Flood hazard assessment and mapping

Challenge: Unknown climate risks **Adaptation response:** Hazard and risk assessment

Description

Flood hazard assessment and mapping is used to identify areas at risk of flooding, and consequently to improve flood risk management and disaster preparedness. Flood hazard assessments and maps typically look at the expected extent and depth of flooding in a given location, based on various scenarios (e.g. 100-year events, 50-year events, etc.).

Measures to improve preparedness can include changes in land-use planning, implementation of specific flood-proofing measures, creation of emergency response plans, etc. Flood hazard assessments can be further expanded to assess specific risks, which take into consideration the socioeconomic characteristics (e.g. industrial activities, population density, land use) of the exposed areas..

Implementation

Key components of flood hazard assessment and mapping include data for Digital Elevation Models (thus the topography characteristics of the area) and hydrological models to simulate various flood events and their impacts. The data can be further supplemented by land cover data, soil data, and other datasets. For creation of maps and visualization tools, additional software (e.g. ArcGIS) may be required.

Topography data can be collected (e.g. using LIDAR technology), or already existing topography datasets can be utilized, where available. The depth and extent of flooding is mapped using GIS software by measuring local land elevations in relation to extreme water levels. Flood modelling and scenario design further requires hydrological data and historical data on flooding events and rainfall patterns, as well as climate data. These variables are used to assess the flood depth and extent under different scenarios.

High-risk flood areas can thus be identified, allowing planners to improve preparedness and design interventions. Flood hazard assessments and related maps can also be adopted by land use and development planners as part of an integrative approach to improve flood preparedness that can improve future land developments and raise community awareness.

Environmental Benefits

- Identifies and protects wetlands, forests or other ecosystems that could provide flood protection benefits.
- Provides necessary information to implement flood protection measures at sites with high pollution risks (e.g. power plants, nuclear facilities, etc.).

Socioeconomic Benefits

- Provides necessary information for flood risk and vulnerability assessments.
- Improves flood management and response planning (prioritization of interventions).
- Improves land-use planning, limiting development in flood-prone areas.
- Provides a visual representation of flood risks for awareness-raising in local communities.
- Improves information basis for property, crop and infrastructure insurance.

Opportunities and Barriers

Opportunities:

- Can be applied for a variety of purposes, including emergency response plans, flood proofing, land-use and development planning, crop resilience planning, etc.

Barriers:

- Advanced and accurate mapping can require complex models and expensive data-collection procedures if sufficient quality data is not readily available
- Requires advanced expertise to process data and create necessary models
- Local communities may not see the direct benefits, and may prefer investing in projects where benefits are obvious (public dissatisfaction)
- Needs to be done on a continuous basis for optimal results (adapting to changing conditions)
- =Mapping in itself does not provide risk reduction (the hazard assessment needs to be complemented with responses on the ground)

Implementation considerations*

Technological maturity:	4-5
Initial investment:	2-5 (depending on choice of assessment/mapping)
Operational costs:	1-2
Implementation timeframe:	2-3

* This adaptation technology brief includes a general assessment of four dimensions relating to implementation of the technology. It represents an indicative assessment scale of 1-5 as follows:
Technological maturity: 1 - in early stages of research and development, to 5 – fully mature and widely used
Initial investment: 1 – very low cost, to 5 – very high cost investment needed to implement technology
Operational costs: 1 – very low/no cost, to 5 – very high costs of operation and maintenance
Implementation timeframe: 1 – very quick to implement and reach desired capacity, to 5 – significant time investments needed to establish and/or reach full capacity
This assessment is to be used as an indication only and is to be seen as relative to the other technologies included in this guide. More specific costs and timelines are to be identified as relevant for the specific technology and geography.

Sources and further information

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