



Coastal Management at Selsey in West Sussex

“With the exception of certain parts of the Norfolk Coast, it may probably be said without fear of contradiction, that at no point in the British Isles are the effects of Coast Erosion more clearly observable than upon the Selsey Peninsula.”

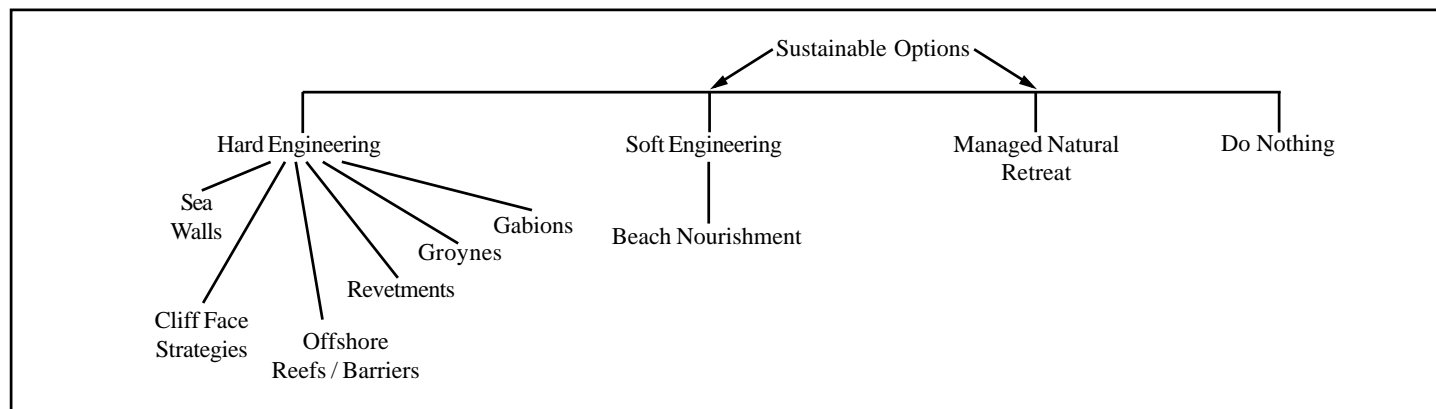
Selsey Town Council - A proposed plan for the co-ordination of Green Energy, Coastal defence and Reclamation. May 1999

Like it or not the coastline at Selsey is receding, and has been doing so for hundreds of years. The question is, what, if anything should be done about it. How should the coastline be managed or should it be left to its own devices? Fig 1. shows the spectrum of coastal management options.

What is at risk at Selsey?

Area of risk (Ha)	1200	Population at risk	200
Property at risk	80	Cost	£3.1m
Benefit/cost ratio	>1		

Fig 1. The Spectrum of Coastal Management Options



What is coastal defence?

- **Coastal defence** is an attempt to reduce the risk to land from sea water encroachment / inundation caused by erosion and/or flooding.
- **Coast protection** is defined as defences whose primary function is to prevent or mitigate erosion.
- **Sea defences** are coastal defences whose main function is the prevention or mitigation of sea flooding.
- **Flood defences** reduce the risk of river and tidal flooding.

Historical Perspective at Selsey Bill

Selsey Bill is made up of alternating bands of loosely consolidated sands and clays which belong to the Bracklesham Beds, above which lies 3-5 metres of stony loam giving place at one or two sites, to a mass of flint shingle belonging to a raised beach.

The rocks offer little resistance to erosion and because of the shape of the coastline there is little accumulation of shingle. Therefore under natural conditions this could result in the coastline being relatively unprotected.

In the early 1900's it was calculated that the coastline was receding at 2 - 3 metres per year. If this rate is assumed constant, then at the time of the Domesday survey the Selsey coastline would have been between 1.5 and 2 kilometres further out to sea than it is at present.

Another factor that influences change is rainfall, which at Selsey is high especially in Autumn and Winter. The subsequent ground water, with or without the assistance of frost in winter loosens considerable amounts of coastal rock, which is washed away by the tide, therefore helping to accelerate the rate of erosion. As a consequence, erosion tends to be more rapid in winter than the summer.

