6. Bronze Age Human Ecodynamics in the Humber Estuary

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For much of lowland Britain during the Holocene one important factor in determining environmental change was sea level fluctuation. A net rise of circa 20 m, within an oscillating *short term picture of transgression and regression, caused significant short to medium term challenges for people exploiting those resources. During transgression phases estuarine creek systems extended landwards, and during the final transgression phase, widespread sedimentation took place, allowing for the development of saltmarshes on tidal flats.*

In later prehistory the exploitation of lowlands and estuarine wetlands was predominantly for fishing, waterfowling and pastoral use, and this paper explores the human ecodynamics of the intertidal zone in the Humber estuary during the Bronze Age. Results of the Humber Wetlands Project's recent estuarine survey, will be used to argue that following a marine transgression circa 1500 cal BC, the foreshore was fully exploited in terms of food procurement. Furthermore the construction of hurdle trackways allowed access across expanding tidal creek systems to be maintained. This not only shows continued use of the most productive environments, and provides evidence for selective use of woodland, but also the continued exploitation of the intertidal zone may have played a role in the evolution of social and political structures in this area during the Bronze Age.

Keywords: WETLANDS; HUMBER ESTUARY; BRONZE AGE; SEA LEVEL CHANGE; TRACKWAYS; EXPLOITATION.

INTRODUCTION

The exploitation of the north west European coastal resources within hunter-gatherer groups is well established, as is the reclamation and occupation of intertidal areas in the Roman period (e.g. Zvelebil *et al.* 1998; Rippon 1996). However, the value of coastal resources in early agricultural societies has been less widely explored, and the early agriculturists who settled within or near intertidal areas have been conveniently labelled *transitional* agriculturists. It has been assumed that the technical ability and political and social structures necessary to exploit the intertidal zone were absent, or restricted to small-scale exploitation during periods of relative sea-level fall. Studies in the East Anglian Fens, for example, suggest a broad retreat of prehistoric human activity in advance of the wetland development resulting from sea-level rise (Hall and Coles 1995).

This paper explores the human ecodynamics of the intertidal zone in the Humber estuary during the Bronze Age, using evidence provided by a recent estuarine survey. The paper will argue that the foreshore was fully exploited in terms of food procurement, and also that marine transgression and the developing intertidal zone may have played a role in the developing and evolving social and political structures in this area during the Bronze Age.

THE HUMBER ESTUARY: AN ARCHAEOLOGICAL RESOURCE

The Humber estuary in its current form is about 30,000 ha of water, sandbanks, mudflats, islands, and an ever decreasing amount of saltmarsh. The river Humber commences at the confluence of the rivers Ouse and

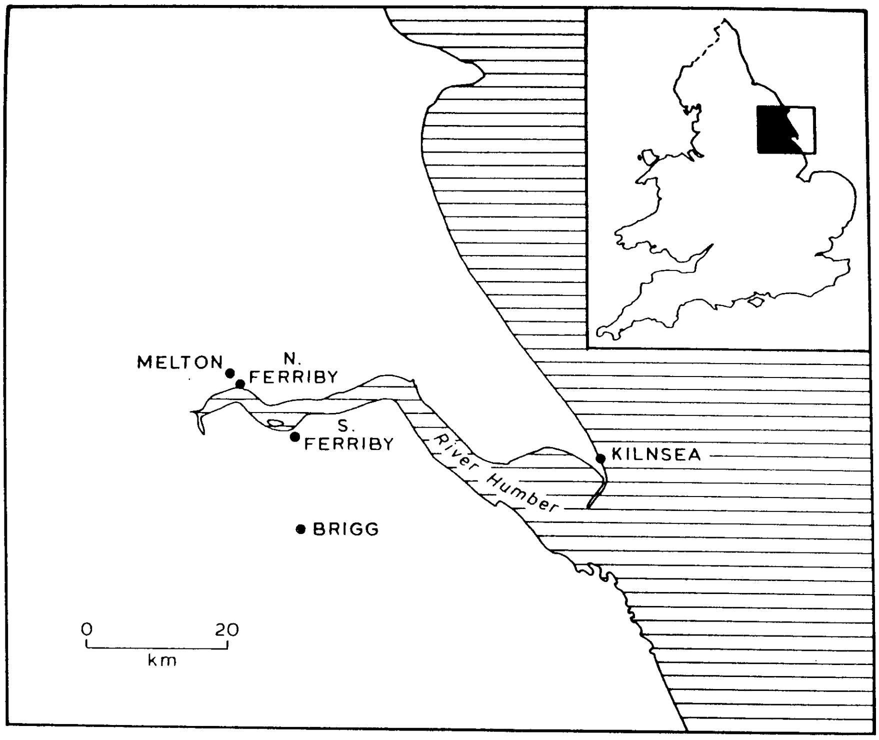

Figure 6.1 The Humber estuary, and main locations referred to in the text.

