

Figure 2.31: The coastal system

For information on other systems, see:

- Chapter 1.1 (page 1)
- Chapter 1.2 (page 3)
- Chapter 5.2 (page 117)
- Chapter 5.5 (page 123).

Find the location of Southampton Water on an atlas map of the British Isles.

2.6 Coastal conflicts

The coastal system

The coast is often described as being a **system** as with the drainage basins (see page 3) and the ecosystem (see page 43) (Figure 2.31). To understand what this means, think of the sea as an invisible box. Things enter that box (**inputs**) and either remain there (**stores**) or pass through it (**transfers**) and eventually leave it (**outputs**). One input is sediment. This comes from rivers and the weathering and erosion of cliffs. The stores of sediment are beaches and sand dunes. The transfer of sediment is mainly the movement of sand and shingle along the coast by longshore drift. The loss of sediment from the coast to the open sea is an output.

Where there is a balance between inputs and outputs, the system is said to be in **equilibrium**. However, the system can have a positive **sediment budget**. In other words, inputs are greater than the outputs. In which case, it is likely that beaches and other depositional features will increase in size. If the sediment budget is negative, with outputs exceeding inputs, then those features are likely to be declining.

Today, coastal management is based on identifying **coastal cells**. These are sections of the coast which are self-contained in terms of the movement of sediment. In other words, these coastal cells are systems (see Figure 2.39 on page 61).

An important point is that the equilibrium of coastal systems can easily be upset by a whole range of human activities. As we saw in Part 2.5, human activities can seriously disrupt coastal ecosystems. Equally, in this part, we will see that most forms of human intervention in the coastal system can give rise to a whole range of conflicts.

Conflict between development and conservation

Each of the threats considered in Part 2.5 creates a specific conflict. Many of those conflicts are about human needs versus the well-being of coastal ecosystems. They all raise the basic questions – should those ecosystems be protected and conserved? Or should people be encouraged to make the fullest use of their resources and opportunities, that is exploit them? In short, the overriding coastal conflict is between **conservation** and **development**. The case study of Southampton Water below is a tale of land reclamation, of marshes being turned into sites for a variety of activities.

Case study: Southampton Water, southern England

Southampton, on the English south coast, is one of the UK's leading ports. It is a port with a very long history. One of the attractions was that it was located at the head of a very sheltered and secure stretch of water – Southampton Water (Figure 2.32). In its natural state, the shores of Southampton Water were fringed by mudflats and salt marshes. These two habitats provided feeding for huge numbers of wildfowl and wetland birds. However, over the centuries these wildlife havens have been much reduced by development.

In the 19th and 20th centuries, because of Southampton's success as a port, mudflats were reclaimed on which to build new docks – first the Eastern Docks and then the Western Docks. The latter were built for the large ocean-

going liners carrying passengers to all parts of the world. These docks were subsequently extended upstream to provide the large terminal facilities needed for handling containerised cargo. Southampton is now the UK's second busiest container port.

In the middle of the 20th century, land was reclaimed on the southern shore close to the entrance to Southampton Water to provide the site for a large oil refinery. Later, more land was reclaimed for an oil-fired electric power station. At the same time, salt marshes were being reclaimed at Dibden Bay to accommodate a planned further expansion of the port (Figure 2.33). However, in the interests of nature conservation, it has been decided not to go ahead with the plan. A small area at the southern end has been used as the site for a residential marina at Hythe. Hamble, on the other side of the water, is renowned as a yachting centre.

Most of the salt marshes have now been reclaimed and other sections of the Southampton Water shores have become built up, not just by the expansion of Southampton, but also by urban settlements such as Fawley, Hamble and Hythe. In fact, the development of the Southampton Water coastline has led to a range of different land uses being accommodated.

Unfortunately, the natural environment and conservation have taken a back seat. It is only recently that the western shore has received some official protection. The stretch of shore to the north of Hythe is now a Special Protection Area (SPA) and that to the south is now a Special Area of Conservation (SAC). However, this protection has come far too late. It was needed 100 years ago!



Figure 2.32: Southampton Water



Figure 2.33: The reclaimed land at Dibden Bay

Conflicts between coastal users

The competition between development and conservation is just one cause of conflict in coastal areas. There are many other conflicts. These conflicts are between the various users (sometimes called **stakeholders**) of the coast. In many respects, these users are competing with each other because of their particular needs.