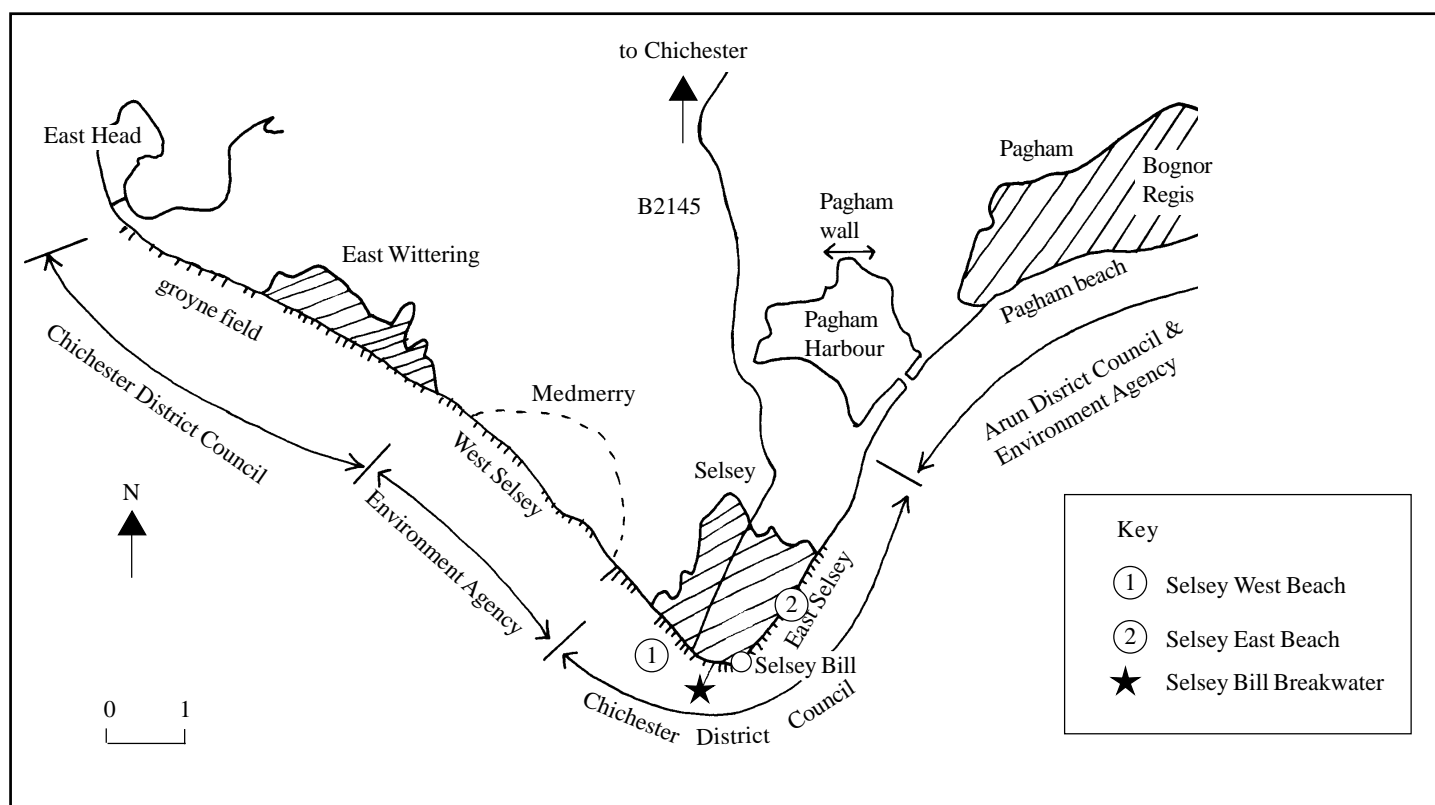
Who is responsible?

Human occupancy of the coastline makes coastal erosion a threat to both property and life. It is a hazard that tends to be disregarded or misunderstood by those who live away from the coast and are not, therefore, directly affected. The current situation at Selsey is complicated by the fact that three different groups have responsibility for coastal management.

Nationally the Ministry of Agriculture, Fisheries and Food (MAFF) has overall responsibility for coastal defences, while the planning, maintenance and operation of sea defence schemes are the responsibility of the Environment Agency and local authorities. Local councils were given powers of responsibility for coastal protection under the 1949 Coast Protection Act.

Responsibility for coastal protection in this area rests with Arun District Council, the Environment Agency in association with West Sussex County Council, Chichester District Council and the National Trust. Each of these organisations is responsible for a separate stretch of coastline, (Fig 2. overleaf). In addition Selsey Town Council has considerable concerns about coastal erosion in the Selsey area.

