comparison with patterns now established in Gloucestershire and Somerset.
- (c) Using aerial photographic and other remote sensing data, to undertake the systematic mapping of the earlier drainage patterns within the Levels.
- (d) Historical and topographical research into the Medieval settlement patterns of the levels to show the changes in exploitation.
- (e) Research into the Post-Medieval history of the sea defences and the existing drainage pattern behind the seawall.
- (c) Analysis of buried and datable reens to show what the historic plant communities were within those features.
- (d) Documentary research into modern and Medieval records to show aspects of the vegetational history now lost in the landscape.
- (e) More detailed mapping of the existing plant communities within particularly threatened areas, for example, surviving salt marsh, eelgrass beds, and proposed development sites.

Expected Outcomes

- (1) A better understanding of the changes in sea-level against which the present concerns about the rising sea-level can be measured.
- (2) The basis of a predictive model of where buried archaeological and sedimentological sites of importance are more likely to occur and be threatened by development.
- (3) The identification of the different phases of drainage within the landscape and development of policies to protect the environmentally and historically most significant of them.
- (4) The identification of different phases of sea-defence before they are lost under proposed improvements.
- (5) An educational resource.

(2) *Vegetational History of the Levels*

- (a) Further analysis of the peat exposures within the inter-tidal zone, both in plan and section as they are being destroyed by the sea.
- (b) Greater analysis of the peat

Expected Outcomes

- (1) Information from which to guide any future creation of new environments within the Levels.
- (2) Identification of trends in the distribution of threatened species.
- (3) Assessment of man's impact on the landscape through time.
- (4) An educational resource.

(3) *History and Archaeology of the Levels*

- (a) Systematic mapping, recording and selective excavation of sites exposed on the peat shelves in the inter-tidal zone.
- (b) Documentary and oral history of traditional fishing methods, linked to fieldwork to locate and date fishweirs and fishtraps within the estuary.
- (c) Development of noninterventional prospecting methods for locating sites within alluvium.
- (d) Study of existing and future waterlogged wood assemblages to show the changing woodland management practices and development of woodworking technology.
- (e) Survey of the surviving buildings on the Levels to indicate periods

of prosperity and change in the Medieval and Post-Medieval periods.

Expected Outcomes

- (1) An adequate response to the existing threatened archaeological sites.
- (2) The development of a strategy to both preserve and investigate the most important aspects of the historic landscape.
- (3) Further the recording and study of waterlogged wood assemblages.
- (4) The promotion of a wider awareness of the special nature of this area and its use as an educational resource.

(4) *Environmental Audit*

- (a) The further development and interrelating of existing databases concerning the Levels. This consists of the Sites and Monuments Record held by the Glamorgan-Gwent Archaeological Trust, botanical records held by the Gwent Wildlife Trust's plant recorder, geological and sedimentary records held by many institutions, remote sensing information gathered by the Natural Environment Research Council.
- (b) The development of systems of environmental audit by which all developments on the Levels could be assessed for their impact on the different strands of the environment identified in this paper taken together, rather than treated separately by the different agencies.

Expected Outcomes

- (1) More informed planning decisions.
- (2) More successful design of mitigatory measures.

- (3) The more effective application of statutory protection by the different governmental agencies.
- (4) A greater awareness of the environmental importance of this remarkable area.

Co-operation and Interaction

No part of the Welsh Severn Levels now seems free from the threat of development, changes in land-use, or erosion by the sea. The purpose of this paper and its long introduction is to propose greater co-operation between those involved in the environment of the Severn Levels. This co-operation will be developed through stimulating interdisciplinary projects of mutual interest. The projects will be aimed at improving our understanding of the history and present state of the Levels, developing an integrated or interactive database relating to the environment of the Levels and developing this information and understanding into the assessment and modelling of the impact of any development proposal within the Levels. The results of the academic research proposed here will have a direct bearing on the future of this remarkable landscape.

As the pace of development increases on the Welsh side of the Severn Levels, there will have to be a greater effort by all the bodies with an interest in the conservation of this area. To make the most of the resources available, projects and initiatives will need to share joint aims. No one organisation has sufficient expertise to cover all areas. Also, the problems and potential of the Severn Levels are not limited to Wales and joint initiatives could also be developed with equivalent organisations on the English side.

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