Drought risk assessment and mapping

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

Description

Drought risk assessment and mapping is a key element of drought management as it helps identify the areas most at risk of droughts, allowing communities to plan, as well as prepare for and mitigate possible impacts. Drought risk is calculated as the probability of negative impact caused by interactions between hazard (probability of future drought events occurring based on past, current and projected drought conditions), exposure (scale of assets and population in the area) and vulnerability (probability of assets and population being affected by droughts in the area).

Implementation

Hydro-meteorological or hydrological indicators, such as the Normalized Difference Vegetation Index (NDVI) (uses light reflection from vegetation to detect changes in health including drought related stress), or Standardized Precipitation-Evapotranspiration Index (SPEI) (compares water availability to evapotranspiration rates) are common indicators used to assess drought risks that work by implementing remote sensing to determine potential drought hazards. This data can then be coupled with data on population and assets in the area, as well as the community's vulnerability to damage by drought, to assess the drought risk.

Data for drought risks assessments include that derived from remote sensing, as well as field measurements (e.g. of soil moisture), where possible. Modelling and creation of risk maps requires Geographical Information Systems (GIS) software.

Drought risks modelling must also take into account climate change trends in the area in order to calculate the effect they may have on drought impacts. Drought risk assessments are often accompanied by drought forecasting and monitoring measures. Selected drought risk indicators are monitored and projected to enable drought early warning.

Environmental Benefits

- Protects vulnerable ecosystems against effects of droughts in high-risk areas where drought impacts are exacerbated by human activity.
- Contributes to reduced land degradation and desertification.

Socioeconomic Benefits

- Improves drought mitigation and management in high-risk areas and in consideration of factors that may exacerbate the impacts.
- Creates visual products that may improve the understanding of climate-related risks and threats amongst key stakeholders.
- Informs better identification of response measures, e.g. water-retaining agricultural practices, water storage, fixing leaks in municipal water supplies, promotion of water-saving techniques in households.

Opportunities and Barriers

Opportunities:

- Options for remote sensing provide quick and (relatively) low cost sources of data for drought risk assessments and mapping of larger (and remote) areas
- Contributes to improved disaster management planning and risk reduction for critical economic activities such as power production and agricultural activities

Barriers:

- Drought hazards are largely dependent on meteorological conditions, thus opportunities to mitigate impacts may be limited, even where appropriate risk assessments are in place
- Remote sensing equipment and software required to process data can be expensive and demand high level of staff expertise
- Assessments including climate conditions are subject to uncertainties

Implementation considerations*

Technological maturity:	3-5
Initial investment:	2-4
Operational costs:	1-3
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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