3.1.3.4b: Coastal management: Part 2

Learning Objectives

- To understand human intervention in coastal landscapes
- To understand why people manage coastlines in different ways
- To understand sustainable approaches to flood risk and erosion management

Key words:
Hard engineering
Soft engineering
Cost-benefit analysis
Tangible
Intangible
Integrated Coastal Zone Management

Concept Checker:

- ❑ **The concept of cost-benefit analysis (CBA)**
- ❑ **The concept of sustainable management**

The Options?

Sea Walls!

Do nothing!

Beach nourishment?!

Groynes?

Breakers?

Sustainable approaches to coastal flood and erosion management

Some soft engineering schemes adopt sustainable principles, but they tend to be focused a particular stretch of coastline. Increasingly management authorities are looking at holistic management plans for significant stretches of coastline.

Policies have been adapted by the UK Government to make coastal management more sustainable and also policies have developed at a **global** level to create a common and integrated approach around the world.

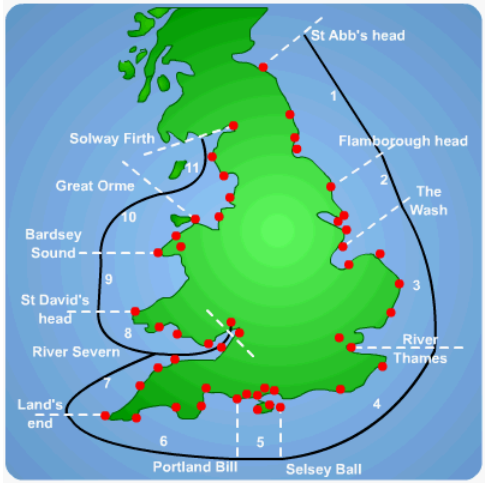
1. Shoreline Management Plans
   - Introduced in 1995, 22 SMPs around England and Wales. An SMP works with the concept of littoral cells, or sediment cells along the coast. Each cell is managed either as a whole unit or a sub-unit. The SMP does not take account of other activities beyond the shoreline, so ICZM has now been adopted by many coastlines around the world
2. Integrated Coastal Zone Management
   - Originated from the UN Earth Summit of Rio De Janeiro in 1992 (Agenda 21). The European Commission have developed a framework to promote ICZM to manage the fine balance between people, economy and environment. In 2013, the EC launched the maritime spatial planning (MSP) framework to support ICZM.

Shoreline Management Plans (SMPs)

Who should decide whether coastal management schemes should be implemented and what they should be?

What is the issue if Local Authorities are the ones making the decisions?

- To avoid a piecemeal approach to coastal management an integrated system of SMPs was introduced in 1995 by the national government.
- There are 22 SMPs which correspond to the sediment cells and sub cells around the coast of England and Wales.
- Their aim is to identify the most sustainable approach to managing the different sections of coastline in the short term (0-20 years), medium term (20-50 years) and the long term (50-100 years)



What is the aim of the SMP?

- To provide the basis for sustainable coastal defence policies within a sediment cell (specified lengths of coast) and to set objectives for the future management of the coastline.
- Their aim is to identify the most sustainable approach to managing the different sections of coastline in the short term (0-20 years), medium term (20-50 years) and the long term (50-100 years)
- They are funded mostly by the national government agency – DEFRA, along with the Environment Agency and local councils.

S.M.Ps. Four Strategies

Extend the coast into what is currently the sea. (Very few examples around Britain, but the basis of Dutch polder reclamation and construction of manmade islands in Tokyo Bay).