Who are the main users of coastal areas and what are their special needs?

The users include:

- local residents – good choice of housing; clean environment
- employers – access to labour; space for shops, offices and factories
- farmers – well-drained land; shelter from strong onshore winds
- fishermen – harbours; unpolluted waters
- port authorities – harbours and space for port-side services and terminals
- transport companies – good roads and terminals such as ports and airports
- tourists – beaches, hotels, recreational amenities, heritage sites
- developers – greenfield sites.

Which two of the coastal stakeholders do you think are most in conflict. Give your reasons.

Case study: The Mediterranean coast under pressure

The mainland coast of the Mediterranean coast is over 19 000 km long and home to over 160 million people living in the 22 countries that share the coastline. It is reported to hold 584 coastal cities, 750 yachting harbours, 286 commercial ports, 68 oil and gas terminals, 180 power stations and 112 airports.



Figure 2.34: A highly-developed stretch of the Mediterranean coast

Tourism is the major economic activity of the Mediterranean region. Since it is of the 'sun, sea and sand variety', it has put great pressure on coastal areas (Figure 2.34). Much coastal space is taken up by the infrastructure of tourism – hotels, restaurants, bars, recreational amenities and so on. The growth of coastal tourism has also encouraged the development of roads, airports and ports for ships, boats and liners. It is estimated that an additional 200 km of coastline is being developed each year and that by 2025 over half of the Mediterranean coastline will be built upon.

See also the Case study in Chapter 8.5 (page 225).

The growth of tourism is clearly damaging and destroying the natural environment. Equally, there are developments taking place that are damaging tourism. For example, inshore waters are being polluted by:

- the ships serving the oil and gas terminals
- discharges from industrial plants
- the run off of agricultural chemicals into the sea.

The success of tourism depends on clean beaches and clear seawater. So in terms of marine pollution, tourism is in conflict with at least three other activities. It is also in conflict with these same activities because:

- they are all competing for coastal sites
- no upmarket hotel wants to be located close to an oil refinery or a power station. It would be bad for their image and their visitor appeal!

Similar problems and conflicts also occur in the UK as can be seen in Figure 2.35 below.