Fig 2. Coastal Protection Responsibility



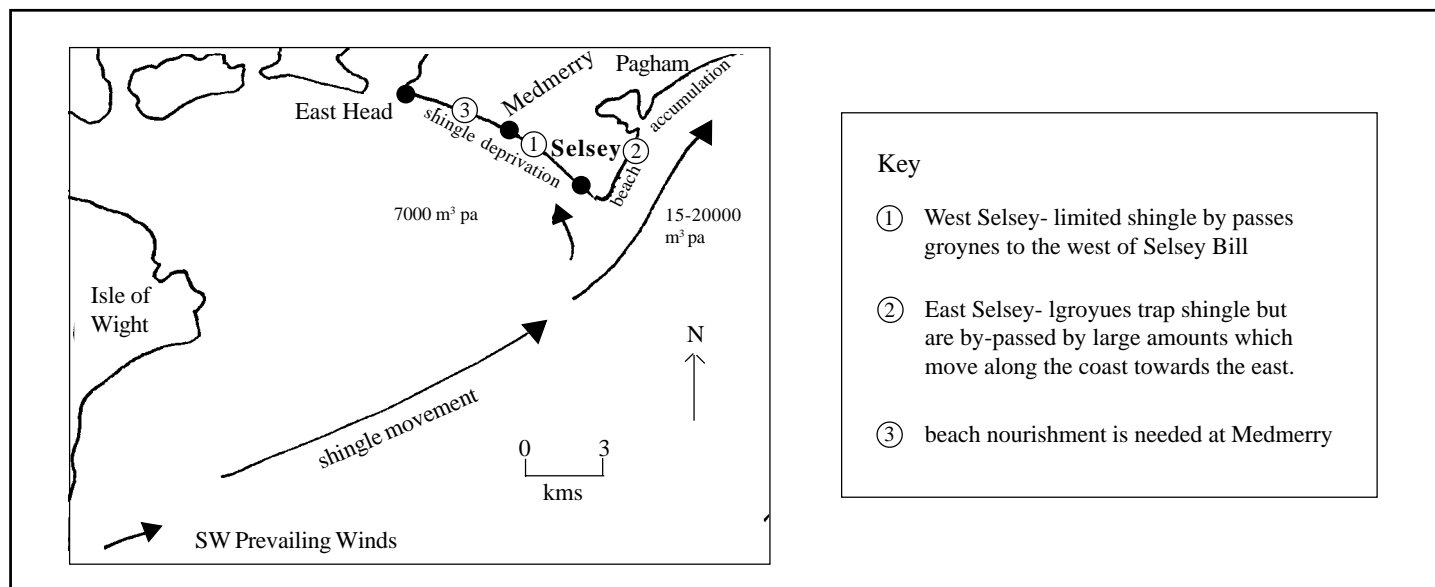
Shingle Movement

Shingle naturally moves eastwards from Selsey Bill, but because of the sheltering effect of the Isle of Wight and the south westerly prevailing winds the beach to the west of Selsey Bill is largely deprived of shingle. As much of the land behind Medmerry is below sea level, this lack of natural shingle nourishment leaves this area particularly open to inundation by the sea. (Fig 3)

The beach to the east of Selsey has maintained a growth rate which has kept pace with rising sea levels. It is thought that much of the beach depletion to the west has been caused by coastal defence works at the south east corner of the Bill and the past quarrying of offshore reefs, which have interfered with shingle movement and caused onshore shingle movement to be diverted up the eastern side of the Bill (see Fig 3).

One solution might be to reshape the end of Selsey Bill so that more shingle flows naturally to the west. In the past surplus material from Pagham beach has been moved by people to west of Selsey. This, however, could leave Pagham beach vulnerable. It would be preferable if gravel could be brought from onshore sources. Offshore dredging of shingle can often have a very damaging impact on coastal sediment cells.