Advance The Line

Hold The Line

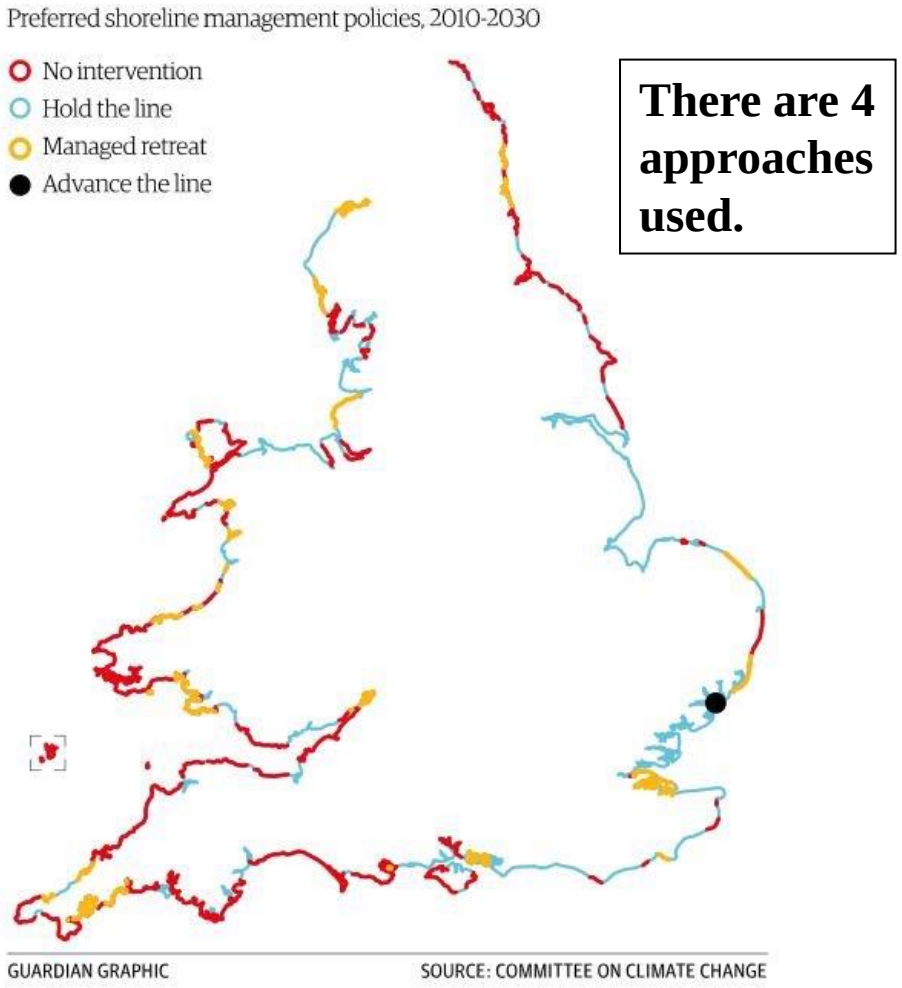
Intervene against coastal erosion with hard or soft engineering to prevent any further shoreline retreat.

Realignment of the coast to a pre-determined line some distance further inland from the current position of the coast

Managed Retreat

Do Nothing

Permit natural systems to modify the coastline as they are currently operating. It usually means allowing erosion and cliff retreat to continue.



There are 4 approaches used.

Analyse the map of preferred shoreline management policies.

Each SMP describes how each stretch of coastal covered by the plan is to be managed.

What factors might determine which of the above strategies is designated along a stretch of coast?

What issues might arise if different sections of coastline are designated different strategies?

Which option?

The factors that determine which of the four options is designated for a section of coast depends on:

- The rate of coastal change (threatened loss of land as well as sea level rise)
- The economic value of land uses put at risk by coastal change (homes, businesses, infrastructure)
- The value of agricultural land at risk, along with habitats of value
- The cost of intervention strategies

Issues can arise if one section of coast is selected for ‘Hold the line’ strategies but a neighbouring section is designated ‘No active intervention’ without clear justification. Even more controversial is when the ‘Hold the line’ strategy selected actually increases the rate of coastal erosion downcoast (such as with sediment-capture by groynes).

Costs and benefits of different management options

1.→Tables·1·and·2·show·different·ways·of·looking·at·costs·and·benefits·at·the·coast.¶

Table·1.·A·simple·view·of·costs·and·benefits:¶

¤	CONSIDERATIONS¤	BENEFITS¤	COSTS¤
£¤	Economic·considerations¤	¤	e.g.·Building·and·maintaining·the·coastal·defences¤
 ¤	Social·considerations¤	e.g.·Security·and·peace·of·mind¤	e.g.·Increased·problems·of·access·to·beaches¤
e¤	Environmental·considerations¤	e.g.·Rarely·beneficial·unless·'soft'·engineering¤	¤