Trent in the west, and flows into the North Sea in between Spurn Point and Donna Nook in the east (Fig. 6.1). Through its many tributaries, including the rivers Ancholme and Hull, about 20% of the landmass of England is drained through the Humber (Pethick 1990). The current situation is one of increasing erosion, particularly of the intertidal zone. This is, in part, the result of a long process of land reclamation combined with the construction of hard defences, resulting in increased flow rate and tidal range. Sea-level change, and the *flushing* of precipitation through the network of field drains and drainage channels in the estuary's hinterland have resulted in a problem known as *coastal squeeze* (Ellis and Van de Noort 1998) (Fig. 6.2).

Coastal squeeze is not a new phenomenon. Dakyns noted as early as 1886 the exposure of bog oaks on the northern shore of the Humber (Lillie 1999), and when Ferriby-1 was discovered in 1937, the then extensive peatshelf at North Ferriby was already eroding (Wright 1990). The problem is augmented around North Ferriby by the shipping channel, which changes its course within the estuary at a regular interval, and is currently contributing much to the lateral erosion of the peatshelf at North Ferriby and Melton. As a consequence, the problem of coastal squeeze is now greater than ever before, as real and projected sea-level change has accelerated the construction of hard embankments to prevent future flooding.

The archaeological resource of the intertidal area of the Humber estuary is closely linked to the erosive nature of the Humber, and the discoveries made during the previous seven decades are often associated with the nearness of the shipping channel. The discoveries of the boats Ferriby-1, -2 and -3, and more recently of a Roman period road at South Ferriby, have all been attributed in part to the enhanced visibility resulting from accelerated erosion (Wright 1990; Chapman *et al.* 1998).

The systematic survey of the foreshore as part of the English Heritage funded Humber Wetlands Survey, and its subsequent management as part of the overall flood defence scheme, is therefore timely (Van de Noort and Ellis 1999). The logistics of the survey required a rigid inflatable boat, which provides access and safety in this environment that is not without danger. The boat gave the survey flexibility and efficiency and enabled the investigation of about a quarter of the estuary during 1998. Areas with the highest potential, such as North Ferriby, were systematically surveyed at low tide. The sites were located using differential GPS (Global Positioning System), the versatility of which allowed the survey of complex structures and individual stakes, which could be located to within a centimetre.

DEVELOPMENT OF THE ESTUARY

The Holocene development of the Humber as an estuary commences after *circa* 8000 cal BC, when the run-off of

