Case study

Local-scale conflict: Studland Beach and sand dunes

Studland Beach is a National Nature Reserve in the UK run by the National Trust. The number of visitors is controlled by price and car parking spaces available, but in high season it is very busy, and the staff have many problems to deal with. The problems include:

- vehicle congestion: during busy periods up to 1,000 cars park on the Ferry Road
- visitor congestion, especially in July and August, when 95% come just for the beach and only 5% venture into the nature reserve
- litter, which may be as much as 12–13 tonnes a week
- lost children, often up to 30 a day
- conflicts of interest, mostly involving naturists, but also dog-walkers, families, naturalists and water sports enthusiasts
- erosion of the sand dunes.

The main solution has been to adopt land-use zoning, whereby most of the high-intensity recreation occurs at either end of the beach, close to the two car parks. The conservation area is in the middle of the beach, farthest away from the heavily used areas. A naturist area is close to the conservation area, and so away from where the majority of the people are located.

### Table B.1: Examples of mangrove restoration

<table>
<thead>
<tr>
<th>Visitors to Studland Beach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visitor numbers</td>
</tr>
<tr>
<td>Parking spaces</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total number of cars per year in National Trust parks</td>
</tr>
<tr>
<td>Foot passengers during high season on the ferry</td>
</tr>
<tr>
<td>Estimated number of visitors on a busy day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The spread of visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to June</td>
</tr>
<tr>
<td>July and August</td>
</tr>
<tr>
<td>September</td>
</tr>
</tbody>
</table>
### Activity

1. Choose a suitable method to show the data for the spread of visitors. Describe and explain the data you have shown.

2. Examine the implications of the concentration of visitors in July and August for managing the beach at Studland.

3. Briefly explain **three** problems that result from human activities on Studland dunes and beach.

4. Describe **two** methods of tackling these problems.
Managing the Great Barrier Reef, Australia

Australia’s Great Barrier Reef, off the coast of Queensland, is the world’s largest living structure. Extending for over 2,000 kilometres and covering an area of 343,800 square kilometres, it consists of over 2,900 separate reefs. It is also a world-renowned tourist attraction, and the most used marine park in the world.

The Great Barrier Reef contains 1,500 species of fish, 400 species of coral and 4,000 species of molluscs. It is a major feeding ground for many endangered species and a nesting ground for many species of turtle. It was placed on the World Heritage List in 1981.
Before it was managed, the reef suffered from the impacts of tourism, agriculture, and recreational and commercial fishing. Each year 77 000 tonnes of nitrogen, 11 000 tonnes of phosphorus, and 15 million tonnes of sediment are washed into the coastal waters from Queensland.

Access to the reef is now carefully controlled (Figures 6.48 and 6.49) by the Great Barrier Reef Marine Park Authority, which is responsible for the management and development of the reef. It follows the Agenda 21 philosophy, namely that resources must be used and managed in such a way that they are not destroyed or devalued for future generations.

The main type of management is that of land-use zoning. This means that some areas can be used for some things, such as recreation or fishing, whereas others are reserved for other activities such as conservation. The main aims of zoning are to:

- ensure permanent conservation of the area
- provide protection for selected species and ecosystems
- separate conflicting activities
- preserve some untouched areas
- allow human use of the reef, while at the same time protecting it.

### Table B.1: Land-use zoning on the Great Barrier Reef

| Zone                        | Bait-netting and gathering | Camping | Collecting | Commercial fishing | Use also bait-netting | Crabbing and gathering | Diving, boating, photography | Spear fishing, pricking, etc.) | Research (manipulative) | Research (non-manipulative) | Scientific research | Preservation Zone |
|-----------------------------|---------------------------|---------|------------|--------------------|----------------------|------------------------|-----------------------------|-----------------------------|------------------------|------------------------|------------------------|---------------------|----------------|
| General Use ‘A’             | Yes                       | Yes     | Yes        | Yes                | Yes                  | Yes                    | Yes                         | Yes                         | Yes                    | Yes                    | Yes                    | Yes                 | Yes     |
| General Use ‘B’             | Yes                       | Yes     | Yes        | Yes                | Yes                  | Yes                    | Yes                         | Yes                         | Yes                    | Yes                    | Yes                    | Yes                 | Yes     |
| Marine National Park ‘A’    | Yes                       | Yes     | Yes        | Yes                | Yes                  | Yes                    | Yes                         | Yes                         | Yes                    | Yes                    | Yes                    | Yes                 | Yes     |
| Marine National Park ‘B’    | Yes                       | Yes     | Yes        | Yes                | Yes                  | Yes                    | Yes                         | Yes                         | Yes                    | Yes                    | Yes                    | Yes                 | Yes     |
| Scientific Research         | No                        | No      | No         | No                 | No                   | No                     | No                          | No                          | No                     | No                     | Yes                    | Yes                 | No      |
| Preservation Zone           | No                        | No      | No         | No                 | No                   | No                     | Yes                         | No                          | No                     | Yes                    | Yes                    | Yes                 | Yes     |

