World Bank Next Generation Drought Index

Project Summary

After years of steady decline, the trend in world hunger has again increased. Currently, more than 820 million people are affected by malnutrition. Another 130 million people might suffer from acute malnutrition due to COVID-19. By 2050, the number of people in need of humanitarian assistance annually due to the impacts of extreme climate events could double. Drought is not the only root- cause for malnutrition, but one of the most important ones. Different organizations are currently developing anticipatory financing mechanisms that focus particularly on drought risk. Understanding which state-of-the-art datasets, methods, and technologies exist, what their added-value and uncertainties are in the context of parametric drought insurance and how they can be used/improved/combined is key to reducing basis risk in the context of advanced financial instruments in low-income countries.

The Next Generation Drought Index Project (NGDI) is coordinated by the World Bank's Disaster Risk Financing and Insurance Program (DRFIP), which helps low-income countries design and implement solutions to increase their financial resilience against natural hazards. The project consortium, which includes the International Research Institute for Climate and Society at Columbia University (IRI, project lead), the International Water Management Institute (IWMI) and AIR Worldwide, is developing a practical framework for a set of indices or indicators that will better monitor, anticipate, and trigger financial responses to severe drought events.

The next generation of drought indexes must be tailored to specific needs, co-generated with stakeholders and satisfy key performance indicators (KPIs) following a transparent design, calibration and validation process. The consortium is utilizing a decision tree framework that provides an easily implementable structure on how to assess and develop a drought index. The project relies on a combination of state-of-the-art earth observation (EO) data, such as precipitation, soil moisture and vegetation greenness, advanced risk modeling and novel methods to close critical socioeconomic data gaps via mobile technologies.

Through a prototype toolbox, suggested index elements, and datasets/simulations the consortium is developing the framework to facilitate or support index design and calibration that will enable decision-makers to evaluate and compare insurance index options. The prototype toolbox provides a concrete example to support decision makers through the operational design process. Senegal and Mozambique were chosen as the first two study countries.

Objectives

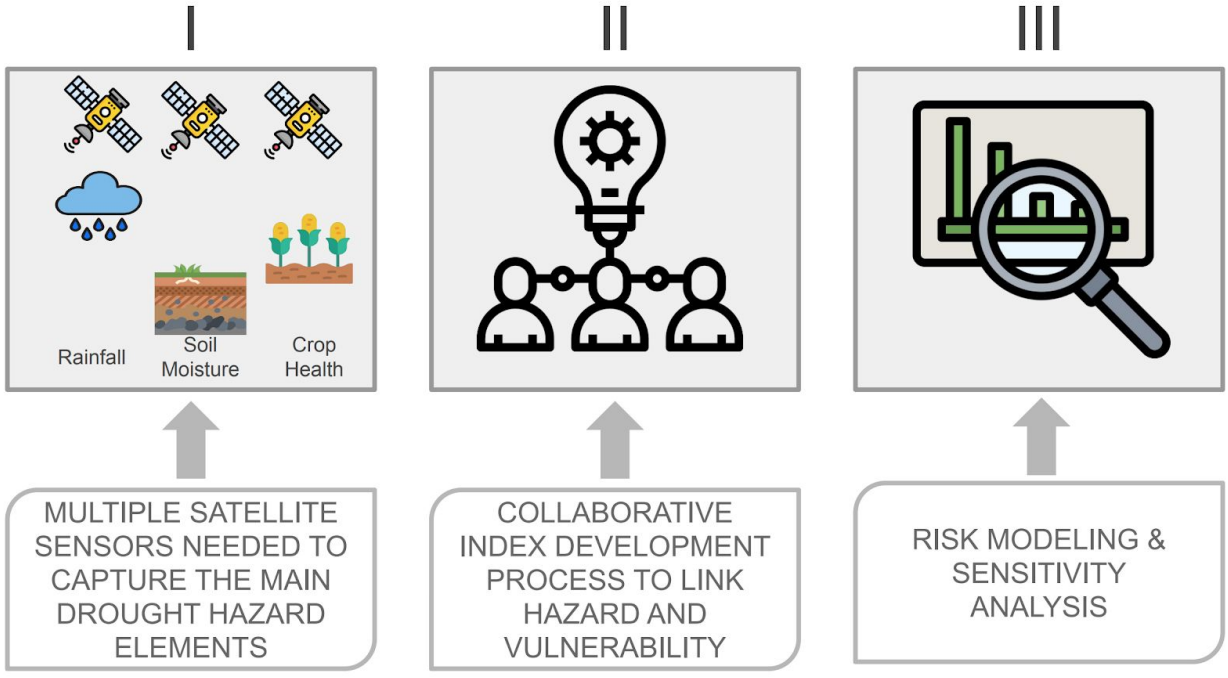
The main goal of the NGDI project is for decision-makers to be able to unpack critical index design processes and tailor drought indexes to meet their specific needs at micro and macro scale. The NGDI project aims to explain critical design trade-offs as well as ways to compare the strengths and weaknesses of different EO datasets and index design choices.