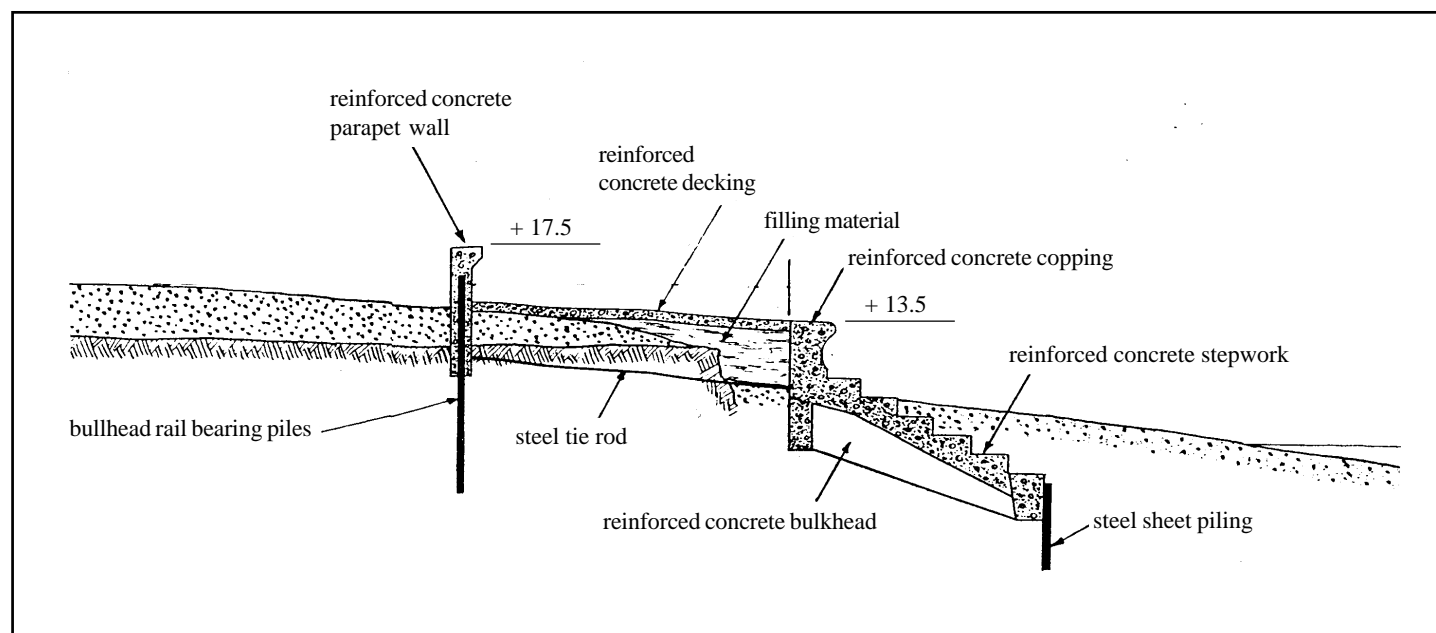
Fig. 3 Shingle Movements Around Selsey



Present day defences

The most frequently used coastal protection is wooden groynes, to intercept the littoral drift. This is better for shingle than sand. The groynes are then supplemented by sea walls and other concrete defences to protect the back shore, see Fig 4 for a typical example.

Fig 4. Typical cross section through sea wall defences in the Selsey area



Shoreline Management Plans

MAFF has encouraged the formation of coastal groups to co-ordinate management strategies for coastlines. The group responsible for this stretch of coastline is the East Solent Coastal Group. Groups are encouraged to develop Shoreline Management Plans (SMP). An SMP is a non-statutory document providing guidance and assistance with coastal defence planning. It identifies options that consider the needs of the natural, human and built environment. There are two SMPs that are relevant to this area:-

- East Solent Shoreline Management Plan, June 1997
- South Downs Shoreline Management Plan, June 1997

These plans put forward four options:

- Do nothing
- Hold the existing defence line
- Advance the existing defence line
- Retreat the existing defence line

which form the basis of coastal defence strategies.

They are defined in the SMP of 1997 as:

1. **Advance the line** - manage and defend a line forward (seawards of the existing defence line).
2. **Do nothing** - where a specific line need not be defended, so that the coast line can be allowed to evolve without human intervention. This option does allow some management (such as realignment of footpaths) and monitoring.
3. **Hold the line** - maintain the line of the existing defence.
4. **Retreat the line** - manage and defend a line landward of the present line, to accommodate coastal erosion and in the longer term to promote a more stable coastal formation.

