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Multi-hazard risk assessment in Afghanistan

◀ *Cemented irrigation channel*

Legend
Water depth [m], T=100y
0 - 1
1 - 2
2 - 3
3 - 4
More than 4

Legend
EAD [$/y/ha]
0 - 500
500 - 1000
1000 - 10 000
10 000 - 100 000
More than 100 000

Hazard map (above) and risk map (below)

The geographical location of Afghanistan and years of environmental degradation in the country have made Afghanistan highly prone to intense and recurring natural hazards such as flooding, earthquakes, snow avalanches, landslides and droughts. Since 1980, disasters caused by natural hazards have affected 9 million people and caused over 20,000 fatalities in Afghanistan.

The understanding and accessibility of hazard, exposure, vulnerability and risk information is key to the effective management of disaster risk. Currently, the government of Afghanistan possesses limited information about current and future disaster risks and the effectiveness of policy options as a basis for decisions about reconstruction and risk reduction.

The World Bank and Global Facility for Disaster Reduction and Recovery (GFDRR) initiated a project to develop new risk information for Afghanistan about fluvial floods, flash floods, droughts, landslides, snow avalanches and seismic hazards. The project was carried out by a consortium of five institutes: Deltares (Netherlands), ENEA (Italy), GRF-Davos (Switzerland), KIT-Karlsruhe (Germany) and OMRAN (Afghanistan). Deltares was responsible for the overall project lead and risk assessments for fluvial floods, flash floods and droughts.

Risk is computed as the product of hazard, exposure and vulnerability. The hazard component is the combination of probability and magnitude of hazardous events. Hazard analyses were carried out separately for each threat. Several models were implemented to simulate the relevant processes involved. These models were fed by climate data and geological data like elevation, slope, land use, soil characteristics and so on.

Exposure is a measure of the assets and population at risk. An extensive data collection and processing effort was carried out to derive nation-wide exposure data. This includes data about the population, residential buildings, household inventory, commercial buildings, schools, hospitals, mosques, capital stock and livestock. The derived exposure data were applied uniformly to all threats to ensure mutual consistency.
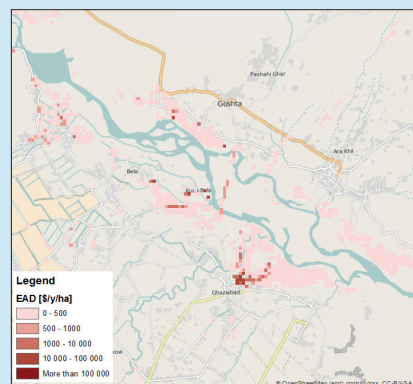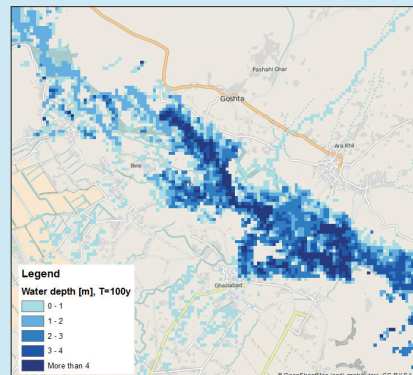
Vulnerability is a measure of potential exposure losses if a hazardous event occurs. Vulnerability analyses were carried out separately for each threat because of differences in the impact characteristics. For example, the vulnerability of agriculture to floods is high, whereas the vulnerability of agriculture to earthquakes is low.

The main project output consists of tables and maps (GIS) showing hazard, exposure and risk. The tables present results at the nationwide, province and district levels. An example of a flood hazard map and a risk map for the Nangarhar province can be found in the illustration. It shows the clear similarities between the hazard and risk contours. Areas of high risk (>500/y/ha) are found in municipality districts that are located in the floodplain as these are the areas where both hazard and exposure are significant. All maps are stored in an open access Web-based GIS platform (*http://disasterrisk.af.geonode.org/*), which can be consulted by the government of Afghanistan, the World Bank, NGOs or anyone else interested in risks due to natural hazards in Afghanistan.

RISK

HAZARD   EXPOSURE   VULNERABILITY

Further reading:
Diermanse et al, (2017) Afghanistan – Multi-hazard risk assessment, cost-benefit analysis, and resilient design recommendations; final report