In line with the figure below, the NGDI project will answer critical index design questions, such as:

I) Which satellite-based variables perform best with regard to capturing historical drought impacts? Where are 'clusters' (e.g areas with similar moisture characteristics) that can help to decide how many different indices are needed to cover large areas? How can rainfall deficits be confirmed via soil moisture anomalies and information about the response of the land surface or specific crops?

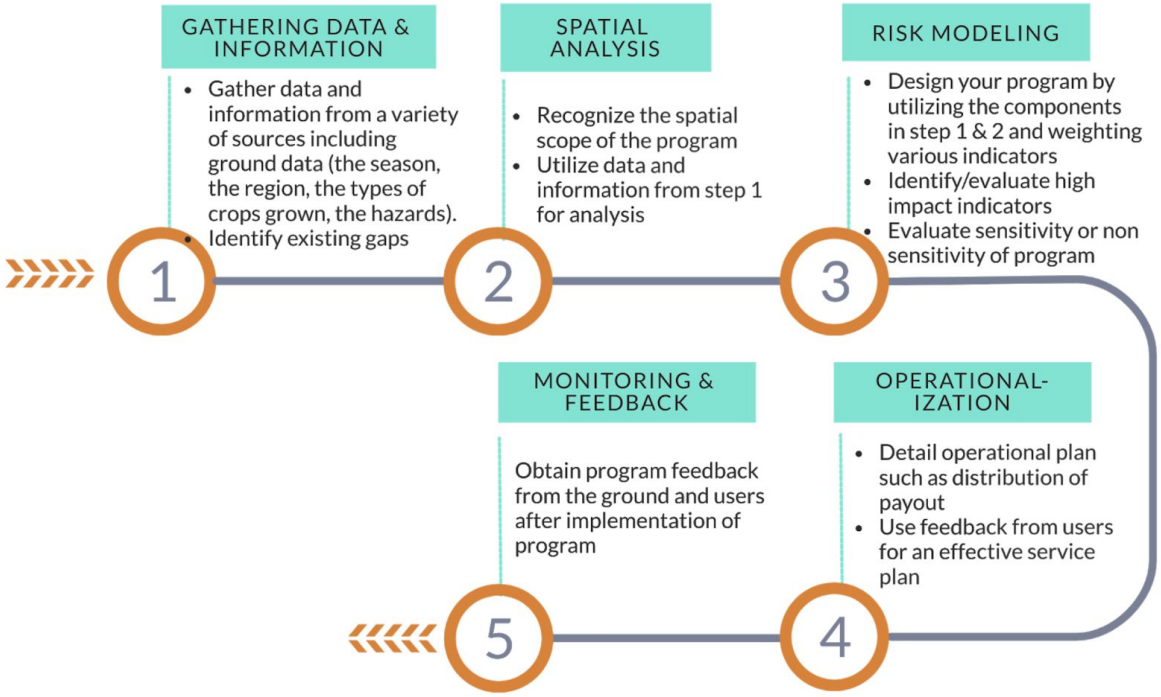
II) Which socioeconomic data are available to close the gap between drought hazard and impact information? How does vulnerability analysis fit into the index design, calibration and validation process?

III) Which methods are best suited to quantify the robustness of an index? How do decisions related to the index design process (e.g. datasets, payout frequencies, insurance windows) affect the overall sensitivity?



A novel Co-Design Process

The co-design process aims specifically to strengthen risk ownership in target countries. It is composed of five interrelated phases (illustration below), aiming to establish a data-driven logical design process that starts with an inventory of available data and ends with a feedback process.



Main Project Outcomes and Added-Value

Project Outcome	Added-value
Inventory of EO data and drought indices	Overview of strengths and weaknesses
'Convergence of evidence' approach applied to EO data	Additional level of confidence; No need to rely on a single data source
Interactive online dashboard	Immediate visual feedback to changes in index parameters
Integrated risk modeling and detrending of climate data	Simplification of complex relationships; KPIs; increased robustness of index design
Guided expert assessment process	Hybrid risk design process relying on quantitative EO data and expert knowledge
Low-cost data collection framework for mobile technologies	Complementation of historical socioeconomic surveys with up-to-date information