Whatever happens in terms of coastal defence will be constrained by the existing development and infrastructure. Consequently there will be little room for manoeuvre particularly if a radical policy is proposed and adopted. This is highly unlikely as the financial considerations relating to property and livelihood would be considerable. It is, therefore, likely that the status quo will be maintained and that a policy of hold the line will be applied to most coastlines in Britain. The question is how sustainable is this option?

Table 1 Preferred Management Options

No.	Management Unit Description	Description of Preferred Generic Policy Option
1	Pagham Harbour to East Beach, Selsey	Hold the Line in the short term within predetermined limits + consider future managed retreat along the south spit
2	East Beach to West Beach, Selsey	Hold the Line
3	West Beach, Selsey to Bracklesham	Hold the Line in the short term + managed retreat in Medmerry
4	Bracklesham to East Wittering	Hold the Line
5	Cakeham Estate to East Head	Hold the Line

The above table summarises the preferred options from the SMPs of the Selsey area. As can be seen the preferred option is hold the line for most areas. Over time, however, this option will give rise to increasing costs and use of resources if the impacts of erosion, combined with rising sea level are to be resisted.

A more sustainable policy may be to accept that if the social and economic well being of the whole area are to be protected, it may be necessary to make adjustments towards a more natural shoreline in certain areas with low value development. The policy of do nothing and let the sea have its way may be the most sustainable option long term, but not for any people who live on the coastal stretch in question - hence the huge controversy at Seaford.

The main options for defence are:

Selsey East Beach - continue with the existing defences, shingle beach, groynes and sea wall by maintenance and renewal as appropriate, with options to vary the maintenance / management of the shingle beach and groynes.

Selsey Bill - continue with the existing sea wall, timber groynes and beach by maintenance and renewal as necessary. There is little scope for variation here because of the built up nature of the area.

Selsey West Beach - continue with the existing concrete wall, timber groynes and shingle beach by maintenance and renewal as necessary, with options to raise the standard of defence, maintain the wall and not the groynes, and recharge the beach. The weakness here is the Medmerry area where the beach has been regularly over topped by waves, where alternative controlled retreat strategies have to be reviewed.

Discarded options, mainly on grounds of cost, included:

Rock revetments, off shore rock breakwaters, flood banks (secondary defence), realignment of sea wall, flood walls (secondary line of defence), rock groynes and a low level rock reef. In some cases these would have advanced the line of defence.

Recent events added to the controversy as to what to do at Medmerry

The winters of 1998 and 1999 saw a series of severe storms which seriously damaged the beach at Medmerry, resulting in serious overtopping and flooding. The outcome of this is that the Environment Agency has decided that further efforts of defence would be inappropriate and that the coastline will be moved back 50 metres, allowing 5 hectares of land to be flooded. This would mean that three homes and part of a caravan park would be surrendered to the sea, in short a policy of **managed and controlled retreat**. The Agency has been spending £600,000 a year on replenishing the shingle banks but has decided that as climate changes lead to higher tides and stronger waves, the effort is futile, mainly because it would not be cost effective

