Canvey Island, Thames Estuary (Changes in relative sea level)

Specification topic: Changes in relative sea level

Case study: Canvey Island

Canvey island, a low-lying area on the north side of the Thames Estuary was particularly badly affected by a devastating storm surge in 1953. At just 1 m. above average sea level, when spring tides occur it can be as much as 2 m. below high tide level, relying on the protection of 6 m. high sea walls. The eastern part of the island is densely populated and includes the town of Canvey, to the south there is a large oil storage facility and much of the western half of the island is marshland.

The risk: while existing coastal defences are considered to be effective for current tidal and storm conditions, the forecast changes in relative sea level require additional measures to be considered. The isostatic rebound of the British Isles is unevenly experienced with the north west of Scotland (the region most 'depressed' by the greatest weight of ice in the last glacial advance) rising faster at a consistent rate of 1 mm. per year. However, in response to a geological axis the south east of England is tilting down which, in the Thames Estuary, is at a rate of 1.5 mm per year. Up to 2100 that is likely to mean an isostatic submergence of 12 cm. In addition, eustatic changes to sea level as a result of thermal expansion and glacial/ice-sheet melt is believed to be causing sea level to rise at a rate of 3 mm per year. While it is difficult to forecast future rates, the combination of these factors means that by 2100, the sea level in the Thames Estuary is likely to be considerably higher compared to 1990 levels by between 53.1 cm. (high forecast) and 37.3 cm. (low forecast), in contrast with Edinburgh which may anticipate a sea level rise of 39.2 cm. (high forecast) and 23.4 cm. (low forecast).

The response: The Thames Estuary 2100 (TE2100) plan identifies that the 40,000 population is vulnerable to the overtopping of current defences by higher-than-present storm surges and proposes adaptation strategies. These include maintaining and improving the current defences and introducing community strategies such as safe havens on the highest land. Vulnerable low-storey developments such as mobile homes, single-storey buildings and camp sites should have escape or community refuge plans. If this is not possible they should be replaced with multi-storey buildings. The western marshlands may need to be remodelled for managed retreat if climate change mitigation strategies have not been successful in arresting sea level rise by 2050. With only two access roads off the island (making population evacuation difficult in the event of higher tidal surges) the main strategy is to prepare safe havens, high level building access and shelters.

Exam style questions:

1. **To what extent should Canvey Island be considered a 'high risk' coastal area in experiencing the impact of changes to the relative level of sea and land? (9 marks)**

2. **Critically examine the range of strategies available to reduce the risks resulting from changes in relative sea level faced by communities such as those on Canvey Island. (20 marks)**