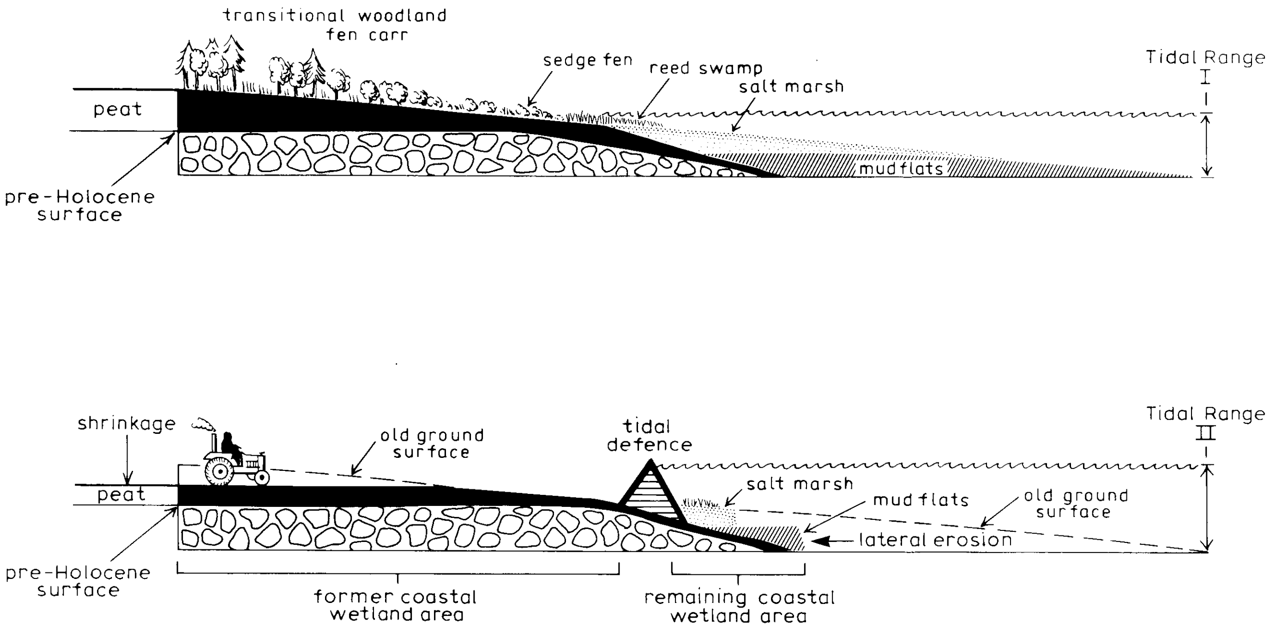

Figure 6.2 Schematic representation of the effects of coastal squeeze.

this catchment is impeded by the rising sea-level (Berridge and Pattison 1994). The estuarine development in the Humber lowlands is time-transgressive, with wetlands developing in the lower estuary well before the upper estuary (Gaunt and Tooley 1974). For example, the *dry valleys* of southern Holderness experienced estuarine incursions around 5000 cal BC, the lower *Ancholme valley* around 4000 cal BC, and the lower *reaches* of rivers in the Humberhead Levels came under *tidal* influence from about 2300 cal BC, and further up the catchment, the extensive raised mires development of Thorne and Hatfield Moors dated to *c.* 1800 cal BC (Dinnin and Lillie 1995; Dinnin 1997; Neumann 1998).

The widespread paludification resulted in the formation of a basal peat in the floodplains throughout much of the Humber wetlands. We can plot the wetland development in the area around the Humber as represented by this basal peat. The most reliable evidence is taken from the Humber's tributaries, where past and present erosion is more limited than within the estuary itself. Such work undertaken in the lower reaches of the Ancholme valley shows a dated expansion of wet alder-dominated fen mire as a result of higher groundwater tables and paludification (Neumann 1998) (Fig. 6.3). This high resolution dating of the basal peat forms the basis of a simple mathematical model in which altitude, position in the estuary, and date of basal peat are linked. Although the expansion of wetland development is closely linked to the regional marine base-level in the past, sea-level change was more erratic and the sea-level curve would have oscillated against a general rise. However, this model can still be used to determine the full extent of wetland development in the Humber wetlands at any point in time from *circa* 5000 cal BC.

At any time from 3300 cal BC, a landscape with vegetation zones including mudflats, saltmarsh, reed swamp, sedge fen, fen carr, transitional woodland, and deciduous woodland (from sea to dryland) could be encountered in the Humber. In periods of relatively low sea-levels, or regional marine regression, a seaward expansion of the vegetation zones could be observed, and during periods of sea-level rise, or regional marine transgression, the vegetation zones shift landwards. This results in an accretion of clastic sediments on top of the basal peat during marine transgressions and peat accretions during marine regressions. Of course this is only a model, initially developed by Godwin (1978) for the East Anglian Fens, and locally the effects of erosion, development of ombrotrophic mire, and peat shrinkage have resulted in a considerable variety both in space and over time (Waller 1994). Furthermore, human activity may have influenced the model, for example, through forest clearances of the fen margins and adjacent drylands.