![Table B.1: Land-use zoning on the Great Barrier Reef](image)
Case study

Superstorm Sandy

Hurricane Sandy was a tropical cyclone that developed into a hurricane in 2012, and it moved out of the Caribbean to impact an extra-tropical region. In its wake it affected seven countries, which were a mix of developed and developing countries. Hurricane Sandy was the deadliest Hurricane to hit the USA since Hurricane Katrina (2005). Sandy devastated portions of the Caribbean and east coast of the USA during late October 2012. The hurricane acted like a tropical hurricane while it was over the tropics (the Caribbean), but as it moved northwards over the Atlantic (Figure 1) it lost some of its strength. Then it merged with a weather system from the west and became an extra-tropical hurricane.

Losses due to damage and business interruption are estimated at $65.6 billion (USD, 2012), making it the second most costly hurricane to hit the USA. Over 250 people were killed along its path across seven countries.

In Haiti, an outbreak of cholera linked to Sandy, killed over 40 people and infected more than 5,000 others. More than 50 deaths were attributed to Hurricane Sandy in Haiti, with tents across the refugee camps flooded and crops washed away.

In the United States, Hurricane Sandy affected 24 states, including the entire eastern seaboard from Florida to Maine and west across to Michigan and Wisconsin. Damage was particularly severe in New Jersey and New York. Researchers from John Hopkins University predicted 10 million customers along the eastern coast of the USA would be without electricity due to the storm. Over 8.2 million customers were without power. Worst affected areas included New Jersey (over 1.98 million without power), New York (over 1.5 million) and Pennsylvania (over 0.5 million). The poor quality of the USA’s aging electricity infrastructure was partly to blame. Battery Park (New York) had a storm surge of 13.88 ft. Over 100,000 homes on Long Island were damaged or destroyed.

Transport infrastructure was badly affected. In New York, JFK, Newark-Liberty and LaGuardia airports were closed. Almost 20,000 commercial flights were cancelled between October 27 and November 1. The Metro North and Long Island Railroads closed. It was the worst flooding in the 108-year history of the Metropolitan Transportation Authority. The city’s most recent subway station, South Ferry, was flooded by a 14 ft storm surge and it cost $600 million to repair.
There have been calls for $20 billion to be spent on New York flood defences. Engineers have put forward many alternatives for flood protection, including a five-mile barrier across the lower bay of New York, and placing back-up generators high up in buildings rather than in basements.

Knowledge that the storm was coming allowed governments, businesses and individuals to take precautions ranging from evacuating areas, to moving furniture and electrical equipment out of basements.

A $9 billion scheme has been suggested to offer flood protection for the World Trade Center and back-up power for the fuel supply system. Storm gates could be fitted at subway stations. Lower Manhattan suffered an energy blackout caused by flooding at the electricity substation on the East River at 14th Street. It had a flood wall to protect against a 12 ft storm surge but was overwhelmed by the 14 ft storm surge. For $20 billion, New York could have a system of flood barriers similar to those that protect London and Rotterdam.

![Figure 1: The path and impacts of Hurricane Sandy](image-url)
Case study

Managing Indonesia’s fishing

Tens of millions of Indonesians live from fishing. However, the country exports relatively few fish. Small-scale fishermen bring in the vast majority of Indonesia’s catch. But the fishing industry is very inefficient. Few vessels have blast freezers, or they have only small ones. Because the catch must be brought back to shore quickly, fishermen make frequent short trips rather than longer journeys that are more lucrative. Most ports lack adequate cold-storage facilities, which means that the catch spoils if it is not sold quickly. Many of the processors are “cottage industries”: for example, fishermen’s wives salt their husband’s catch.

As small Indonesian vessels work inshore, well-funded foreign pirate fleets, often sailing under flags of convenience, plunder Indonesian fisheries further offshore. It is believed that the annual cost to Indonesia is around $3 billion a year. The Indonesian Head of State claimed that nine-tenths of 5,400 fishing boats in Indonesia’s waters each day are illegal. In 2014 a Vietnamese fishing boat illegally trawling in Indonesian waters was seized by the Indonesian navy and sunk. The navy also blew up two Thai boats in the same area. The sinking of ships sends a clear message that Indonesia means business when it comes to illegal fishing.

