The Upper Submerged Forest of Goldcliff East, South Wales, Severn Estuary

Scott Timpany 1
Emma Tetlow 2

1 Headland Archaeology Ltd, 13 Jane Street, Edinburgh, EH6 5HE
2 The University of Edinburgh, Institute of Geography, School of Geosciences, Drummond Street, Edinburgh, EH8 9XP

Introduction

The palaeocoecological work on the Upper Submerged Forest at Goldcliff East, south Wales was undertaken as part of PhD studies by the authors, at the University of Reading and the University of Birmingham, respectively. These studies are linked to a wider study of the submerged environment in southern Wales funded by the Natural Environmental Research Council (NERC) and CADW. Further results of this work have recently been published in Bell (2007). The Upper Submerged Forest at Goldcliff East was investigated at three sites across the upper peat shelf; Sites J, F and K (see Figure 1). This study concentrates on the results gained from Site J a wetland/dryland interface, located on the eastern edge of the former Goldcliff Island, which rose c. 18m above a basal sub-sea-level rock platform (Allen, 2000). Extensive eldwork and systematic sampling at Goldcliff East between 2001 and 2003 produced a comprehensive data set of palaeoenvironmental information, including insects, pollen, waterlogged plant and wood analyses (Tetlow, 2005, Timpany, 2005).

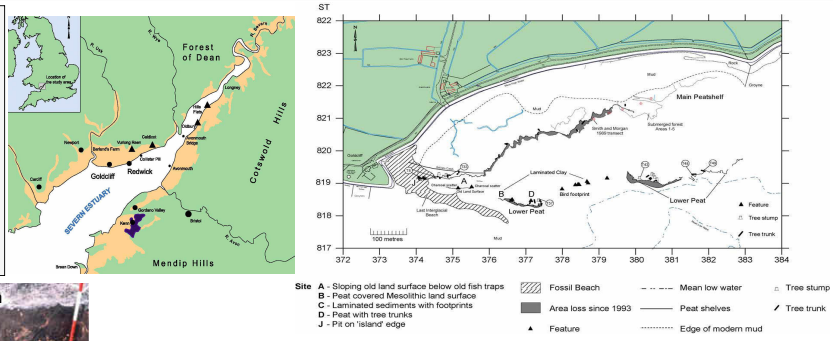


Figure 1 Location Map Goldcliff East and Site locations

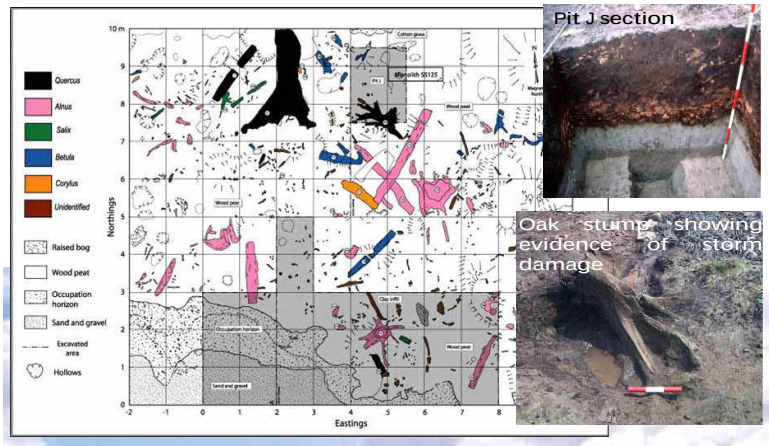


Figure 2 Wood Plan, Site J, Goldcliff East

Method

Wood identifcation samples were taken from trees following the planning of the area of submerged forest. Pollen, insect and plant macrofossil samples were recovered from a sampling Pit at Site J approximately 2 metres deep, cut between 7.5 metres and 9.5 metres from the Mesolithic edge the former Goldcliff Island and situated at 1.49 metres OD. Radiocarbon dating indicates peat formation commenced at 5749±23BP (OxA-12356; 4690-4520 Cal. BC), a further radiocarbon date from the current surface of the peat indicates formation continued until at least 5061±21BP (OxA-12355; 3950-3790 Cal. BC) (Bell 2007).