RECENT ARCHAEOLOGICAL DEVELOPMENTS

During the recent intertidal survey, over 30 new sites were discovered, found clustered on several surviving fragments of the prehistoric landscape. The majority of sites date to the Bronze Age, with the range of radiocarbon dates from *circa* 1550 cal BC to *circa* 400 cal BC (Fletcher *et al.* 1999). Sites include individual stakes, a platform, post alignments, and clustered stakes which may represent traps for wildfowl and fish. A sampling strategy was

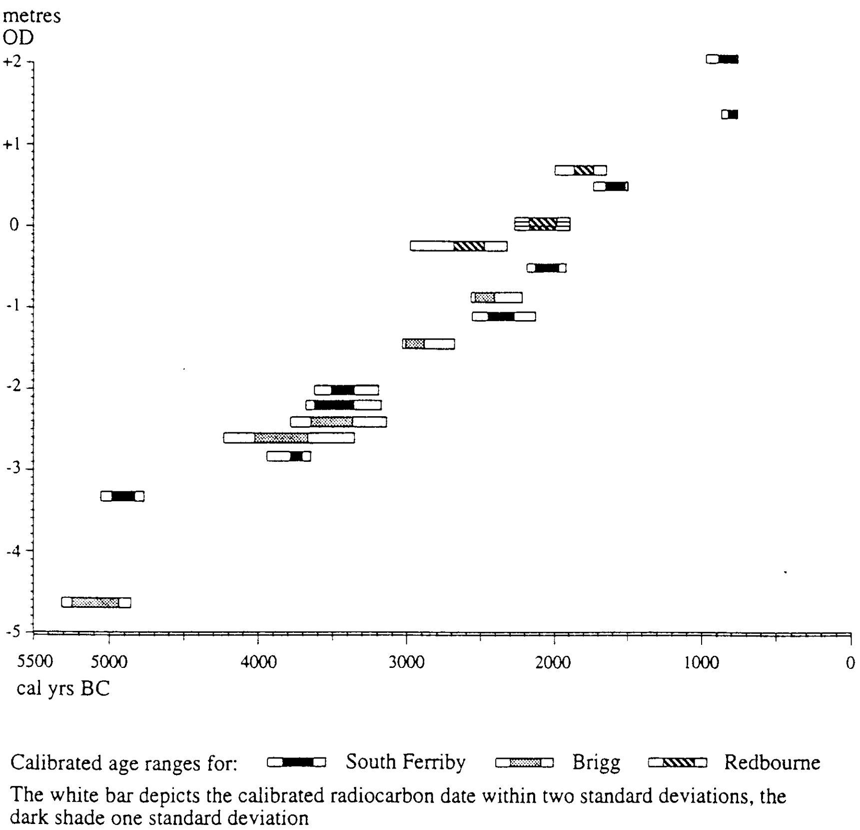

Figure 6.3 The dated basal peats from the Ancholme valley, and archaeological remains from the Humber estuary.

employed to maximise the amount of information gained during the survey whilst minimising the disturbance to the foreshore. At least one archaeological timber was excavated from each site. In the majority of cases, preservation of timbers was excellent and axe facets and other woodworking marks provided a wealth of information. An initial analysis of the axe facets allowed sites to be dated to an archaeological period. An additional programme of radiocarbon dating of samples from key sites provided a basis for a more refined chronology of the majority of archaeological sites discovered.

A large number of sites were located on the peat-shelves, which represent palaeo-land surfaces within the estuary. This included single stakes as well as some of the more identifiable post clusters. The stakes were found near the surface of the surviving deposits and the majority of samples remain as points of long stakes that had been hammered into a larger but now eroded peat deposit. In these cases any above ground structural detail had been destroyed in antiquity. In contrast, a number of sites were identified within alluvium, this represents deposits from the silted up channels or former creek systems that have been identified at regular intervals along the foreshore. These sites included a previously excavated platform (Crowther 1987) and several trackways discovered and partially excavated during the survey (Fletcher *et al.* 1999). As a whole, the alluvial creek systems have proved rich in organic archaeological deposits, allowing the survival of complex manufacturing and structural details, and can be seen in places to overlie the same peat deposits from which other sites were recovered further along the foreshore. In addition, the Ferriby boats were discovered from comparable alluvial deposits at North Ferriby (Wright 1990).

The excavated trackways displayed a number of characteristics in common with others found in bogs and estuaries in Britain and Ireland, for example, the Eclipse track in the Somerset Levels and several tracks in Derryoghil in Co. Longford (Coles *et al.* 1982; Raftery 1996). They were constructed from woven panels or hurdles assembled on dryland from small rods, in the same way wattle fencing is made (Fig. 6.4). The panels were transported to the estuary and placed on unstable ground, across salt-marsh and the tidal creeks, and held in place with a series of flanking vertical posts driven into the mud.

