Exploring Possible Spatial Panning Scenarios in the Context of Potential Sea-level Rise in the Netherlands; Dealing with the Uncertainties of Climate Change

W. Loonen and E. Koomen
Netherlands Environmental Assessment Agency (MNP) and Vrije Universiteit Amsterdam
Faculty of Economics and Business Administration

The long time scale and large scientific uncertainties concerning climate change and sea level rise are a important issues in contemporary spatial planning. Its potential effects may, however, be severe. There is, for instance, an unknown but small probability that a 5-6 metre global sea level rise may occur within the next century, due to collapse of the Western Antarctic Ice Sheet (WAIS) or the Greenland ice mass. As many other delta's in the world, the Netherlands are particularly vulnerable for such drastic sea level rises.

Currently about 60 to 70% of the population and the economical value in the Netherlands are concentrated in the areas vulnerable to flooding either by the sea or by the rivers. In this study the uncertaintiy and plausibility of sea level rise scenarios are explored as well as the main adaptation strategies for the Netherlands. The long-term robustness and spatial consequences of various adaptation strategies (adapt, protect, retreat) are explored and confronted with expected autonomous spatial developments in the Netherlands in the period 2000 - 2040.

In these long-term scenario-studies we use the Land Use Scanner. This GIS-based model simulates future land use and has been used for various policy-related research projects. The Land Use Scanner offers an integrated view of all types of land use. It deals with urban, natural and agricultural functions, normally distinguishing almost 30 different land-use categories. The model is grid based, covering the Netherlands in over 3,000,000 cells of 100 by 100 metres each. Each cell describes the relative proportion of all present land-use types, thus presenting a highly disaggregated description of the whole country. Regional projections of land-use change are used as input for the model. These are land-use type specific and can be derived from sector-specific models of specialised institutes. The various land-use claims are allocated to individual grid cells based on their suitability. Unlike many other land-use models the objective of the Land Use Scanner is not to forecast the dimension of land-use change but rather to integrate and allocate future land-use claims from different sector-specific models or experts. The outcomes of the model should not be interpreted as fixed predictions for particular locations but rather as probable spatial patterns.

This paper describes a recent Land Use Scanner application that explores different policy scenarios aimed at protecting the Netherlands against the potential long-term impact of climate changes.