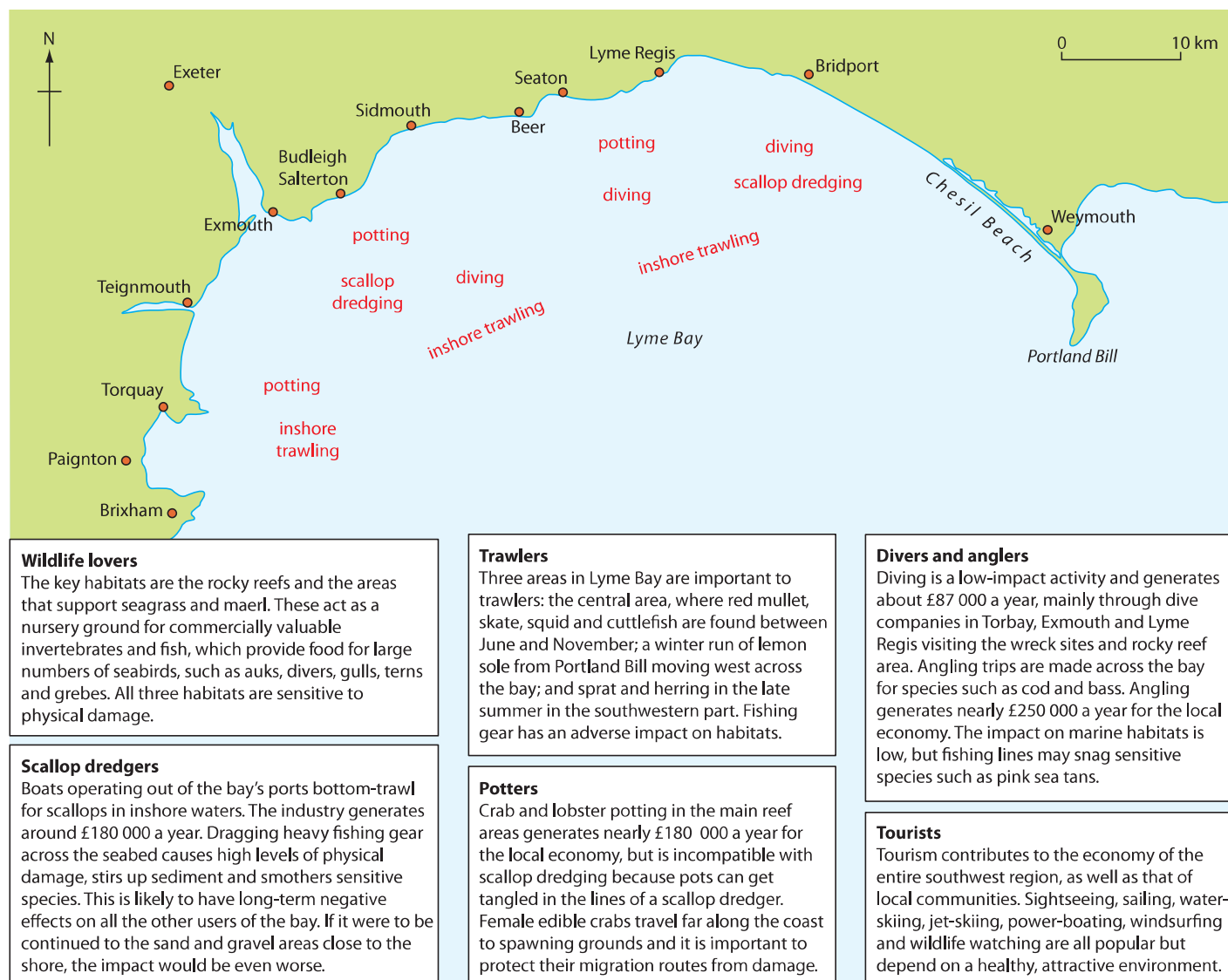


Figure 2.35: Key stakeholders in Lyme Bay, southern England

The conflicts that occur in coastal areas are on the landward side of the coastline and between different users of the inshore waters. This was the case with the coral reefs of St Lucia (see Part 2.4). It is also illustrated in the waters of Lyme Bay on the south coast of England. Here there are at least six stakeholders or users of its waters (Figure 2.35). It is important to note that one of these stakeholders is wildlife. Again, the only solution to the conflict is to separate the different uses by allocating specific areas of water to particular users. This solution is not as simple as it might seem. It is quite difficult to mark out areas of the sea. It is also difficult to police these areas to check that they are being used as they should be.

2.7 Coastal management

Coastal management is about two things. The first is resolving the conflicts, as we saw in the previous part, between different users of the coast and between those users and the well-being of coastal ecosystems. The second is taking action to meet big changes that threaten long stretches of the coast. The changes can present risks. Two risks stand out today – the risk of coastal erosion, and the risk of coastal flooding. These two risks are related. The managers of the coast are usually employees of either local authorities or the national government.



Figure 2.36: Retreat of the Holderness coast, England

Coastal erosion

Coastal erosion is quite normal and natural, and in most places it is unremarkable. However, there are some stretches which are eroding at alarming speeds. For example, at Holderness on the northeast coast of England (Figure 2.36), the 20–30 metres high cliffs which are made up of soft sands, gravels and clays are currently retreating at a rate of 1 metre per year – occasionally up to 10 metres per year. Over the last 2000 years the coastline has been pushed back some 4 km.

Coastal flooding

There is a difference between the gradual retreat of a coastline by erosion and the flooding of a low-lying coastline by occasional, abnormally high sea levels. **Storm surges** are the greatest flood threat. These are caused by very low air pressure, which raises the height of the high-tide sea. Strong onshore winds then drive the ‘raised’ sea towards the coast and are capable of breaching coastal defences and flooding large areas. **Tsunamis** generated by earthquakes can also lead to widespread coastal flooding as was the case with the 2004 tsunami.

Storm surges and tsunamis are periodic events. However, there are some stretches of coastline where the risk of flooding is both constant and increasing. This is the case with the city of Venice at the head of the Adriatic Sea. Global warming and its associated rise in sea levels is also increasing the coastal flood risk in many parts of the world.