Two trackways were partially excavated, located less that 15 m from each other, aligned in a similar direction. The earlier of the two trackways has been dated by radiocarbon assay to *c.* 1400 cal BC, whereas the second

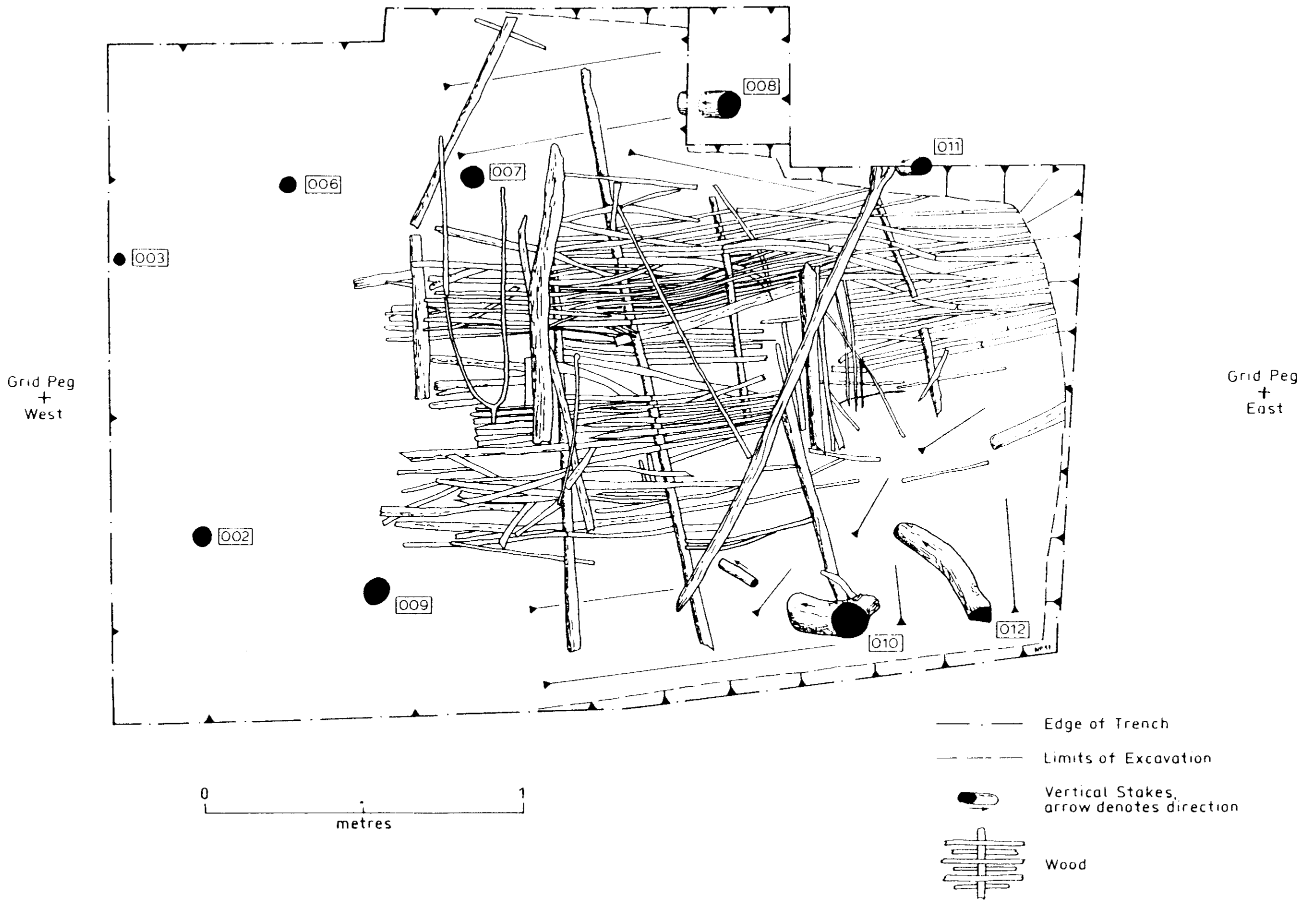

Figure 6.4 A plan of a Bronze Age trackway from Melton

of the two trackways was dated to *circa* 1400–900 cal BC (Fletcher *et al.* 1999). This second trackway was also made from hurdles, but the construction lacked the finesse of the first trackway. The hurdle was of coarser materials and had been laid upon roundwood timbers, with the excavated end resting on a crosspiece, supported in turn by the verticals. The hurdles themselves were held in place by stakes driven into the alluvium, reflecting the dynamic and fluid nature of the saltmarsh environment for which they were constructed.

