Sustainable Coastal Management

In The Netherlands

Further Example

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1. How the Dutch conquered the oceans

1300

1900-2000

For hundreds of years, the Dutch have been experts in managing their fragile coastal environment sustainably. Since the 1500s their distinctive windmills have been used to raise and pump away water, acting as the world's first 'flood control system.' At the same time, they have over time added thousands of square kilometers of artificial land to cope with a growing population.

Did you know? 27% of the Netherlands is actually located below sea level!

The Netherlands is protected against flooding and coastal erosion by natural dunes, dikes, dams and storm surge barriers. Population growth, coastal urbanisation, economic development and a changing climate increase pressures on the coastal zone.

Managing the sediment budget of the sandy coast is one of the main strategies used to protect coastal land, infrastructure and people in the Netherlands from flooding and erosion.

Beach nourishment has been successfully and systematically applied since 1990. Designing and evaluating coastal defences, such as sand nourishment requires long term and annual monitoring of coastal morpho-dynamic processes along the entire coast. Every 6 years, testing the compliance with statutory safety standards requires state-of-art information of the hydraulic conditions and geo-technical state of the primary flood defence.

Integrated planning addresses the increasing risk of flooding and coastal erosion and is a useful tool to help reduce the risk to the population and capital investments. The integrated approach focuses on 'spatial quality' and 'sustainable safety' and is based on a set of ICZM principles.

Key Term Check!

ICZM – Integrated Coastal Zone Management is a set of strategies by which all aspects of coastal change can be 'holistically' overseen together and solutions drawn up.

2. What is being done?

2.1 Dams, Dykes and Delta Works

These are hard-engineered structures (as in the figure above) which have been engineered into only the most spatially defined vulnerable areas of the Dutch coastline forming a massive network, costing over $15Bn. These are obviously less environmentally sustainable, but efforts have been made to improve their environmental credibility. For example, hundreds of km of roads and railways have been constructed across coastal defenses, making it useful transportation infrastructure in addition.

2.2 Sediment Nourishment

Currently, some 12 million m^3 of sand is replenished annually to cover loss due to erosion. This is locally sourced as a lower-environmental impact soft engineering strategy. Unlike the UK the Dutch have built highly efficient annual programs for maintaining the sediment budget, meaning that they work on a far larger scale then our 'on-then-off' smaller scale beach nourishment schemes. As mentioned, all material is very heavily checked for nutrient imbalances which can occur in the ecosystem with importing sediment from far afield.

2.2 Technology & Innovation

The key to the Netherlands' success has been primarily its ability to switch from being 'reactive' or 'adaptive' in managing the hazards of coastal sea level rise and erosion to being 'proactive' and 'mitigating' these. This has been conducted holistically (ICZM) by the government in tandem with many expert institutes such as Deltares and The Netherlands Centre For Coastal Research as well as 5 specialist universities. Together they produce eco-conscious solutions which are tested and then if successful, implemented on a national scale.