ISOE Policy Brief No. 6

Institute for
Social-Ecological
Research

Integrated responses to drought risk in Namibia and Angola

Summary

Droughts threaten millions of people in Sub-Saharan Africa, leading to famines, water shortages, migration and casualties. Climate change will most probably exacerbate the devastating consequences as exceptional droughts are expected to occur more frequently. Conventional drought risk assessments however, do not provide adequate tools, as they often limit their focus to environmental parameters, ignoring social vulnerabilities. Integrated strategies are required to carry out holistic drought risk assessments that serve to find adapted technological and institutional solutions to ensure water and food security. This will contribute to the Sustainable Development Goals 1 "No Poverty", 2 "Zero Hunger" and 6 "Clean Water and Sanitation".

Key findings and recommendations

- The transboundary Cuvelai-Basin in Namibia and Angola requires an integrated, transnational Drought Information System (DIS) that incorporates both, natural hazard data (e.g. precipitation, vegetation) and the social vulnerability domain (sensitivity and coping capacities). Only this integrated perspective enables governmental bodies to design suitable relief and adaptation measures.
- Water use efficiencies and local water buffers must be enhanced, in particular on the Angolan side of the border: The targeted implementation and further development of Multi-Resources-Mix technologies (e.g. rainwater harvesting, water reuse) can reduce the population's drought vulnerability.
- Larger scale infrastructural developments should go hand in hand with flexible decentralized solutions to enhance water and food security.
- Local community solidarity is an important institutional backbone for the population to cope with drought and to adapt to future changes. In particular, rural development efforts are required that go beyond technological interventions and support community building and collective actions in both, water management and agricultural production, to decouple livelihoods from local rainfall.
- Environment and society are subject to continuous change in the Cuvelai-Basin and southern Africa in general. Continuous monitoring of key drought risk parameters from both, the natural hazard side (e.g. hydro-meteorological measurements) as well as the societal dimension (e.g. census surveys), are critical for successful drought mitigation and adaptation.
- A bundle of promising key interventions to reduce the population's sensitivity and to enhance its coping capacities in the case of drought events needs to be considered. These interventions lie in the fields of water, food, infrastructure, community and education (see Figure 1).

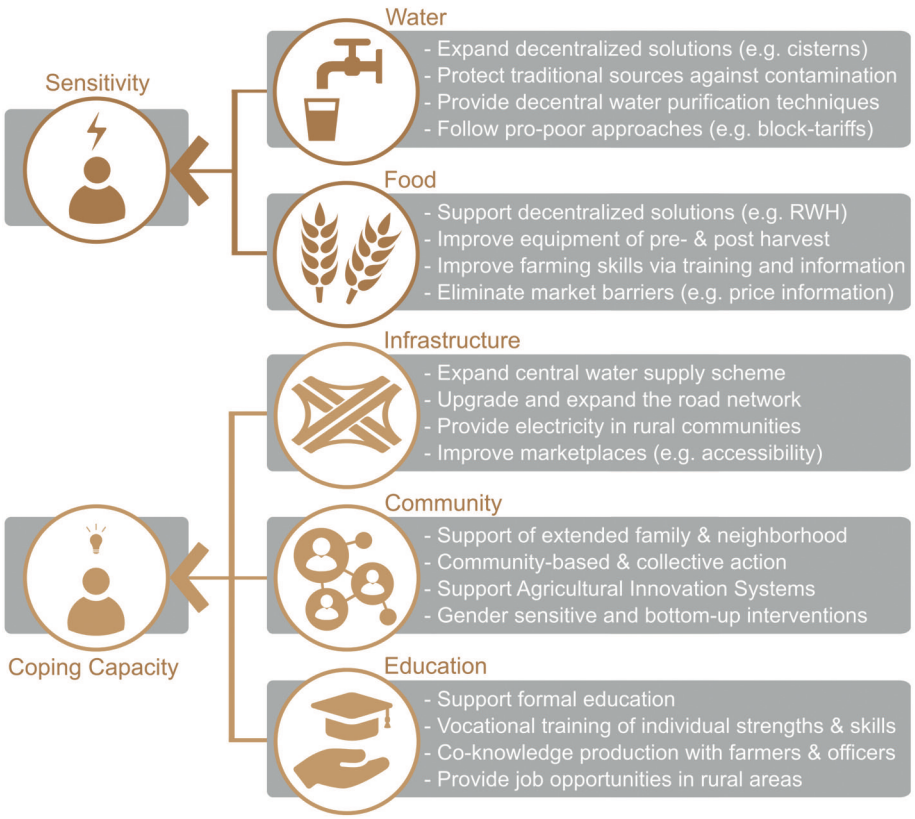

Figure 1: Proposed fields of action to reduce household sensitivity and to enhance coping capacities.

Background – Exceptional droughts occur more frequently

Drought is a critical threat to the development opportunities of societies in Sub-Saharan Africa. In the recent past, severe continental droughts occurred in the early 1970s, the mid 1980s and the early 1990s, followed by failed harvests, dead livestock and water shortages, leading to economic damages, health issues, migration and even casualties. Estimates show that between 1900 and 2013 a total of almost 850,000 people died and more than 350 million people were affected by numerous drought events on the African continent. The droughts in the East African Region (e.g. Somalia) and South Africa (e.g. Cape Town), aggravated by the 2015 El Niño event, are two of the latest and most severe droughts resulting in ongoing humanitarian crises.