Wood was sampled for size and species identification. The majority of sampled sites did not provide sufficient information for the study of woodland management techniques, but such information was obtained from the two trackways. Species identification for the first trackway, showed that *Corylus* (hazel) was the dominant species used for the rods, sails, and verticals with a small additional component of *Alnus* (alder), *Quercus* (oak), and *Salix/Populus* (willow/poplar), mainly for sails or verticals. All the rods had a diameter of 10 mm or less, the sails were slightly larger in diameter but equal in size and the verticals were larger again. The pattern was repeated for the second trackway, although the relative size of the wood was larger overall. It is apparent that the species were deliberately selected with hazel particularly favoured. If this is compared to woodland assemblages around the Humber from this period (Lillie 1999), it is possible to suggest that the ratio of hazel to alder used for the trackways, for example, is not merely a reflection of the contemporaneous local woodlands.

The construction of multiple hurdle trackways, traps, structures, and boats required a regular supply of even sized timbers of hazel and other trees, possibly leading to some form of woodland management. The term woodland management can cover a variety of operations from selective felling of timbers to systematic coppicing (e.g. Goodburn 1999). In the archaeological wood assemblage from the Humber estuary, a number of pieces have a noticeable curve to the base against which the timbers were felled. This curve was identified as being from wood taken from a coppiced stool. In addition, several samples appear to be the discarded heels of coppiced timber (Fletcher *et al.* 1999). This may have been a natural by-product of selective felling, or alternatively the product of a systematic managed woodland. In this case, the abundance of local woodland shown in the pollen record

(Lillie 1999) suggests that there is no shortage of woodland, but the paucity of information currently hampers any detailed analysis.

ENVIRONMENTAL CONTEXT

In terms of environments, estuarine archaeology in the UK includes discoveries from peat, representing palaeolandscapes, including Goldcliff in the Severn and on Wootton Quarr in the Solent (Neumann and Bell 1997; Loader 1997), and from clastic sediments, representing saltmarshes, for example, in the Stour and Blackwater estuaries in Essex (Wilkinson and Murphy 1995). The Humber estuary has produced a large number of sites from both type of environments. The intertidal peat is associated with periods of regional marine transgression where it concerns basal peats, or with periods of regional marine regression when vegetation development was enabled. The saltmarsh deposits are associated with periods of regional marine transgression, overtopping earlier peat deposits.

The biological productivity of wetlands compared to drylands has been highlighted by many (e.g. Dinnin and Van de Noort 1999). In a Western European context, for example, wetlands, such as reedswamps, can have a projected primary productivity of up to four times the amounts for temperate oak woodland, boreal forests, and temperate grassland. However, there are similar variations in the primary productivity of different wetlands, related to the amount of throughflow of water and therefore the amounts of nutrients that enter the system. Therefore, oligotrophic or nutrient poor wetlands, such as blanket mire or raised mire, have low projected primary productivity, whereas, minerotrophic wetlands, such as fen carr, have up to double the primary productivity, with the highest figures associated with *Phragmites* (common reed) and *Scirpus* (lake rush). Saltwater wetlands subject to frequent tidal inundation are more diverse and productive than occasionally inundated wetlands. Furthermore, freshwater tidal wetlands may be even more productive and diverse because these areas benefit from nutrient replenishment from tidal flushing while avoiding the stresses of saltwater inundation. Brackish wetlands, such as saltmarsh similar to that which had developed in the Humber during the Bronze Age, have a primary productivity somewhere in between.

In short, saltmarshes are not only among the most biologically productive environments, but from an anthropogenic point of view, their exploitable resource potential was particularly high, and included fish, waterfowl, and rich pasture land. Evidence for this in the Humber is only now being recognised, as the inventiveness and determination needed to exploit this resource has come to light. In particular, the trackways offered access to areas of rich saltmarsh across estuarine creeks, which during sea-level transgression phases typically extend landwards. Their existence therefore represents a direct response to environmental change and illustrates an aspect of human ecodynamics on the Humber foreshore.