¶

Table·2.·A·simple·cost-benefit·calculation·for·three·coastal·defence·options:¶

Options¤	Benefits¤	Damage¤	Costs¤	Benefit/¶ Cost·Ratio¤
1.·Do·nothing¤	X¤	£650,·000¤	X¤	X¤
2.·'Holding·the·line'·along·the·whole·section·of·the·coast.¤	£650,·000¤	£0¤	£1,·000,·000¤	0.65¤
3.·Protect·some·places·but·not·others·along·the·coast¤	£600,·000¤	£50,·000¤	£350,·000¤	1.5¤

¶

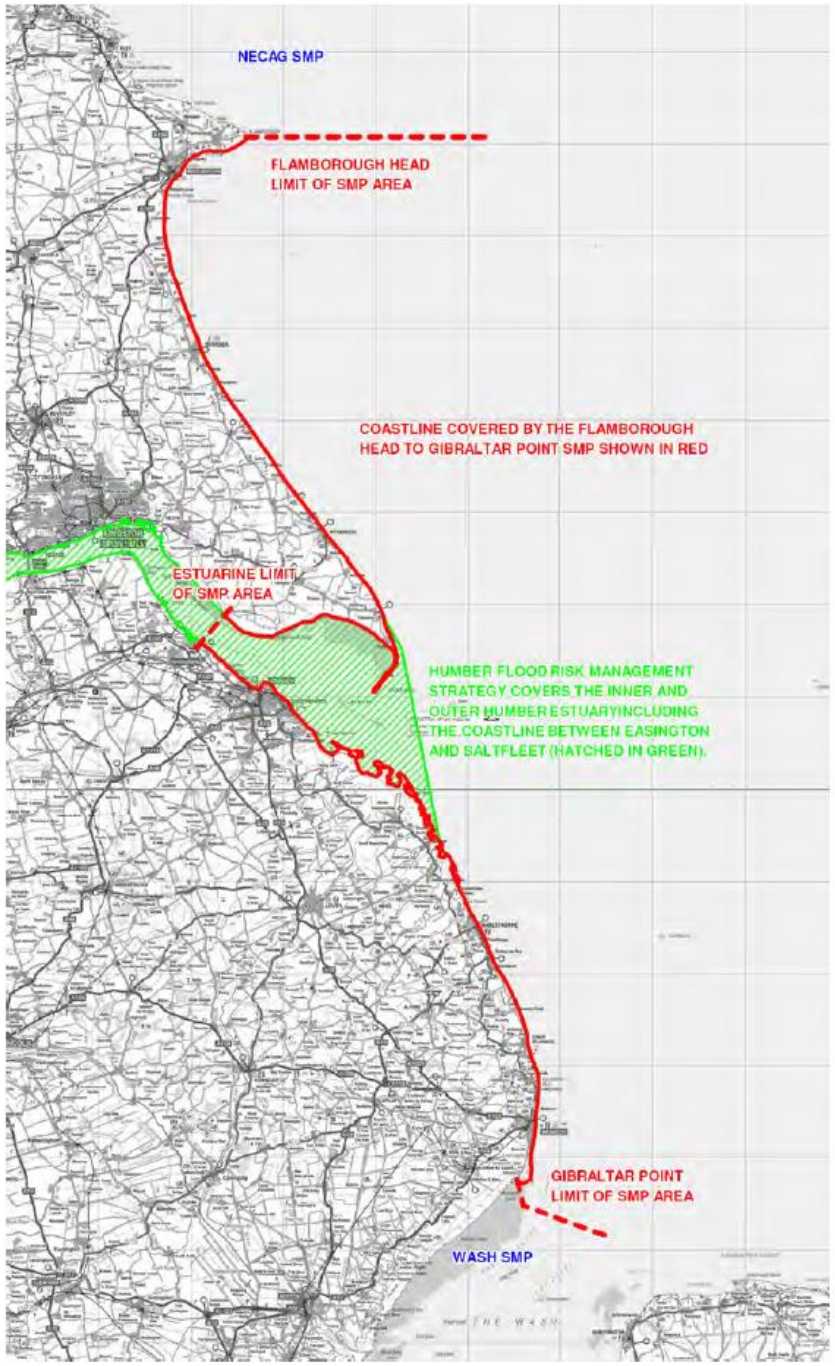
The Challenges of Sustainable Management – Holderness Case Study:

Watch Parts 3 &4 of the e-stream video: Defending the coast (11.49 min +)

Holderness DME

SMP Holderness

- The Holderness SMP is a plan for managing coastal flood and erosion risk for stretches of coastline in the short term (up to 2025), the medium term (2026 – 2055) and the long term (up to 2105).
- This Shoreline Management Plan covers the coastline from Flamborough Head to Gibraltar Point including the outer Humber Estuary.
- Shoreline Management Plans identify policies for sections of coastline in order to best manage coastal flood and erosion risk to people and the developed, historic and natural environment.
- The main aim of the SMP is to **develop a sustainable management approach (actions that do not cause problems elsewhere) for the shoreline that takes account of the key issues and achieves the best possible balance of all the values and features that occur around the shoreline over the next 100 years.** This needs to recognise the strong relationship with social, economic and environmental activities around the shoreline. SMP policies therefore have to be realistic.
- SMPs are reviewed every five to 10 years; the first round SMPs are now being reviewed to take into account updated information and changing circumstances.



Flamborough Head to Gibraltar Point Shoreline Management Plan area

- This Shoreline Management Plan covers the coastline from Flamborough Head to Gibraltar Point. The northern boundary of the SMP is at Flamborough Head (as shown on the map).

- The southern boundary of the SMP is at Gibraltar Point (as shown on the map) where this SMP joins the adjacent Wash SMP, to the south.

- The Humber Flood Risk Management Strategy was published in March 2008 and the area covered by it (shown as the green hatching on the following map) overlaps the SMP area. To ensure this overlap is addressed, there has been close communication between the project teams with the Humber Strategy team represented on the SMP Client Steering Group.

- The Plan area covers a highly varied coastline with a range of different land uses and environments. Much of the Holderness coastline has experienced rapid erosion over recent centuries. Due to the presence of human settlement along the coast, there are many conflicting local issues and objectives. The floodplain of the outer Humber Estuary includes some of the most productive agricultural land in the UK as well as major industry and many commercial buildings.

Sea Level Rise – the challenge

Sea level rise

Facts and Figures

Climate change is occurring due to both human and natural factors. Some facts and figures have been produced by the International Panel for Climate Change in 2007 to show how the climate has changed over recent times:

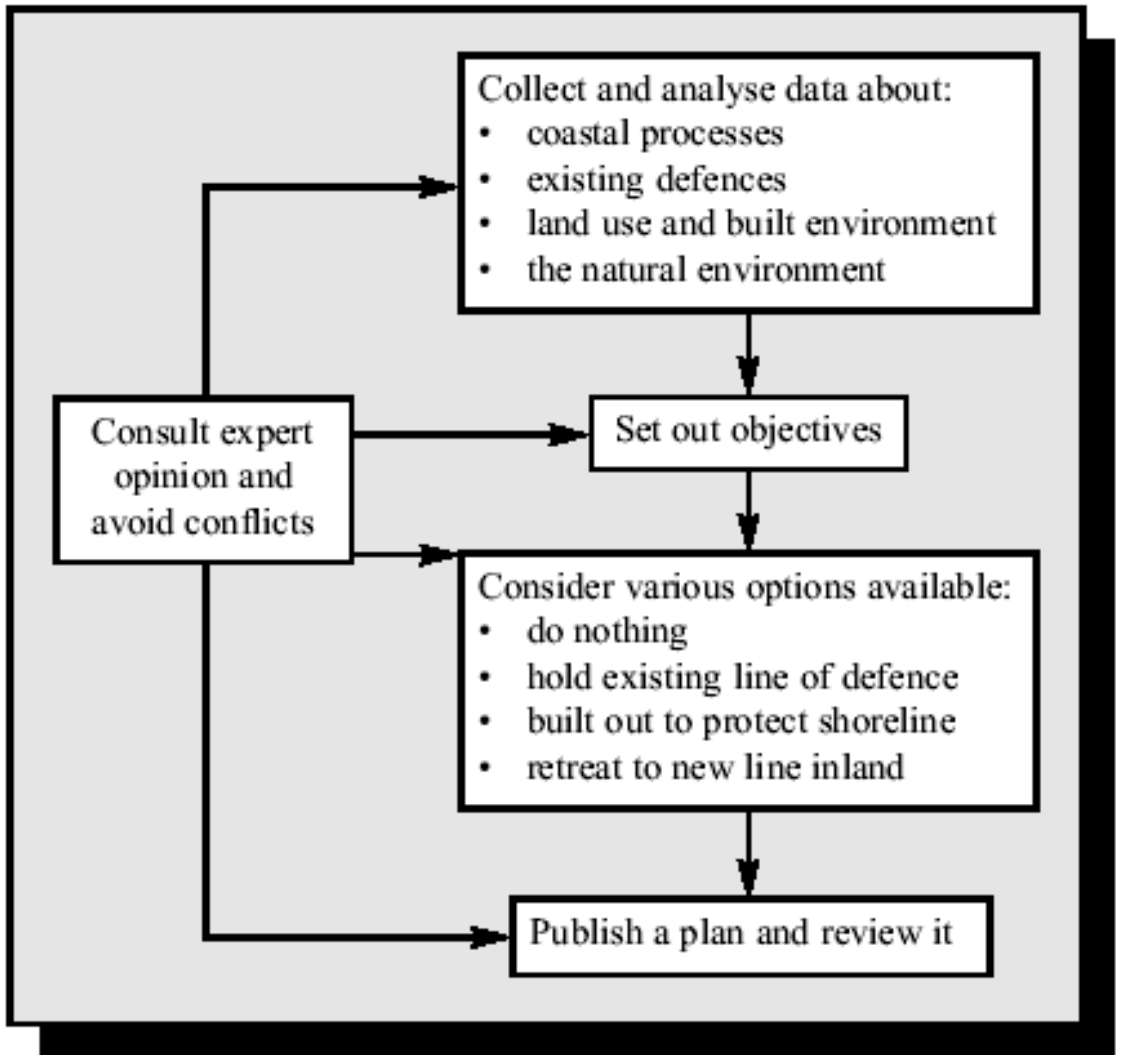
- The linear global warming trend over the last 50 years (approximately 0.13°C per decade) is nearly twice as much as that for the last 100 years.
- The total temperature increase from 1850–1899 to 2001–2005 is approximately 0.76°C.
- Global average sea level has risen at an average rate of approximately 1.8 millimetres per year over the period 1961 to 2003. The rate was faster over the period between 1993 and 2003 at about 3.1 millimetres per year.
- The total 20th-century rise in sea level is estimated to be approximately 0.17 metres.

- In the Flamborough Head to Gibraltar Point SMP region, the historic rate of sea level rise is just over 1.1 millimetres per year, based on the sea level measured at Immingham over the period between 1960 and 1995.

Decision making assessments

- **The Holderness Coast is threatened by the process of erosion and in addition the beach areas, which are important for tourism around some locations, are being depleted at an alarming rate. Land has been reclaimed in the Humber estuary and this is now being used for industry; a key location as it will boost the local economy and also marks the edge of the river and the beginning of the coastline.**
- **The aim of this exercise is for you to develop ideas for a Shoreline Management Plan for whole of the Holderness Coast whilst considering:**
  - existing coastal defence and the use of the land being protected
  - coastal processes in operation along the whole of the coast
  - current research into sediment movement along Holderness

Fig. 5 Setting up a Shoreline Management Plan.



Holderness DME

- You have been allocated one of the seven sites along the Holderness coast, where coastal management is taking place. You have to choose the best option for the future. **You need to put forward your recommendation for managing the coastline in the future to the council at the next meeting choosing from one of the four management options. You will do this after completing the following 3 activities:**
  1. **Information sorting – see information about your section of coastline**
  2. **Cost-benefit analysis using a 'conflict- matrix'**
  3. **Final recommendation for your stretch of coastline to present to the group.**

HOLDERNESS – the challenges represented in sustainable management of the Holderness Coast

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).

