

3.11 Managing coasts in a holistic way

In this section, you'll find out how coasts in different parts of the world are being managed in a more holistic and sustainable way.

Odisha's coastal zone

Odisha's coastal zone, on India's north-east coast, has a wide range of coastal and marine flora and fauna (including 1435 km² of mangrove forest). It is rich in mineral deposits and has huge potential for offshore wind, tidal and wave power. Cultural and archaeological sites also dot the coast. Coastal fishing employs large numbers of people as fishermen, as well as those employed to process the fish caught.

However, Odisha's coastal zone is under stress from:

- ◆ rapid urban industrialisation
- ◆ marine transport, fishing and **aquaculture**
- ◆ tourism
- ◆ coastal and seabed mining
- ◆ coastal erosion
- ◆ offshore oil and natural gas production
- ◆ an increase in the frequency and intensity of severe weather events, such as cyclones
- ◆ and rising sea levels.

In an attempt to manage some of these problems, an Integrated Coastal Zone Management (ICZM) project has been implemented – with the aim of managing the coast and its resources in a **sustainable** way.

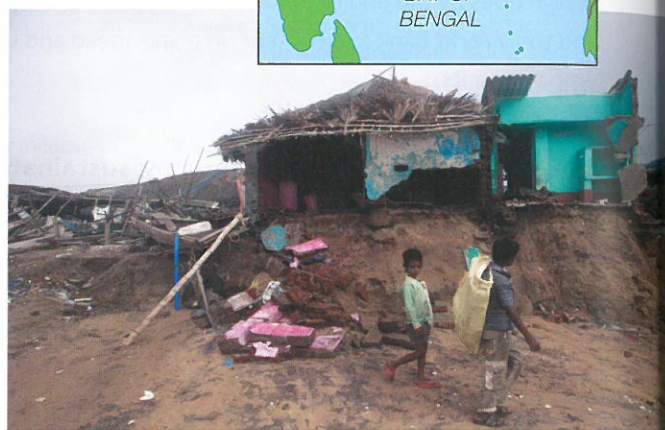
In Odisha, many different organisations have an interest in managing the coast, and these have consulted with others who have a stake in its future. Some of the main organisations involved in the consultations have been listed in the stakeholders box on page 143.

In addition to the inter-organisational consultations, a wide range of public consultations have also been held – including with individual villages about issues including:

- ◆ the assessment and control of coastal erosion
- ◆ the development of eco-tourism
- ◆ planting or replanting mangroves
- ◆ building cyclone shelters.



▼ **Figure 1** Coastal erosion in Puri, Odisha



Key word

Aquaculture – The farming of aquatic organisms, such as shellfish, for food.

BACKGROUND

Integrated Coastal Zone Management (ICZM)

The move to adopt an **Integrated Coastal Zone Management** strategy means that complete sections of coast are now being managed as a whole – rather than by individual towns or villages. This is because we now know that human actions in one place will affect other places further along the coast – because sediment moves along the coast in **sediment (or littoral) cells** (see page 117).

ICZM is a process that brings together all of those involved in the development, management and use of the coast.

The aim is to establish sustainable levels of economic and social activity; resolve environmental, social and economic challenges and conflicts; and protect the coastal environment.

Greenpeace India (an environmental pressure group) has also been involved in meetings about income generation and the management of marine resources, acting with some of the villages included in the ICZM project.

Back to Holderness

The East Riding of Yorkshire Council developed an ICZM, which was launched in 2002. It involved over 80 organisations and was called 'Towards a Sustainable Coast'. It was based on the UK government's principles for coastal management in England, which included:

- ◆ taking a holistic approach
- ◆ adopting a long-term perspective
- ◆ pursuing adaptive management
- ◆ seeking specific solutions and flexible measures
- ◆ working with natural processes
- ◆ providing participatory planning.

The ICZM was used to develop the Flamborough Head to Gibraltar Point **Shoreline Management Plan (SMP)** – published in 2011 – and to deliver the East Riding Coastal Change Pathfinder, 2010-12 (see page 131). Flamborough Head and Gibraltar Point are the northern and southern limits of a major sediment cell on England's east coast (see Figure 14 in Section 3.5).

What is the SMP?