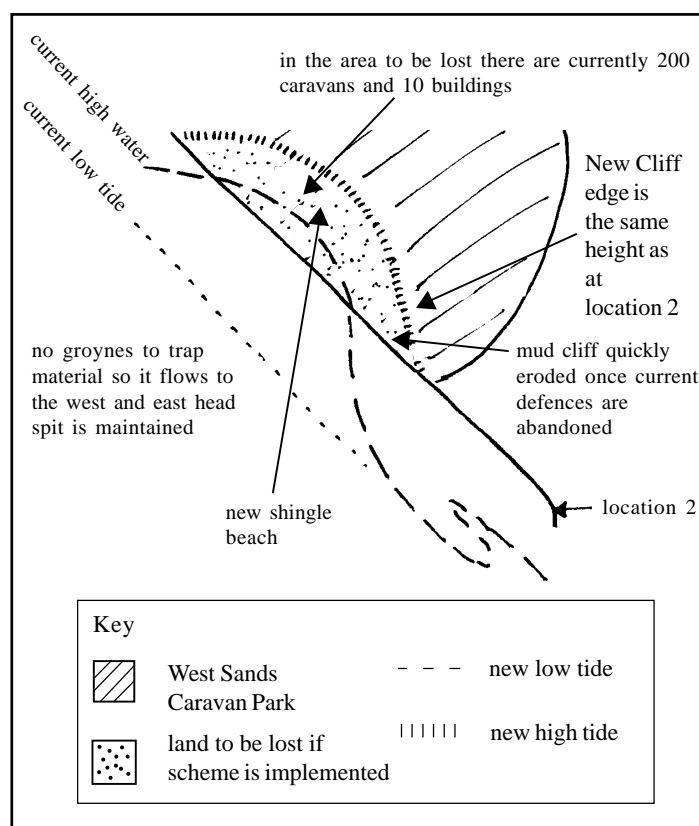
Arguments for managed retreat

- Retreat may be more cost effective than either accepting an increased risk of flooding **or** investment in expensive capital works. The soft engineering option could become progressively more expensive as beach maintenance will be required more often.
- A policy of controlled retreat is attractive on the grounds that it would replace wild life habitats that have been lost to agriculture. Coastal salt marshes are a highly productive ecosystem.
- The concept of controlled retreat is an attractive one on both environmental and economic grounds. Note however start up costs for managing the retreat are often high, because it is not a do nothing policy.

Two influential bodies are English Nature and the RSPB, both recommend managed retreat and soft engineering as opposed to hard engineering options. By its very definition, managed retreat requires an active programme for the location of potentially suitable sites, specific engineering works at chosen sites to put in place the infrastructure to control flooding and long term management of the resulting habitat. There are therefore very real costs to it, both short and long term.

If the option of managed retreat is adopted the area that could be retreated is shown below (Fig 5).

Fig 5. Area of possible managed retreat, Medmerry



A large benefit of this scheme is that the flow of material along the coast would be less interrupted, so East Head spit, to the west, would still receive material and would need less protection.

Below is the approximate costing for managed retreat.

Replacement Embankment:	200 m at £6000 per m =	£1,200,000
Replacement Groynes:	5 at £10,000 each =	£50,000
Buildings Lost:	10 at £100,000 each =	£1,000,000
Caravan Plots lost:	200 at £7,500 each =	£1,500,000

Total Cost £3,750,000

This option would, therefore, cost less than building a new sea wall, however, but it has some disadvantages and the long term benefits are unknown. While the sea wall and groynes could be removed once the sea has taken the land, it will be irretrievable. The managed retreat option could end up costing more because the new coastline that is formed may have problems and need defending in the future.

According to the Environment Agency, Selsey is the most vulnerable beach in Southern England and would be the first to suffer as a result of rising sea levels increased storms caused by climatic change. Managed retreat at Medmerry will not allow Selsey to become an island and will give it a better chance of survival. It has been decided that the best chance for Medmerry is to place new shingle embankments 50 metres further back from where they are at present. They are currently too close to the sea and cannot be expected to hold out much longer. Waves are getting stronger and long concrete sea walls would not be able to cope with the increased pressure placed upon them.

Practice Questions

1. Why do people live in hazardous areas such as Selsey?
2. What factors influence the viability of managed natural retreat as a coastal management option?
3. What fieldwork techniques could you use if investigating this area to assess the nature and rate of coastal erosion?

Answers

1. People often choose to live in hazardous areas because they are considered useful, for example is a small fishing village and a holiday resort. In addition many people like to retire to low lying coastal areas because the climate is pleasant and the environment attractive. Selsey is close to Chichester and the attractions of the South Downs and coastal strip.
2. In the case of Medmerry the land lost in the managed retreat scheme would not be of very high environmental quality, a small amount of a farmer's field and the caravan park. However the caravan park has a high economic cost with an average plot being estimated at £5000 - £7,500. If the caravan park were lost the local economy would also suffer because there would no longer be the holiday makers spending their money in the local shops and on the local services. However the caravans are only a semi-permanent installation and long term could be moved.
3. Two sorts of data could be collected, primary and secondary. Fieldwork techniques used to collect primary data could include the following, wave counts, long shore drift measurements, pebble count / survey, beach profiles at various times supported by sketches and photos, questionnaires and interviews of residents. What ever techniques are used it is important to consider the locations where the data is collected and the sampling techniques that are used. Secondary data collection techniques could include the following, news paper articles, letters to/from concerned parties, books, Internet and weather data, and above all historic maps and old photographs to assess changes over time.

Further Research

www.environment-agency.gov.uk. provides details of shoreline Management Plans

www.nos.noaa.gov/icm is a useful site for international data on shoreline management.

Classic Land forms published by The Geographical Association have useful series on Devon, Dorset, Pembrokeshire, Gower etc.

Acknowledgements;

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