Discussion

The palaeoenvironmental evidence shows that the Upper Submerged Forest at Site J developed from a primarily open environment of reed swamp/sedge fen, which was invaded by arboreal species including Salix, Betula and Alnus. The increase in micro-charcoal values is thought to represent the burning of reeds from micro-charcoal fragments retaining enough structure to identify as grasses. This may represent deliberate burning of the reedswamp environment by people in order to manage the growth of reeds (see Timpany, 2005).

Carr-woodland dominated by Alnus developed as it spread across the wetland and was present from 5749±23BP (OxA-12356; 4690-4520 Cal. BC) to 5061±21BP (OxA-12355; 3950-3790 Cal. BC), a period of c. 700 years. This is shown overwhelmingly in the pollen and wood identifcations but it is less well represented in the plant macrofossil and insect assemblages. The field layer is suggested to have consisted of tall-herb fen with Rubus ideaus also a signifcant component. Insect evidence dominated by aquatic and waterside species highlights the consistent wetness of the woodland floor; this is also indicated by the non-pollen palynomorphs in particular the presence of Types 62 and 72.

The latter stages of woodland development saw the increased presence of Quercus, which can be seen by the large tree remnants and in the insect record. These trees are likely to represent the spread of Quercus into the wetland from the dryland as indicated by the dendrochronological records (see Bell, 2007) and is the final stage of woodland succession at Site J.

The insect, pollen and plant macrofossil assemblages have combined to give an indication of not only the canopy layer but also the field layer of this woodland, together with indicating the possible presence of animals and pooling of water in the woodland.

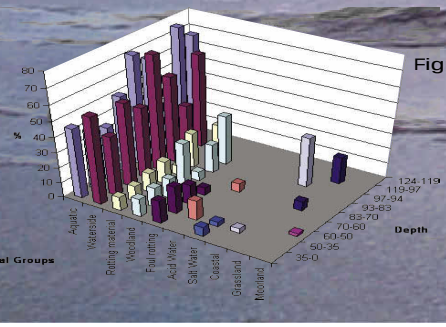
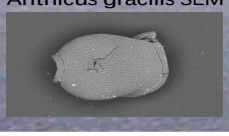


Figure 5 Insect results Pit J



Results

Wood:

Measured OD heights from wood identifcation samples chart the in-situ vegetational succession at the site. This can be seen in Figure 2, as the peat surface slopes seaward, from north to south, a difference of c. 1.5m OD. Larger tree remains at the north of the site rise some 2m in height from the peat surface. Therefore the wood plan shows a palimpsest of woodland succession from south to north. The first trees to invade the wetland at the island edge were largely Alnus, with Betula, Quercus and Salix. Figure 2 shows this initial carr-woodland was succeeded by Betula, Alnus, Salix and Corylus carr-woodland and was later invaded by Quercus, which represents the final stage of woodland succession at Site J.

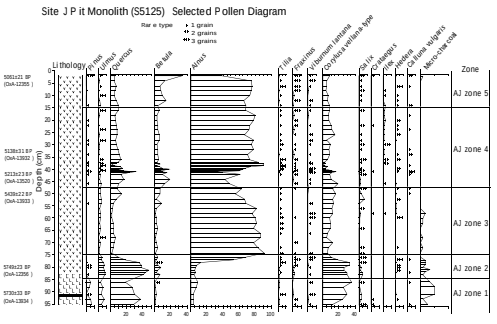
Pollen, non-pollen palynomorphs and plant macrofossils:

The pollen and non-pollen palynomorph results are presented in Figures 3a & 3b, with the plant macrofossil results shown in Figure 4. The pollen and plant macrofossil evidence shows the presence of a locally open environment of Poaceae and Cyperaceae dominated plant communities with sporadic arboreal presence of Alnus, Betula and Salix. There is also a strong signal from the Quercus-Corylus woodland on the dryland, whilst micro-charcoal values are also high (AJ Zone 1 into 2). The expansion of the Alnus carr-woodland is then evident with large increases in the pollen values, while Poaceae and Cyperaceae values decrease (AJ Zone 2 to 5). The plant macrofossils and wood identifcations show that Betula was also a signifcant part of this woodland, despite its lower pollen values. A field layer of tall-herb fen communities is suggested by the pollen with Lychnis-type, Filipendula, Apiaceae and Lactuceae all present, together with reduced Poaceae and Cyperaceae pollen (Rodwell, 1995). The plant macrofossil assemblage indicates Rubus ideaus was also an important part of this layer (AJ Zone 2 to 5). Non-pollen palynomorphs present such as Type 55 a/b (Sordaria sp.) have been found to relate to rotting wood and animal dung (van Geel, 1986) and may indicate the presence of animals moving within this woodland.

