



Integrating adaptive behaviour in large-scale flood risk assessments: an Agent-Based Modelling approach

Toon Haer and Jeroen Aerts

Institute for Environmental Studies (IVM), VU University Amsterdam, De Boelelaan 1087, 1081HV Amsterdam, The Netherlands

Between 1998 and 2009, Europe suffered over 213 major damaging floods, causing 1126 deaths, displacing around half a million people. In this period, floods caused at least 52 billion euro in insured economic losses making floods the most costly natural hazard faced in Europe. In many low-lying areas, the main strategy to cope with floods is to reduce the risk of the hazard through flood defence structures, like dikes and levees. However, it is suggested that part of the responsibility for flood protection needs to shift to households and businesses in areas at risk, and that governments and insurers can effectively stimulate the implementation of individual protective measures. However, adaptive behaviour towards flood risk reduction and the interaction between the government, insurers, and individuals has hardly been studied in large-scale flood risk assessments.

In this study, an European Agent-Based Model is developed including agent representatives for the administrative stakeholders of European Member states, insurers and reinsurers markets, and individuals following complex behaviour models. The Agent-Based Modelling approach allows for an in-depth analysis of the interaction between heterogeneous autonomous agents and the resulting (non-)adaptive behaviour. Existing flood damage models are part of the European Agent-Based Model to allow for a dynamic response of both the agents and the environment to changing flood risk and protective efforts. By following an Agent-Based Modelling approach this study is a first contribution to overcome the limitations of traditional large-scale flood risk models in which the influence of individual adaptive behaviour towards flood risk reduction is often lacking.