

The Netherlands: flood, coastal erosion and management

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The low lying western part of the Netherlands, sensitive to flooding and coastal erosion, is protected by dunes, in places supported by additional coastal measures. Visible behind the single ridge dune are the capital-intensive horticulture in glass houses and urban settlements.
(photo: //beeldbank.rws.nl, Rijkswaterstaat)

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Summary

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. Sand 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 defences.

The total government spending on primary flood defences is from an economic point of view, cost effective with the annual costs representing a tiny fraction of the capital protected. Currently the Ministry of Transport, Public Works and Water Management (Min.I&E) is reviewing the safety standards and looking for alternative approaches. This is because of the strong growth of the socio-economic sectors, which has resulted in a big increase in the value of the assets at risk. Moreover, the increased probability of flooding in the future due to the anticipated impacts of climate change will further exacerbate this. Sand nourishment is a flexible way of adapting to these changes.

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.

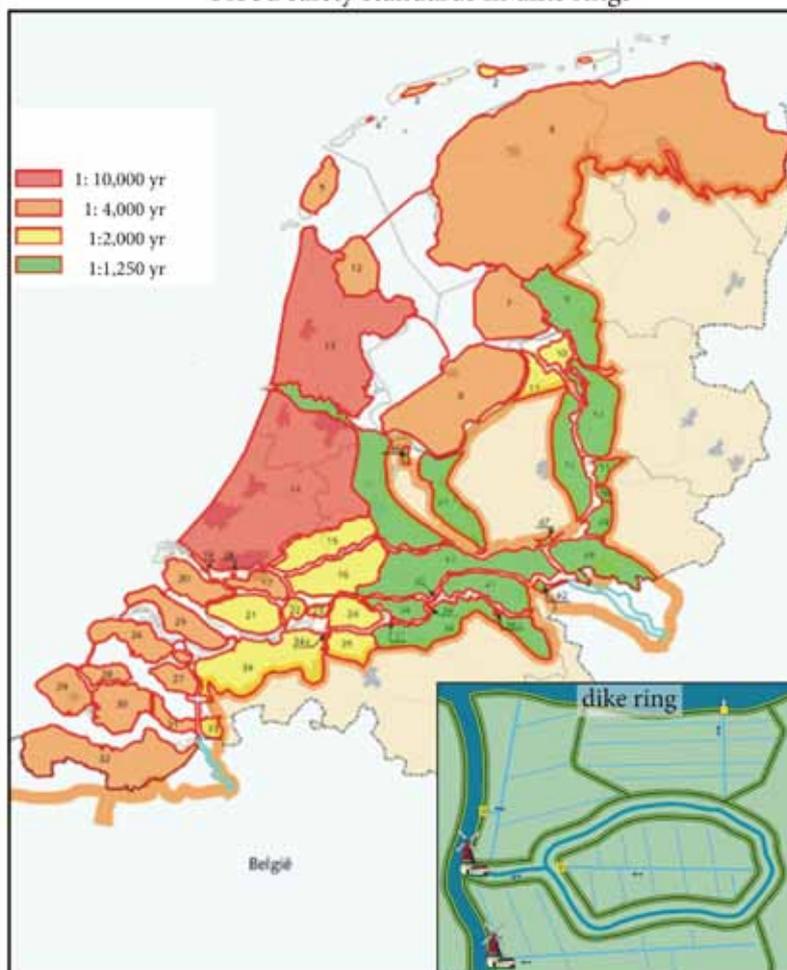
Integrated Spatial Planning



Water as a guiding principle in integrated spatial planning of the marine and terrestrial parts of the coastal zone – ('Space for Development' –Governmental Document prepared by four Ministries and adopted by Parliament 2006):

- Blue rivers: "Room for Rivers" projects;
- Black open squares: non effectuated emergency flooding polders in river dominated areas;
- Dark Yellow: protected dune zone: flood safety is first priority;
- Light Yellow: coastal foundation zone: area of nourishment: fore shore and deep water (up to 20m below MSL) and reserve for sea ward extension
- Red coastal areas: 'weak links' in the coastal zone, reinforcement is being executed;
- Light Blue on land: area below sea level, protected against flooding.

Flood safety standards in dike rings



Dike rings and flood safety standards in the Netherlands.

A dike ring is a series of polders surrounded by a primary flood defence dike.

The western part of the Netherlands (red) is most densely populated, with large capital investments, infrastructure, harbours and airport.

This part has the highest safety standard: the coastal defences (dams, dunes and dikes) can withstand a sea level (and waves) which occurs with a chance of 1/10,000 per year.