The Flamborough Head to Gibraltar Point SMP sets out the policy for managing the coastline and responding to coastal erosion (and flood risks) over the next 100 years. It assesses potential erosion and flood risks, and then identifies sustainable coastal defence and management options, which take into account the influences and needs of the human, natural and historic environments (including existing defences and adjacent coastal areas).

SMPs are recommended for all sections of the coastline in England and Wales by Defra (the government Department for Environment, Food and Rural Affairs). Four options are considered for any stretch of coastline – as outlined on the right.

The East Riding of Yorkshire Council worked with a number of players and stakeholders in developing the SMP, including:

- ◆ **National government agencies** – Environment Agency, Natural England
- ◆ **Local government** – Lincolnshire County Council, North East Lincolnshire Council, East Lindsey District Council
- ◆ **Stakeholders in the economy** – The National Farmers Union
- ◆ **Environmental stakeholders** – English Heritage

ICZM Project Odisha, players and stakeholders

1 Central (Federal) government

- ◆ Archaeology Department of Culture
- ◆ Water Resource Department
- ◆ Fisheries Department

2 State and local government

- ◆ Odisha State Disaster Management Authority
- ◆ Odisha State Pollution Control Board
- ◆ Wildlife Wing of Forest and Environment Department (State)
- ◆ Paradeep Municipality (local)

3 Stakeholders in the local economy

- ◆ Odisha Tourism Development Corporation
- ◆ Handicraft and cottage Industries

Options for coastal action

1 Hold the line. This involves maintaining the current position of the coastline (often using hard-engineering methods).

2 Advance the line. This involves extending the coastline out to sea (e.g. by encouraging the build-up of a wider beach, using beach-nourishment methods and groyne construction).

3 Managed retreat/strategic realignment. This involves allowing the coastline to retreat, but in a managed way. It can involve the deliberate breaching of flood banks built to protect low-quality farmland from flooding (creating salt-marsh environments).

4 Do nothing/no active intervention. This involves letting nature take its course and allowing the sea to erode cliffs and flood low-lying land (whilst letting the existing defences collapse).

What's the plan for Holderness?

Figure 2 shows how the Holderness coast will be managed up to 2025. Beyond that, plans are in place but they may change in a few areas (e.g. the coastline adjacent to the gas terminals at Dimlington and Easington – depending on whether these sites are still in use by then).

CBA and EIA

In order to make the decision about what and where to protect, a **CBA** (see page 139) and an **Environmental Impact assessment** or EIA (see Section 7.2) are carried out. For each different area shown on Figure 2, the economic assessment (CBA) identified whether:

- ◆ the benefits clearly outweighed the costs
- ◆ the benefits marginally outweighed the costs
- ◆ the costs clearly outweighed the benefits.

The CBA concluded the following:

- ◆ Along the undefended parts of the coast, the 'Do nothing' policy has no costs. However, there will be some economic losses (land, buildings, etc.).
- ◆ The benefits outweigh the costs of continuing to protect Bridlington, Hornsea and Withernsea
- ◆ The economic benefit of holding the line at Mappleton is similar to the cost.
- ◆ Because of the current importance of the gas terminals at Dimlington and Easington, the benefits clearly outweigh the costs.
- ◆ Spurn Point will be allowed to evolve – requiring minimal costs.

An EIA decides whether environmental quality will improve, or worsen, as a result of the different options for managing the coast. The decision under the SMP is to 'hold the line' for current defences at Dimlington and Easington gas terminals. An EIA for coastal protection works recommended the current protection scheme of a rock revetment made up of large granite boulders (which is approximately 1 km long).

Wider issues

Decisions about whether to defend the coast or not are complex judgements, based on a range of factors – not just a CBA and EIA. Figure 4 (opposite) summarises some of the main factors considered.

Winners and losers

From Odisha to Holderness, many of the world's coastal zones are vulnerable to flooding or erosion (or face threats from a range of factors). Different players are involved – local authorities, homeowners, environmental pressure groups, to name but a few. As decisions are made about how to manage the issues they face, some people are bound to come out on top, whilst others lose out.



