

# THE NETHERLANDS FACTFILE

## Deltawerken

The Deltawerken is an example of a hard-engineering **megaproject**. It was begun less than three weeks after the devastation of the 1953 North Sea floods. The aims of the project were to:

- reduce the risk of flooding in the low-lying Eastern Scheldt area of the Netherlands, where much land was below sea level
- shorten the length of the coastline exposed to the sea by 700 km
- control the flow of the Rhine, Maas and Scheldt rivers to reduce flood risk
- maintain safe access to the North Sea for shipping from important Dutch ports such as Rotterdam.

Flood defences were designed to protect from a 1:2000 year coastal flood and 1:250 year river flood **return periods**. The Deltawerken took place between 1958 and 1997. A series of dams and sluice gates were constructed between the islands that make up the Eastern Scheldt area to control the flow of water (Figure 11.3). During a storm surge, these can be closed to shut the sea out. Embankments (called ring-dykes) were built to act as flood walls around the islands and along the coast. The entire plan cost over US\$5 billion. However, the risk of rising sea levels due to global warming means that the Dutch will need to continue to raise and strengthen their flood defences. In 2008 a Dutch government report concluded that the Netherlands should assume a sea level rise of 1.3 m by 2100, meaning US\$1.5 billion would need to be spent each year on new flood defences up to 2100.



Figure 11.3 Map of the Deltawerken, Netherlands

The Netherlands' name reflects its low-lying topography, with more than a quarter of its total area under sea level.

The sea defences are continuously being strengthened and raised to meet the safety norm of a flood chance of once every 10,000 years for the west, which is the economic heart and most densely populated part of the Netherlands, and once every 4,000 years for less densely populated areas. The primary flood defences are tested against this norm every five years. In 2010 about 800 km of dikes out of a total of 3,500 km failed to meet the norm. This does not mean there is an immediate flooding risk; it is the result of the norm's becoming more strict from the results of scientific research on, for example, wave action and sea level rise.<sup>[3][4]</sup>

The amount of coastal erosion is compared against the so-called "basic coastline" the average coastline in 1990. Sand replenishment is used where beaches have retreated too far. About 12 million m<sup>3</sup> of sand are deposited yearly on the beaches and below the waterline in front of the coast.<sup>[5]</sup>

The Stormvloedwaarschuwingsdienst (SVSD; Storm Surge Warning Service) makes a water level forecast in case of a **storm surge** and warns the responsible parties in the affected coastal districts. These can then take appropriate measures depending on the expected water levels, such as evacuating areas outside the dikes, closing barriers and in extreme cases patrolling the dikes during the storm.<sup>[6]</sup>