But sending messages may prove the easy part. Corruption is said to be widespread in Indonesia’s port and customs systems. It will not be stamped out unless officials are paid more. Upgrading port infrastructure will also be expensive.

Research and thinking skills

Visit https://www.youtube.com/watch?v=alWwiAcpaGQ to see images of the Indonesian navy dealing with boats that have been fishing illegally in Indonesian waters.

Are they likely to blow up Chinese fishing vessels?

Case study

Dead zones and red tides

Dead zones, red tides and their associated jellyfish seem to have occurred naturally for centuries, but their appearance is becoming increasingly frequent. Red tides, for example, regularly form off the Cape coast of South Africa, fed by nutrients brought up from the deep, and off Kerguelen Island in the Southern Ocean. Nowadays, though, most are associated with a combination of phenomena including overfishing, warmer waters and, often, the washing into the sea of farm fertilizers and sewage.

Most of the fish in shallow coastal waters tend nowadays to have been caught. As the larger species disappear, so the smaller ones thrive. These smaller organisms are also stimulated by nitrogen and phosphorus nutrients running off the land. The upshot is an explosion of growth among phytoplankton and other algae, some of which die, sink to the bottom and decompose, combining with dissolved oxygen as they rot.

Warmer conditions, and sometimes the loss of mangroves and marshes, which once acted as filters, encourage the growth of bacteria in these oxygen-depleted waters.

The result may be a sludge-like soup, apparently lifeless – hence the name “dead zones” – but in truth teeming with simple, and often toxic, organisms. In some places red tides form, producing toxins that get into the food chain through shellfish and rise up to kill bigger fish (if there are any left), birds and even seals and manatees.

Red tides and similar blights do not necessarily last long, nor do they cover much of the surface of the sea. But they are increasing in both size and number: dead zones have now been reported in more than 400 areas. And increasingly they affect not only estuaries and inlets, but also continental seas such as the Baltic, the Kattegat, the Black and East China Seas and the Gulf of Mexico. All of these are traditional fishing grounds.
**Case study**

### Oceanside littoral cell

Inputs into the Californian sediment cell include:
- river deposits
- sediments from cliffs
- materials for beach replenishment
- north–south longshore drift.

Irregular and variable river supplies have been further reduced by 33% due to dam construction. Most of the material supplied for beach replenishment is fine-grained silt and sand.

There is a great deal of movement of sediment along the south Californian coast. Each year rip currents and offshore currents move 100,000 m$^3$ of sediment into the La Jolla submarine canyon, and over 200,000 m$^3$ of material drifts southwards (Figure 1). In addition, seasonal variations in constructive and destructive waves redistribute coastal sediments and sea levels are rising 6–15 mm each year.

There have been many human impacts on the sediment cell. Dams have reduced the supply of sediment to the beaches. The construction of houses, swimming pools, boats, private protection schemes and roads are destabilizing the cliffs. Oceanside Harbour in the north is blocking the southward movement of sediment and most is now diverted to offshore currents and to the La Jolla submarine canyon.

**Figure 1:** Sediment movement at Oceanside Harbour
Geopolitical conflict: The Falkland Islands (Las Malvinas)

The Falkland Islands is a British archipelago in the southern Atlantic off the coast of Argentina. The islands were first inhabited by a French colony in 1764. The British followed in 1765 and the Spanish in 1766. The first Argentinian claim to the island was in 1820. There are no indigenous inhabitants of the Falkland Islands.

In 1982 Argentina invaded the Falkland Islands, leading to geopolitical conflict. After an 11-week conflict, and over 900 deaths, the UK took back control of the Islands.

In 2012 the Organization of American States (OAS), with the exception of Cuba, backed Argentina’s claim to the islands. However, the majority of the Falkland Islanders want to remain British, and successive Argentinian governments have done very little to win them over.

Also in 2012, it was suggested that the oil industry there could be worth $180 billion, with the Sea Lion oil field delivering 430 million barrels of crude oil. The Sea Lion field is less than 150 km off the coast of Argentina.

The UK’s ability to defend the Falklands will not last forever. Defence cuts will make it more difficult to take back the islands should Argentina decide to invade again. Nevertheless, in 2012 Britain sent a Navy destroyer and a nuclear submarine to the Falklands, partly as a show of strength and its commitment to the islanders.

In 2016 a UN commission on the limits of the continental shelf claimed that the Falkland Islands are within Argentinian waters.

---

Communication and social skills

Organize two groups, one pro-Argentina and the other pro-UK.

Debate the question: Who should the Falkland Islands and its resources benefit?