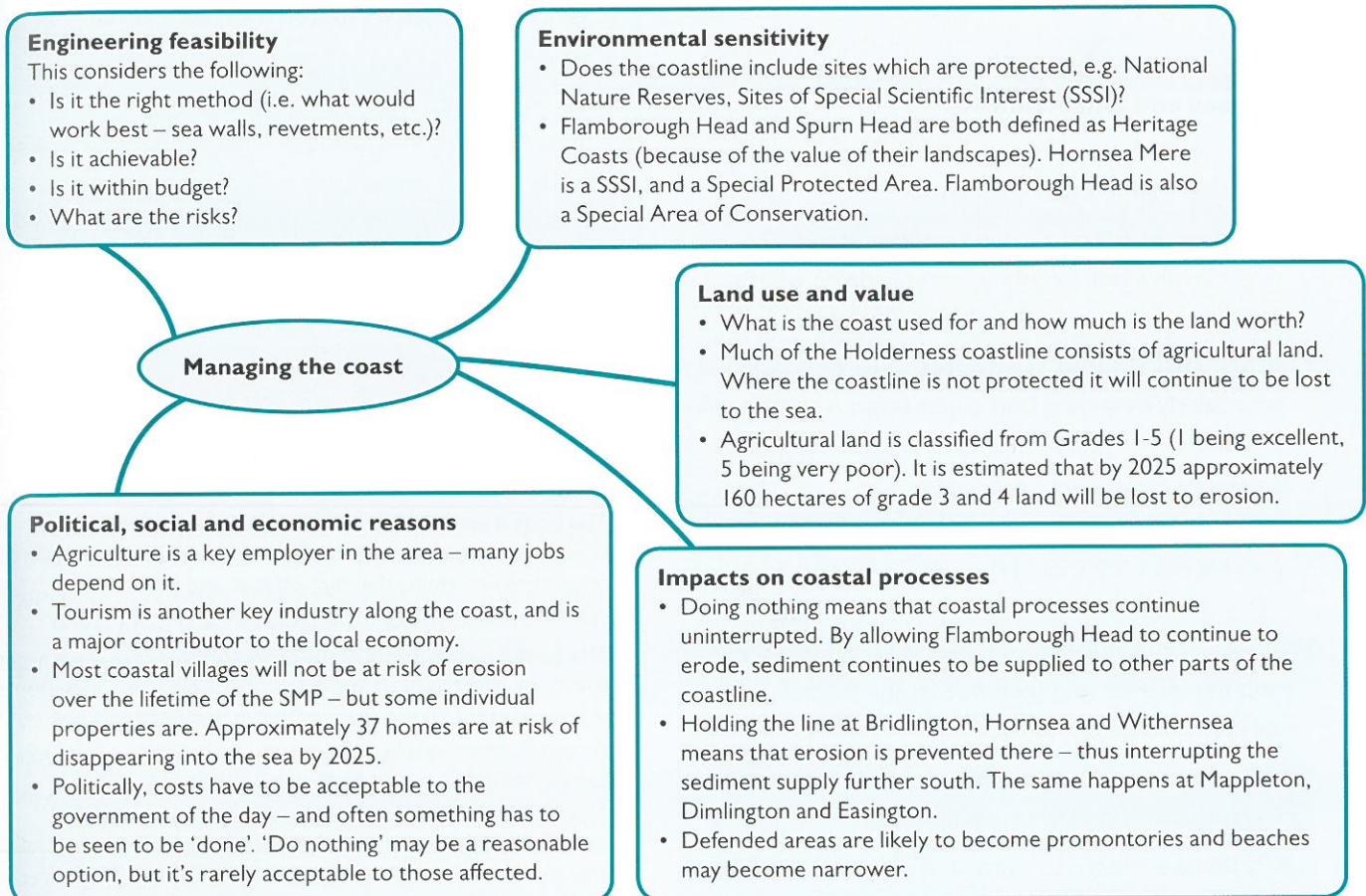
▲ **Figure 2** Coastal management options for Holderness up to 2025

▼ **Figure 3** Easington gas terminal is protected by a rock revetment



Over the next few decades, countries face difficult decisions about the best way to manage the coast. In the UK: farmland and isolated houses are likely to remain unprotected; residents, councils and businesses often disagree about the best approach; conflicts arise when coastal defences in one place have a negative impact elsewhere along the coast – and where there are delays in the implementation of coastal protection.

