



Good practice

Flood risk mapping in the municipality of Aveiro (Portugal)

The municipality of Aveiro, in close cooperation with the University of Aveiro and with help of the EU Cohesion Programme, has developed a special risk map for the flood risk of the Vouga river basin. The concrete objective of this project was to define as precise as possible the expected flood perimeters. Overall goal was to integrate risk mapping in the process of spatial urban planning.

Flood risk typology in Aveiro

The municipality of Aveiro is located at the Atlantic coastal line of Portugal. Till the 15th century the city itself was located directly at the waterfront. After massive deforestation due to the building of the Portuguese armada, the soil erosion in the mountains increased massively, resulting in a lot of sediment in the rivers. Over the centuries a wide strip of new beaches and sand dunes developed, resulting in an enclosed lagoon with large wetlands between the city and the Atlantic Ocean.

In contrast in more recent years the construction of a hydrological dam in the mountain area of a neighboring river resulted in a decreasing of over 65% of the river sediment in the ocean waters along the coastline. Consequence is a rapid coast-

al erosion of up to 50 meters deep during the last decades and an estimated further loss for the Aveiro area of up to 850 acres till the year 2050, in case no measures are implemented. Global warming could further accelerate this coastal erosion and increase the occurrence of floods in the city of Aveiro itself.

The Vouga river runs through the city centre of Aveiro and ends in the lagoon. During high tides and ocean storms the sea level temporarily raises, decreasing the draining capacity of the river. Often this coincides with heavy rain falls, raising the level of the river itself. In various cases in the past this has resulted in an actual flooding of the urban city centre and the surrounding lower rural areas.



Objectives of the project

To get a grip on this flooding risk the municipality of Aveiro started a project to gain more precise insight in the impact of a flood. The University of Aveiro was asked to do research in order

to develop an online risk map with the projected flooding area. This would enable the administration to take the flooding risk into account in future spatial planning, ideally resulting in concrete mitigation measures to protect new and existing areas against the flood risk and increase evacuation possibilities.

Research

As starting point the University of Aveiro did historical research into past floods. In the whole area field research was performed to make an inventory of flood marks on buildings. Furthermore the university performed a topographic survey with a differential GPS.

Construction of the risk map

The risk map encompasses the following characteristics:

- Altimetry
- Urban construction
- Mobility
- Infrastructures.

The risk map constitutes of various layers in GIS format. The combination of risk layers and layers with vulnerabilities enable the municipality to identify sensitive situations.

Lessons learnt

During the development of the risk map Aveiro has learned some valuable lessons:

- Risk mapping can be used as an important



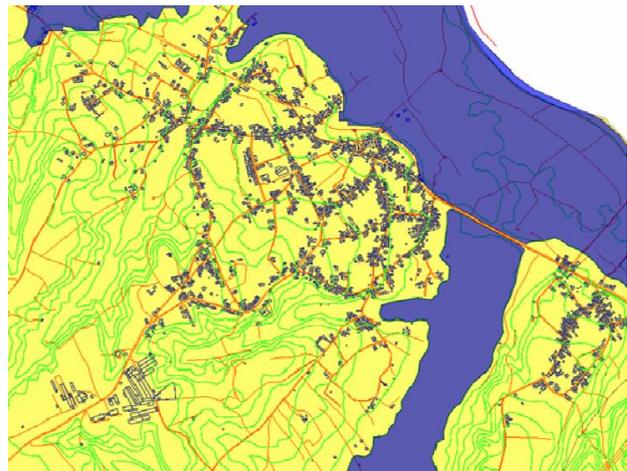
Overview flood risk map Aveiro



Picture: historical research of floods

tool in the political decision process on risk mitigation and spatial planning. However, this kind of usage poses specific challenges. Decision makers may have specific wishes and needs in order to be able to understand and use the information of risk mapping.

- Furthermore risk mapping should be dynamic. In order to be able to use risk mapping for policy decisions it should be accurate and up to date. This requires the implementation of constant updating in the structural processes of the municipality.
- Objective insight in risks does not automatically translate into policy options and decisions. Further analysis of the risks and of the policy options is needed. Risk mapping therefore has to be made an integral part of the risk assessment and capability assessment.
- Gathering information for risk mapping involves a lot of different public and private organizations. Transparent agreements have to be made with all partners to ensure good exchange of information.
- For the actual construction of a GIS based risk map often the collection of marks on the ground is needed. In many cases existing cartography is outdated or inappropriately scaled.
- Risk mapping may involve countless different risk themes and vulnerabilities. For a success-



ful project the risk mapping in first instance is best limited to only a few layers. Additions can always be made later.

- Historical research improves the usability of risk mapping for policy decisions. Insight in past incidents improves the understanding of risks.
- Attention has to be paid to the dispersion of the obtained knowledge. Public accessibility of a risk map is not sufficient to ensure the usage of the risk map. A communication strategy might include instruction classes for professionals in the usage of the risk map.
- In case a risk map is made publicly accessible extra attention has to be paid to public participation during the development. Knowing the information needs and questions of your inhabitants increases the value of risk mapping as a tool for risk communication greatly.

The MiSRaR project

The MiSRaR project is about Mitigation of Spatial Relevant Risks in European Regions and Towns.

The project is a cooperation between seven partners in six EU member states:

- *the Safety Region South-Holland South, The Netherlands (lead partner)*
- *the city of Tallinn, Estonia*
- *the region of Epirus, Greece*
- *the province of Forlì-Cesena, Italy*
- *the municipality of Aveiro, Portugal*
- *the municipality of Mirandela, Portugal*

- *the Euro Perspectives Foundation (EPF), Bulgaria.*

The goal of the project is to exchange knowledge and experiences on risk mitigation in spatial policies. The project will result in a handbook in which the lessons on the mitigation process are described and the good practices from the partners are presented. The Risk Assessment and Mapping Guidelines for Disaster Management of the European Commission will be implemented in the handbook.

The MiSRaR project is cofinanced by the European Regional Development Fund and made possible by the INTERREG IVC programme.

www.misrar.eu

Contact information

Nico van Os, general project manager MiSRaR, Safety Region South-Holland South, The Netherlands
n.van.os@vrzhz.nl

Paulo Lemos, project manager MiSRaR, Municipality of Aveiro, Portugal
misrar.aveiro@gmail.com

Aveiro risk map:
<http://sig.cm-aveiro.pt/securria>
(only in Portuguese)