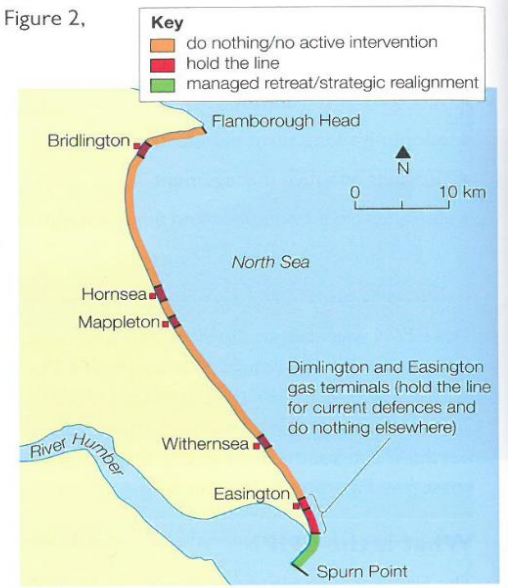


Figure 2 *Coastal management options for Holderness up to 2025*

The Aims of the SMP along the Holderness Coast	Importance score /5
To balance flood and erosion risk management in a sustainable manner appropriate to the overall value of the features affected	
To ensure that shoreline management policies encompass longer term adaptation options, and give time for communities and individuals to adapt to changing climate conditions and levels of risk.	
To develop policies for flood and erosion risk management that will inform spatial planning processes and provide a robust evidence base for Local Development Frameworks	
To support sustainable patterns of development and consider possible effects on communities and their welfare.	
To support the nationally, regionally and locally important social and economic assets of the area in a sustainable manner.	
To consider the effects of coastal change on local industries, agriculture and employment and provide a secure environment for economic activity and development.	
To ensure that local decisions do not have a disproportionately adverse affect on the natural balance of the coastline and shoreline management elsewhere.	
To contribute to the positive management and enhancement of environmentally designated sites and protected species, subject to natural change.	
To support the conservation and enhancement of biodiversity in the wider coastal zone.	
To support the preservation and enhancement of the historic environment.	

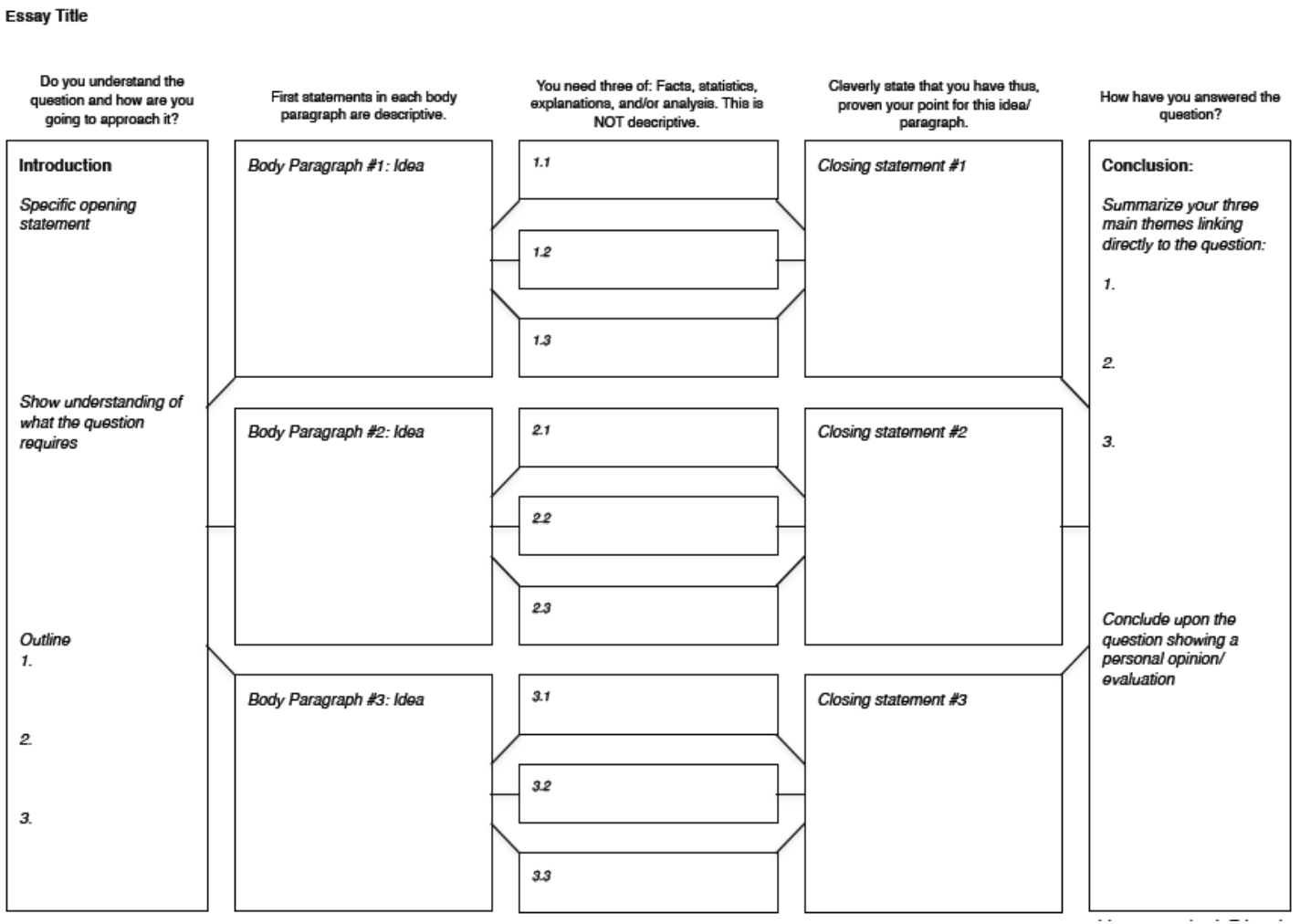
Pick 5 of these aims to memorise for the exam. Make sure that they are a range of ideas, with some more important than others so that you can assess.