Figure 4 Managing the coast



Over to you

- As a class, discuss whether the policies of 'Hold the line' and 'Do nothing', when combined, are suitable options for Holderness.
- In pairs, brainstorm and list a set of up to ten criteria to decide whether different coastal-management options are sustainable or not. Include economic, social, environmental, cultural and political factors.
 - Apply your criteria from (a) to (i) the ICZM in Odisha, (ii) the SMP between Flamborough Head and Gibraltar Point.
 - Write a 750-word explanatory report on your findings.
- To what extent are the aims of the ICZM in Odisha and the SMP for Holderness (a) similar, (b) different?

On your own

- Distinguish between the terms: 'Integrated Coastal Zone Management' and 'Shoreline Management Plan'.
- Explain the differences between the players and stakeholders in Odisha and those in Holderness and East Riding.
- Using all of the criteria/factors in the spider diagram (Figure 4), assess the success of coastal management along the Holderness coast.

Exam-style questions

- AS 1 Assess the effectiveness of holistic management strategies used to protect a stretch of coast from erosion. (12 marks)
- A 2 Evaluate the success of policies which are designed to manage coasts holistically. (20 marks)

Having studied Coastal Landscapes and Change, you can now consider the three synoptic themes embedded in this chapter. 'Players' and 'Attitudes and Actions' were introduced on page 95. This page focuses on 'Futures and Uncertainties', as well as revisiting the four Enquiry Questions around which this topic has been framed (see page 95).

3 Futures and Uncertainties

People approach questions about the future in different ways. They include those who favour:

- **business as usual**, i.e. letting things stand. This might involve doing nothing, or only doing what's absolutely necessary when it's unavoidable.
- **more sustainable strategies** towards coastlines, particularly managing landscapes faced with different threats.
- **radical action** when faced with climate change, e.g. adapting to or mitigating threats from climate change (see Sections 3.9 and 3.11).

Working in groups, select two coastal landscapes from this chapter and then discuss the following questions in relation to each one:

- 1 How far has management of coastal landscapes created unintended consequences?
- 2 Is there evidence to suggest that radical actions are needed to manage the threats to coastal landscapes from climate change?

Revisiting the Enquiry Questions

These are the key questions that drive the whole topic:

- 1 Why are coastal landscapes different and what processes cause these differences?
- 2 How do characteristic coastal landforms contribute to coastal landscapes?
- 3 How do coastal erosion and sea level change alter the physical characteristics of coastlines and increase risks?
- 4 How can coastlines be managed to meet the needs of all players?

Having studied this topic, you can now consider answers to these questions.

Discuss the following questions in a group:

- 3 Consider Sections 3.1-3.2. How far does geology and lithology help to create unique coastal landscapes?
- 4 Consider Sections 3.3-3.6. What is unique about particular named coastal landscapes? Explain your judgments.
- 5 Consider Sections 3.7-3.9. What unique contributions does sea level change make to coastal landscapes?
- 6 Consider Sections 3.10-3.11. Which is best – hard engineering, soft engineering, or holistic approaches to coastal management?

Books, music, and films on this topic

Books to read

1. *Coast: The Journey Continues* by Christopher Somerville (2006)
This book from the BBC TV series looks at the different coastlines around the British Isles and how their different properties determine their appearance and character.
2. *The Beach Book: Science of the Shore* by Carl Hobbs (2012)
This book assesses some of the processes that take place around coastlines, and how such processes shape beaches. It also looks at how different players are involved in managing beaches.
3. *Coastal Flooding impacts and adaptation measures for Bangladesh* by Saquib Ahmad Khan and Ali Hossain (2012)
This is a factual book which assesses the impact of coastal flooding on large populations in Bangladesh, and how the country's approach to dealing with this needs to change to cope with the growing threats to the coast and its people.

Music to listen to

1. 'Ocean Rising' by Justin Sullivan (2003)
This song considers sea levels rising around the world.
2. 'After the Storm' by Mumford and Sons (2009)
The lyrics of this song describe how a flood can cause separation between people.

Films to see

1. *Global Flooding over the next 100 years – National Geographic* (2015)
A documentary film which looks at potential floods that could occur over the next 100 years, their possible causes, and where some of the worst hit areas could be.
2. *Flood* (2007)
A disaster film that shows the terrifying impact a flood can have on a coastal region, in this case London and the Thames Estuary, and how prepared flood defences can prove to be inadequate.
3. *Extreme Engineering: Venice Flood Gates* (2004)
Part of a TV series looking at Extreme Engineering, the coastal city of Venice was studied as the programme assesses the MOSE project that manages the threats the city faces from flooding.