Insects:

The results of the insect analysis are presented in Figure 5. Samples from the base of Pit J suggest an absence of the tall reed swamp, which has been virtually ubiquitous throughout the estuary and point to the presence of a dominant sedge community. The numbers of taxa related to aquatic and waterside habitats (e.g. Hydroporus spp.) are present throughout the sequence, although fall slightly around 50-70cm suggesting a drier phase with preservation of remains becoming poorer. Woodland indicator species such as Rhyncaenus sparsus are present from around 97cm but unlike arboreal pollen do not dominate the assemblage. These taxa are likely to represent both the local carr-woodland environment and some signal from woodland on Goldcliff Island. The defnition of Alnus carr-woodland in the archaeological record using entomological methods is problematic (e.g. Tetlow, 2005). This is compounded by the limited number of taxa (14) associated with Alnus in comparison with other trees e.g. Quercus sp (93) (Bullock 1993). Wetter conditions are signalled towards the top of the sequence with an increase in waterside and aquatic communities, such as Curculionidae and Hydrophilidae.

Figure 3a&b Selected pollen diagram for Pit J



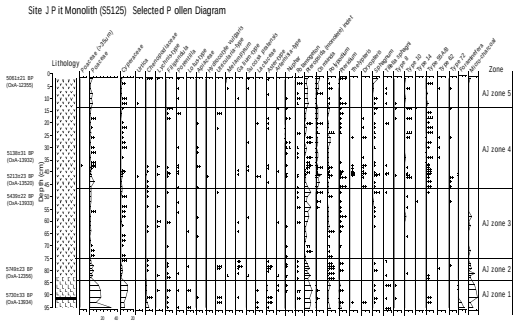
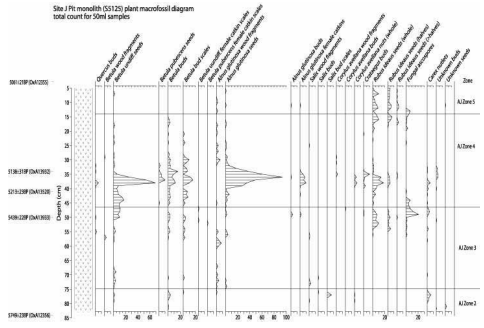


Figure 4 Plant macrofossil diagram for Pit J



References
Allen J.R.L. (2000) Goldcliff Island: geological and sedimentological background, in Bell M.G., Caseldine A. and Neumann H. (2000) Prehistoric Intertidal Archaeology in the Severn Estuary York: C.B.A. Research Report 126, 12-18.
Bell, M. G. (2007) (ed.) Prehistoric Coastal Communities: The Mesolithic in western Britain. York: CBA Research Report 149.
Bullock, A. (1993) Host plants of British Beetles: A list of recorded associations. Amateur Entomologist 11a. 1-24
Rodwell J.S. (ed.) (1995) British Plant Communities Volume 4. Aquatic communities, swamps and tall-herb fens (Cambridge University Press, Cambridge).
Tetlow, E. A. (2005) The Palaeoentomology of the Coastal Woodlands and Salt marshes of the Severn Estuary and Bristol Channel – The Development, Exploitation and Decline of a Human Resource. Unpublished PhD Thesis, University of Birmingham.
Timpany S. (2005) A multi-proxy palaeoecological investigation of submerged forests and intertidal peats, Severn Estuary, UK. Unpublished PhD Thesis, Reading University.
van Geel B. (1986) A Palaeoecological Study of Holocene Peat Bog Sections Based on the Analysis of Pollen, Spores and Macro- and Microscopic Remains of Fungi, Algae, Cormophytes and Animals (Amsterdam: Geboren