Answer the following questions in full and ADD THEM to your case study on the Holderness Coast:

- Referring to named examples (along the Holderness Coast), suggest what factors influence the choice of coastal defence strategy. For example, why might traditional approaches to coastal management, such as some of the hard management strategies, be important in management of the coast? Use your example for the decision making exercise to help you.
- What do you understand by the term ‘sustainable approaches’ to coastal management?
- With the greatest challenge of climate change - what are the most important approaches to coastal management and why?

Exam-style Question

- **‘Sustainable approaches to coastal management will become more important than traditional approaches in dealing with the impacts of climate change.’ To what extent do you agree with this view? [20 marks]**



3.1.3.4b: Coastal management: Part 2

Learning Objectives

- To understand human intervention in coastal landscapes
- To understand why people manage coastlines in different ways
- To understand sustainable approaches to flood risk and erosion management

Key words:
Hard engineering
Soft engineering
Cost-benefit analysis
Tangible
Intangible
Integrated Coastal Zone Management

Concept Checker:

- ❑ **The concept of cost-benefit analysis (CBA)**
- ❑ **The concept of sustainable management**

Integrated Coastal Zone Management - ICZM

The SMPs deal with just the shoreline sections of the coast. However, there has been a growing awareness around the world that SMPs should be coordinated with other policies affecting the coastal zone.