Although the trackways may have had a function in fishing and water fowling, it is suggested that they were primarily built to maximise the use of the saltmarsh as winter pasture for livestock. Four reasons are suggested here:

- The trackways were substantial enough in construction to take the weight of cattle and sheep.
- The trackways run parallel to the water and provide access to areas of saltmarsh across tidal creeks, rather than to the mudflats or the rivers edge, where water fowling and fishing respectively would have been most productive.
- At nearby North Ferriby, where a similar creek and salt-marsh system has been established, the skull and bones of a Bronze Age aurochs or large cow were excavated in 1994 (B. Sitch pers. comm.).
- Finally, in recent historic times, local farmers have attested to the use of saltmarsh as winter pasture for cattle and this practice was still common earlier this century.

The economic, political and social significance of Bronze Age utilisation of saltmarsh as winter pasture may be the underlying cause of increased social differentiation, which is well known from the cultural archaeological record. For example, the exploitation of saltmarsh may have afforded the expansion of cattle herds by groups or individuals living near the Humber compared to those people having no access to this winter fodder. Although we do not argue for a cause and effect relationship between the use of saltmarsh and the developing elite networks, the size of cattle herds could have functioned as a distinct social marker and also have created opportunities for control of food resources by groups or individuals.

Other evidence for exploitation of this dynamic environment comes from the sites that appear to be clustered for holding woven baskets, for the catching of either water-fowl or fish. All the sites discovered are waterlogged and there is a tendency to see these as aspects of fishing, or wet archaeology, but the construction of many of the sites on saltmarsh suggests that at least some of the sites were constructed on dryer land, perhaps for wildfowling. The Humber itself must also be considered as a resource. The number of Bronze Age boats, for example, is of significant importance. Boat finds from North Ferriby, and most recently from Kilnsea on the North Sea coast, have provided evidence for at least four different plank-built boats, dated from *circa* 1750 to 1300 cal BC (Wright 1990; Van de Noort *et al.* 1999). It has been argued that these boats were used for coastal- and sea-faring, underpinning the development of elite networks in this area, represented in goods exchanged across the North Sea and the Channel. If this aspect of the Humber is considered alongside the more recent finds, then social groups living on the shores adjacent to the river have to be regarded as being in an advantageous location. In overall terms the evidence for diversification is compelling, extending beyond the use of the intertidal zone simply for subsistence.

In terms of human ecodynamics the importance of these findings may be summarised in chronological order.

- The middle reach of the Humber estuary, in the late Neolithic, *circa* 3300 cal BC, is represented by extensive palaeo-landsurfaces, with an oak and lime dominated woodland (Lillie 1999). No archaeological evidence of the exploitation of this landscape is present, but fishing and fowling on the waterfront is likely.
- From *circa* 1800 cal BC, clear evidence for renewed marine transgression in the Humber region results in overtopping of the recurrence surfaces and the widespread development of a saltmarsh landscape. It seems likely that this saltmarsh landscape was exploited extensively as winter pasture.
- After *circa* 1500 cal BC, marine transgression accelerated, thereby threatening access to the saltmarsh as tidal creeks extend landwards. The response to this is seen in the construction of a number of trackways across tidal creeks, in an attempt to prolong the use of an important resource. The foreshore continued to be used until *circa* 500 cal BC.

CONCLUSIONS

The finds from Melton and from North Ferriby show a picture of exploitation of multiple resources during the Bronze Age. If the Bronze Age boats reflect use of the water in terms of transport and exchange, then fish weirs, land traps and trackways represent exploitation of tidal mudflats and the saltmarsh. Furthermore, the isolation and selection of particular species for construction of the trackways suggests that the local woodlands and fen margins were being managed or selectively felled.

While the evidence for Bronze Age activity is compelling, it must be emphasised that the estuarine exploitation may have continued into the Iron Age, as indicated by some of the radiocarbon dates (Fletcher *et al.* 1999). There are also Roman sites on the estuary at South Ferriby and Adlingfleet (Van de Noort and Ellis 1998), and literary evidence points to widespread use of the Humber estuary for fishing and waterfowling at Faxfleet and Broomfleet during the medieval period (Reader 1972). Furthermore, the recent survey has also provided archaeological evidence for extensive post-Medieval activity in the intertidal zone. The overall picture points to one of long-term exploitation and adaptation to the changing sea-levels and environment of the Humber throughout the last 3500 years: adaptation to an environment that has been as diverse and dynamic as it is in the present day.

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