INTRODUCTION

This chapter provides an introduction to the Estuary Guide. Within this chapter, there is a brief review of the issues arising in an estuary. These may include environmental issues, ecological change, ports, modifications to natural process, climate change and recreation. Additionally, there is also a brief overview of the purpose and layout of the Estuary Guide.

The Issues

Estuaries are a focal point for the full range of human activities. Throughout history man has settled near to the coastline and has used estuaries and rivers as a transport artery to inland areas. At first estuaries were places of relative shelter and also provided a source of food and means of transport. As trading between different locations developed, ports grew up, initially as far inland as possible, since boats and ships offered the simplest form of transport. With time ships have become larger, to provide greater economy of scale, and so the ports have moved progressively nearer the coastline, where there is deeper water.

The use of rivers and estuaries has increased, not only for transport of raw and finished goods but also in new uses, such as water extraction and discharges of waste. With growing populations there has been a greater need for drinking water and the disposal of human waste, which is often taken from and/or discharged into rivers. Land for agriculture to feed the population and space for dwellings and industry is also required and leads to reclamation or draining of low lying areas. Thus as man's ingenuity has evolved, increasing pressures have been imposed on the natural river and estuary system.

Anthropogenic effects are therefore a major agent influencing the morphology of an estuary either directly by means of engineering works and/or indirectly by modifying the physical, biological and chemical processes at work within the estuary. Since any change rarely has an instant effect, changes to the governing processes caused by an intervention in the past may not have completely worked through the system before further modifications are made thus increasing the complexity of the interactions. The timing of any anthropogenic effects relative to previous modifications along with the magnitude of the effect are important when trying to predict future estuary evolution.

With growing pressures, comes the increasing risk that the long recognised nature conservation importance of estuaries will be compromised and increasingly, a more proactive approach is being adopted towards positive management for future generations. Estuaries are also extensively used for recreational activities, such as sailing, fishing and walking. Conservation and recreation have the potential to both contribute to, and conflict with, social and economic development and as

such require careful balancing. Hence, an integrated approach is needed to address multiple uses and interests, with sustainability central to the management process.

But these and other pressures have affected the health of some estuaries. Various combinations of sinking land levels, rising sea levels and worsening wave climate pose an increasing threat of flooding to any surrounding built-up areas. Toxins from industry and agriculture have, over centuries, become locked in the estuarine sediments and water quality has suffered. This in turn damages the delicate ecosystem of the estuary. The aspirations of industry, commerce and navigation to further wealth creation through expansion could possibly have a deleterious effect on the quality of life in and around estuaries. For example, a port expansion, marina development or barrage could alter the morphology of the estuary leading to increased flood risk; dredging at former industrial sites could uncover polluted sediments; agricultural run-off, or an industrial process plant could release pollutants. Whilst offering significant economic benefits, any of these could adversely affect the ecosystem and habitats. Decisions must be taken which comply with the legal and social requirements to minimise the threat to natural habitats, while continuing to allow social and economic development.

Purpose and Layout of Guide

This guide seeks to provide an overview of how to identify morphological change within estuaries, as a means of managing the many and varied issues identified above.

The guide follows the overall flow shown in Figure 1.1. The first chapter concentrates on the drivers and how these can be addressed within a strategic framework for management and planning of estuaries. The second chapter sits alongside and considers the estuary setting, and introduces the key processes and characteristics that govern the estuary form and function. These introductory sections provide a context for a discussion on how to identify and predict morphological change, which forms the bulk of the guide. This is broken down into three chapters looking at the overall study process, the main methods and techniques currently available and ways in which to study findings can be presented to successfully communicate the results. To conclude, some consideration is given to how the outputs from such studies can be used to assess the impacts of change.

There are many aspects to doing this and each aspect can be dealt with at a number of levels of detail. For this reason, the guide is not a linear document. The main text provides an overview of all relevant aspects. To limit the disruption to the flow of the guide, short diversions on theoretical or esoterical points have been included as a series of “Asides” to be found in the Appendix (with hypertext links in the digital version). More detailed material is presented in a series of related documents. Links to these documents are provided by cross-references (hypertext links, marked as blue text, in the digital version). These documents may in turn cross-refer to other related topics, or to documents that provide a further level of detail, case studies or worked examples. A summary of the related documents, for each chapter of the main text, is given in the table below.

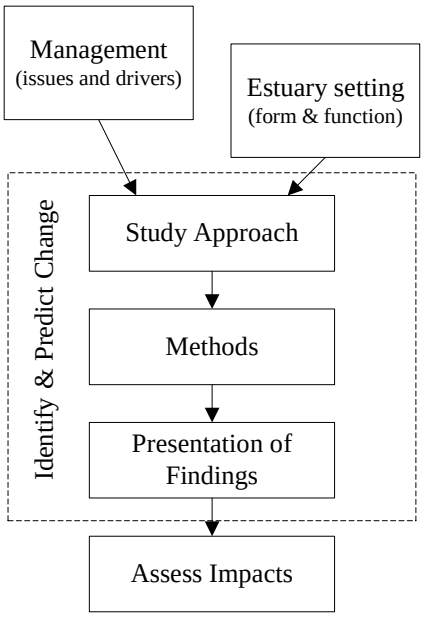

Figure 1.1 – Overall structure of guide

Chapter	Related Documents
Estuary Management Briefly describes some of the issues and drivers in the context of sustainable development and outlines some management frameworks.	• Framework for estuary shoreline management plans • Guidance for the integration of estuaries into SMPs • Cause-consequence model
Estuary Setting Outlines approaches to classifying estuaries and the various measures that are used to summarise an estuaries properties. The form and function of an estuary are discussed as a basis for developing a behavioural understanding.	• Humber Holocene chronology
Study Approach Sets out the steps required to carry out a study to identify and predict change in an estuary with particular emphasis on the role of the conceptual model and the process of synthesis.	• Coast & estuary behaviour systems • Estuary geomorphic elements
Study Methods Gives a brief summary of the tools available and how these can be used to estimate change over various space and time scales.	• Analysis and modelling guide • Data requirements • Error and uncertainty • Future scenario testing • EstProc (website) • EMPHASYS guide • STOWA/RIZA guide • US Army Corps CIRP (website) • Coastal and estuarine managed realignment: design issues • Suitability Criteria for Habitat Creation
Presentation of Findings Discusses a number of ways in which the results can be reported to support the dissemination of study findings, particularly to non-specialists.	• Humber Holocene chronology • Southampton Water case study
Assessing Impacts Sets out a procedure for identifying understanding and evaluating impacts from a proposed development or operation.	• Impact assessment guide • OMREG – Online Managed Realignment Guide • ESPO Code of Practice on the Birds and Habitats Directive • Project Appraisal Framework for Ports