

Intertidal (saltmarshes)

The intertidal zone, at the interface of land and sea, is an area where terrestrial processes impinge on the marine environment, and through which there is a flux of materials between land and sea. The objective of the study of the Biological Influences On the interTidal Areas (BIOTA) has been to quantify the role of saltmarshes in modulating the fluxes of sediments in the intertidal zone.

Saltmarshes are known to lock up sediments and by increasing surface elevation have enabled large areas of coastal land to be enclosed for agriculture, especially along the English North Sea coast. While saltmarshes are of physical importance for sea defence in dissipating wave energy, and offer a cost-effective alternative to engineered sea defences, little has been done to characterise and quantify the fluxes of materials within and between different parts of the intertidal zone (e.g. from mud flats to lower saltmarsh). Nor is the role of saltmarsh biota in influencing deposition and resuspension of sediments properly understood.

Measures of changes in surface elevation provide a unifying methodology for work on saltmarshes and mudflats, since elevation, affecting as it does the amount and frequency of tidal submergence, is a major determinant both of the type of biotic community present and the rate at which that community changes to one characteristic of a different (usually higher) elevation. In the BIOTA study, changes in elevation due to the accretion or erosion of sediments have been estimated at a range of temporal scales from a single tide to more than two decades and on spatial scales varying from a single creek system to the entire Humber estuary and The Wash. Transects normal to the shoreline provide a focus for measuring seasonal and inter-annual changes in sediment movement across a wide range of communities. These communities have been characterised using remote sensing, first by ground radiometry studies to classify cover-types accurately, and then, following a pilot study, by CASI imagery covering the intertidal zone from the Humber to north Norfolk.

Exemplary data on sedimentary processes in the intertidal zone include:

- an airborne remote sensing image using a processed CASI image (**saltmarsh CASI data**) of a saltmarsh in north Norfolk, indicating the various saltmarsh biotopes and substrates (water, sand and mud),
- **saltmarsh monitoring stations,**
- **saltmarsh radiometry data,**

- **saltmarsh, sandflat and mudflat data.**

A Littoral Investigation of Sediment Properties (LISP) has investigated the processes that determine the erodibility of fine-grained cohesive sediments at a single intertidal site on the Skeffling Bank. The objective has been to quantify the effect of micro- and macro-biological processes and products that modify sediment properties. Microbial activity at the surface has a strong influence on sediment erodibility. The effect of larger organisms has been investigated using *in situ* field and laboratory experiments with an annular flume. Infaunal bivalve molluscs feeding on suspended material cause enhanced deposition, and surface sediments may be stabilised by epifaunal bivalves (mussels).

Exemplary data on the Overview CD-ROM show:

- *in situ* flume data indicating the effect of mussel coverage on the shear stresses necessary to resuspend sediments (**estuarine intertidal data**),
- the reflectance properties of sediments that are being explored as a measure of microbial activity and thus cohesiveness of superficial sediments (**estuarine intertidal data**).