

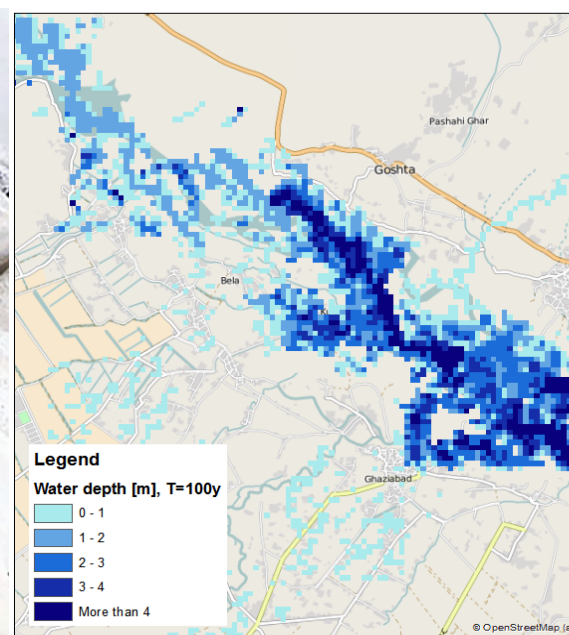


AFGHANISTAN

Establishing Critical Risk Information, a Roadmap for Early Warning and Disaster Risk Management (DRM) Capacity in Key Sectors

Afghanistan is highly prone to intense and recurring natural hazards such as flooding, earthquakes, snow avalanches, landslides, and droughts due to its geographical location and years of environmental degradation. These occur in addition to man-made disasters resulting in the frequent loss of lives, livelihoods, and property. Since 1980, disasters caused by natural hazards have affected 9 million people and caused over 20,000 fatalities in the country.

The creation, understanding and accessibility of hazard, exposure, vulnerability and risk information is key for effective management of disaster risk. This is especially true in Afghanistan, where reconstruction after recent natural disasters and military conflicts is on-going and will continue over the coming years. So far, there has been limited disaster risk information produced in Afghanistan, and information that does exist typically lacks standard methodology and does not have uniform geo-spatial coverage. There are currently no available risk assessment studies that cover all major natural hazards in Afghanistan, which can be used to assess the costs and benefits of different resilient reconstruction and disaster risk reduction strategies. As a result, one of the challenges the Government of Afghanistan faces is the limited information regarding current and future disaster risk and the effectiveness of policy options on which to base their reconstruction and risk reduction decisions.



OBJECTIVES

To better understand natural hazard and disaster risk, the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR) are supporting the development of a comprehensive multi-peril hazard and risk assessment in Afghanistan, as well as a first-order analysis of the costs and benefits of resilient reconstruction and risk reduction strategies. The overall objectives of the current project are:

1. To develop new information on current and future risks from the following perils: fluvial flood,

flash flood, drought, landslide, snow avalanches and seismic hazards in the country.

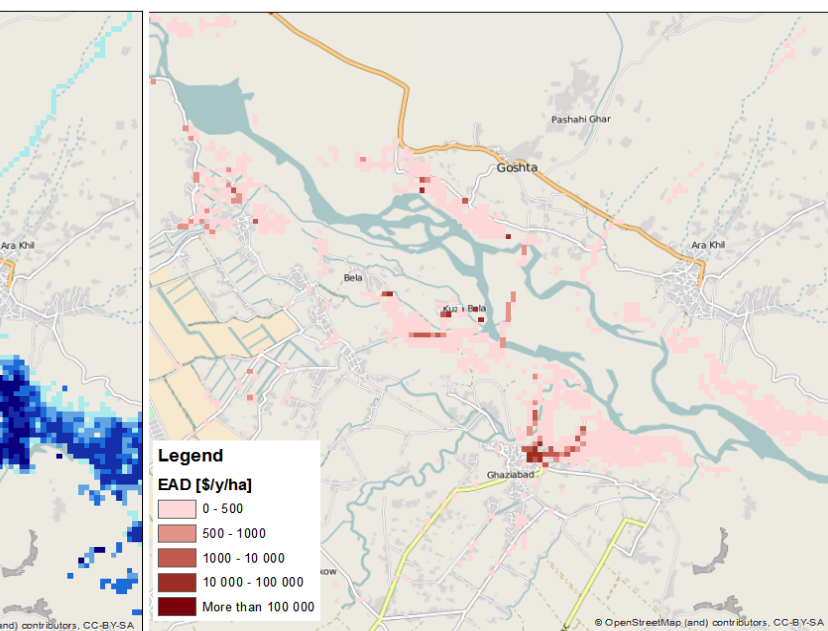
2. To propose resilient reconstruction and risk reduction options based on the outcomes of the risk analysis and subsequent costs and benefits of those alternatives.
3. To inform a roadmap for strengthening weather, climate and hydrological (hydromet) services and a nation-wide integrated multi-hazard early warning system (EWS) in Afghanistan.
4. To mainstream data-driven DRM considerations in the Bank's portfolio in Afghanistan.

APPROACH

Risk is computed as the combination of hazard, exposure and vulnerability. This was first done at the national scale on a grid basis. Subsequently, a more detailed analysis was carried out for a number of focus areas linked to planned investments: (i.) Trans Hindukush and Salang Tunnel - Hazards: avalanche, land slide, rock fall and flooding in summer; (ii.) Kabul/Jalalabad road - Hazards: rock fall, landslide;

(iii.) Doshi Bamyān road - Hazards: flood, earthquake prone area; (iv.) Kabul City, hill sides and District 1 (old city neighborhood) - Hazards: flood, landslide, mudslide; and (v.) Panj Amu river basin - Hazards: flood, drought.