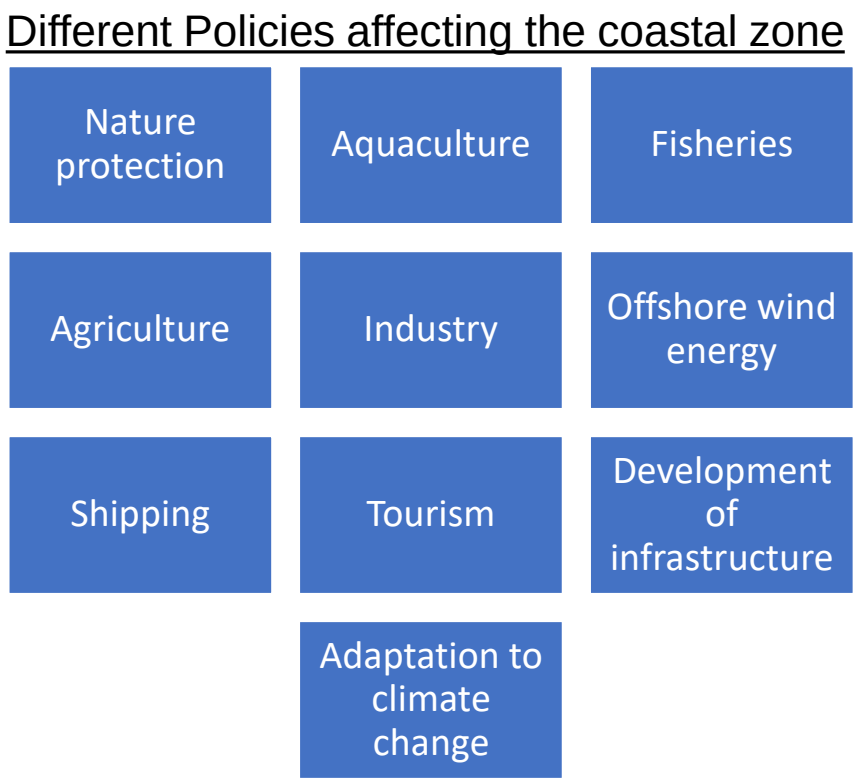
The term ‘integrated coastal zone management’ originated from the UN Earth Summit of Rio de Janeiro in 1992 and was taken up by the European Commission.

Integrated Coastal Zone Management

- A systems perspective recognises that an action in one location is likely to have an impact elsewhere. The development of ICZM plans takes this as a basis for holistic (all components taken into account) planning.
- The coastal zone is not only a place for natural marine processes and habitats but **shoreline activities**, inshore and offshore operations and inland activities that output at the coast through drainage systems that flow into the coastal zone.

ICZM: AIMS

The key aim of ICZM planning is to co-ordinate all the potential pressures and conflicts of interest at the coast and manage them fairly, responsibly and sustainably. Specifically:



- Monitoring, information-gathering and recording of what is taking place at the coast
- Identifying and involving all stakeholders (who may change with time)
- Agreeing co-ordinated plans that allow key objectives for stakeholders to be met
- Following sustainable strategies
- Managing the natural and human systems responsibly
- Considering changes to coastal systems and anticipating likely impacts
- Adapting plans accordingly

ICZM Vs. SMP?

- Integrated coastal zone management is a method of managing the whole coastal zone (near shore, inshore and offshore zones as well as the shoreline) and the shoreline management plan manages the potential risks from coastal processes on the shoreline only and presents a policy to manage these risks.

ICZM - Holderness

The relationship between this plan (ICZM) and the Shoreline Management Plan is crucial.

The SMP is, as its name suggests, a plan for the management of the shoreline, and as such has limited scope. The SMP identifies areas needing more integrated management.

The ICZM Plan, on the other hand, lays out policies for managing all aspects of the coastal zone. It will inform the review of the SMP. The ICZM was used to develop the Flamborough Head to Gibraltor Point Shoreline Management Plan (SMP) – published in 2011. Flamborough Head and Gibraltor Point are the northern and southern limits of a major sediment cell.

What comes out of the SMP review will, likewise, be taken into account in future ICZM plans and reviews.

Fig.1 Area covered by the East Riding ICZM Plan

1) Why do you think an ICZM is needed?

2) Why do you think that it is a global issue?

1) To protect the ecology

To protect the assets:-

- Settlements
- Tourists destinations
- Business centres
- Ports

To protect the 200 million people who live near Europe's coastline

2) Our coastlines are integrated. What happens on one stretch of coastline has an impact on other sections. It is a trans-national issue.

What are the specific issues facing coastal environments in the future?

- Discuss in groups

Self check – traffic light your confidence

Exam boards says you need to know the following:-

- What are the origins of ICZM?
- What is the background to why an integrated coastal management is needed?
- Why is concentrating on people and economic activity putting pressure on coastal environments?
- What are the specific issues facing coastal environments in the future?
- Who are the stakeholders, who should be considered when thinking about coastal management?
- How can ICZM be viewed as a cyclical process?

9 mark question

- Assess the advantages of integrated management plans such as Shoreline Management Plans (SMPs) and Integrated Coastal Zone Management (ICZM) [9 marks]

- Read Oxford textbook pages 142-143, Hodder textbook pages 122-124, and use the information to answer the above question.