WORKSTREAM 3: DROUGHT IMPACT MONITORING, ASSESSMENT AND FORECASTING

Lead Organizations:

INTRODUCTION

Water is fundamental to life on Earth. Prolonged drought drastically reduces productive capacity and ecosystem services. Drought may drive people from their homes and deprive them of their livelihoods, animals and plants may perish, and many forms of economic activity may slow or stop.

Drought is generally defined as a prolonged lack of precipitation that leads to impacts. Drought impacts are defined as a loss or change at a specific place and time due to drought. In more developed countries, diversified economic systems and social safety nets provide some protection from drought impacts, although loss of income or livelihood is still a real threat. In countries with fewer resources, where more people practice subsistence farming or pastoralism with few or no protective programs, drought is more likely to trigger famine, migration or conflict.

Drought impacts can progress from direct effects to indirect or cascading effects. Drought impacts may cover a wide area and intensify over time. Direct effects include reduced crop yield, water systems curtailing deliveries for domestic use or for irrigation, reduced hydroelectricity production, less capacity for transporting goods by river, and degraded habitat for aquatic and terrestrial animals. Indirect effects can include famine, mass migration, conflict, ecosystem regime change, and economic losses to agriculture-related industries.

General reasons for tracking drought impacts: Research, to enhance our understanding of how drought affects social and environmental systems; relief, to know where to direct aid; planning and mitigation, to identify ways to reduce vulnerability

PAST DECADE

CONCEPTUAL DEVELOPMENTS

The publication of “Drought in the Anthropocene” in 2016 (Van Loon et al.) reiterated the recognition that drought is not solely a climatological or meteorological phenomenon. Coping with drought necessarily incorporates human management practices, decisions and expectations that affect how water flows and how it is stored and allocated. Most drought impacts are partially or wholly related to socially constructed and allocated vulnerability. Drought impacts relate to expectations about how much water “should” be available and which uses take priority.

Ecological drought also gained recognition in 2017 (Crausbay et al.). Earlier work focused on more human-centric disciplinary definitions of drought as meteorological, agricultural, hydrologic and socio-economic. Ecological drought recognized that ecosystem services depend on water and that drought may tip an ecosystem into a permanent, less-productive state.

Increasing back-to-back weather extremes have heightened awareness of the risk of cascading hazards: when drought ends in flooding that is made worse by hard, dry ground; when heatwaves and drought coincide; when fire damages watersheds that supply urban populations; or when drought, wind and vegetation conditions lead to intense wildfire or dust storms. The World Bank’s **EPIC Response Framework** emphasizes preparing wholistically for drought and flood. The American Planning Association’s **Falling Dominoes** focused on how drought can set off a chain of cascading hazards.

PRACTICAL APPLICATIONS

Drought-focused, event-driven databases such as the **European Drought Impacts Report Inventory (EDII)** and the U.S. Drought Impact Reporter (DIR) have matured, been used in research, and been through various evaluation processes. Their broad scope makes them useful for scanning the full range of drought impacts and in machine-learning processes. EDII and similar European efforts are part of the new **European Drought Impact Database**, which will be formally launched in 2024.

Advances in crowdsourcing technology, both proprietary and open-source, are leading to efforts around the world to use various platforms to gather information about drought impacts. Many are in context of validating, interpreting or augmenting physical drought indicators.

In systems such as **FEWS NET**, drought is one variable considered in predicting and responding to food insecurity. Famine is rarely a consequence of drought alone; it is the outcome of socio-political construction and allocation of vulnerability.

MAIN CHALLENGES

Drought researchers have long recognized the need to calibrate indicators of physical drought with drought impact data, but in practice, this is rare, in part due to the lack of drought impact data (Bachmair et al., 2016). Drought impact data may be sparse, fragmented, or lack history. We need longitudinal drought impact time series data to establish baselines and detect change. Some of the most consistent drought impact data, such as crop loss, is collected within countries for specific reasons, such as providing relief to farmers or anticipating grain shortages.

Drought-specific databases such as the DIR and EDII complement multi-hazard databases such as **EM-DAT**, **DesInventar Sendai** and the Caribbean Climate Impacts Database. Each of these efforts has different strengths and areas of focus. EM-DAT and Desinventar Sendai are both global in scope yet differences in scale and method result in different results for similar queries.

Making full use of crowd-sourcing technology depends on having clearly articulated uses for the information that volunteers or local officials upload, such as use in decision-making related to transfer payments for agricultural producers, or relief for food insecurity.

NEXT STEPS

Drought monitoring and early warning systems need to incorporate data on drought impacts. Drought impacts data should be viewed as equal in importance to data on precipitation, temperature or any other environmental parameter, with systematic data collection for key sectors established by national coordinating entities.

A coordinating body such as the **International Drought Management Programme** should establish consistent guidelines and best practices for tracking drought impacts across sectors and scales, and for ensuring that metrics align with protecting the well-being of vulnerable populations and ecosystems. Such guidelines will also be of importance to efforts such as the recent **International Drought Resilience Alliance**.

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