The **hazard** component is the combination of probability and magnitude of natural hazards. Hazard



analyses were carried out separately for each peril. Several models were implemented used to simulate the relevant processes involved. These models were fed by global and local climate data and geological data like elevation, slope, land use, soil characteristics etc.

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 on population, residential buildings, household inventory, commercial buildings, schools, hospitals, mosques, capital stock and livestock. The derived exposure data was applied uniformly for all perils to guarantee mutual consistency.

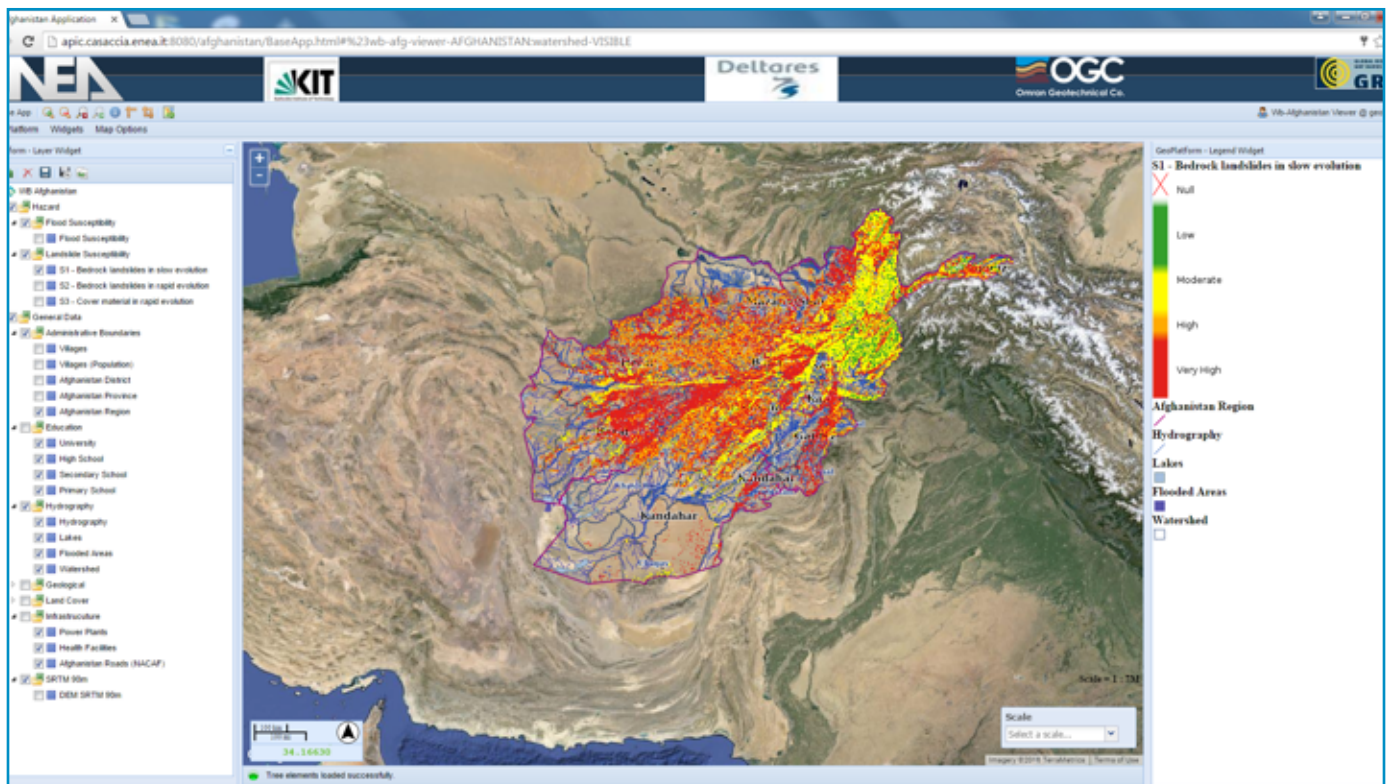
Vulnerability is a measure of potential exposure losses if a hazardous event occurs. Vulnerability analyses were carried out separately for each peril, because of differences in impact characteristics. Damage functions were derived from asset characteristics and/or experiences from (international) literature.

OUTPUT

The main project output consists of tables and (GIS-) maps of hazard, exposure and risk. Tables present results at the nation-wide level (admin0), province level (admin1) and district level (admin2). Hazard maps are provided for various return periods, including 10, 20, 50, 100, 250, 500 and 1000 years.

The figure on the left shows an example of a flood hazard map for the 100 return period and a risk map (based on all return periods) for a selected area (Nangarhar province; Kabul river). It shows there are 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 a Web-based GIS-platform (see figure below). This platform contains four separate directories with [1] generic data (catchment boundaries, rivers etc.), [2] hazard maps, [3] exposure maps and [4] risk maps for each of the considered perils.



ABOUT THE CONSORTIUM

Because of the complexity of the tasks, and the diversity of the hazards that need to be addressed for this assignment, a consortium of several organizations was formed with top expertise on the individual hazards and risk assessment approaches and techniques. This consortium was led by Deltares, a world-renowned non-profit independent research organization on water resources, subsurface and infrastructure based in The Netherlands and included the following organizations: Global Risk Forum

Davos (GRF Davos), Karlsruhe Institute of Technology (KIT), The Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), and Omran Geotechnical Company (OGC).

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www.worldbank.org/drmhubtokyo