Angola and Namibia, too, experienced severe events in the early 1990s and 2000s as well as a perennial drought from 2013 to 2016, where the food security of some 450,000 people in Namibia alone (20% of Namibia's population) was considered to be insecure. The population of both countries, particularly in the transnational Cuvelai-Basin at the border between the Cunene-Province in Angola and the northern regions of Namibia (Figure 2), suffers tremendously as most people live in a subsistence economy that is closely connected to the hydrological conditions. With the bad rainy season 2018/2019, this region will experience the next episode of drought in the coming months. The exceptional droughts are likely to occur more often in the near future as climate change will trigger more extreme hydro-meteorological events. As a consequence, the Intergovernmental Panel on Climate Change (IPCC) emphasizes that droughts will become stronger and more frequent, which challenges the growing population of the Cuvelai-Basin to sustain water and food security in the long-term.

The Aim of this Policy Brief

In order to address this regional challenge, the ISOE Policy Brief, built upon recent research results from SASSCAL (subproject/task 16), provides knowledge for the disaster risk management departments and the development commissions in Angola (e.g. Protecção Civil Angola) and Namibia (e.g. Namibian Directorate for Disaster Risk Management), that seek to reduce drought risk and to adapt to future conditions. Special emphasis is given to the role of the recently established Cuvelai Watercourse Commission (CUVECOM), based in Oshakati, Namibia. It may play a specific role in designing transnational strategies that make use of synergies from both countries' efforts and thus contribute to achieving the mentioned Sustainable Development Goals (SDG).

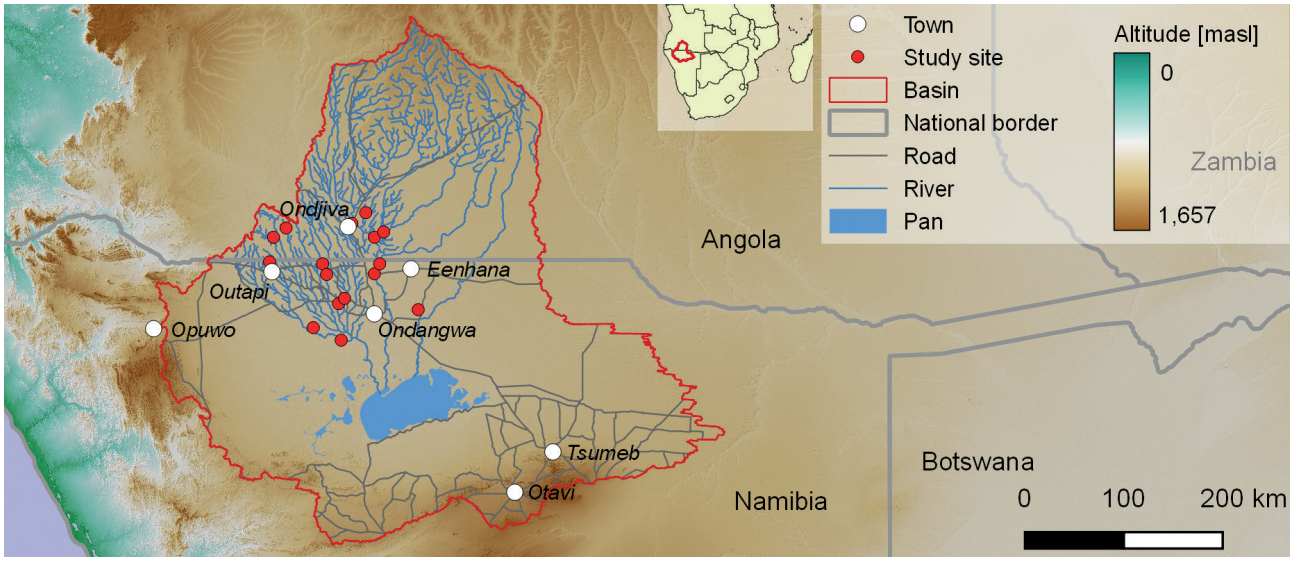

Figure 2: Transnational Cuvelai-Basin in northern Namibia and southern Angola.

Towards a better knowledge: Integrated drought risk assessments

Standard drought hazard assessments typically focus on one or two hydro-meteorological parameters, such as precipitation and evapotranspiration. However, these few parameters can often only tell parts of the story as the drought-sensitive population is connected to its environment in multiple ways, which requires a more comprehensive representation of the drought hazard. Specifically for the Cuvelai-Basin, the research team developed the Blended Drought Index (BDI) to combine relevant drought indicators for precipitation, evapotranspiration, soil moisture and vegetation conditions. The BDI merges these aspects into a single indicator to temporally and spatially identify areas that are exposed to multiple characteristics of the drought hazard. These drought characteristics were culminated in a drought hazard map that identifies the areas in the central north of Namibia and along the western border of the Cuvelai-Basin in Angola as being highly exposed to drought events.

This environmental hazards perspective is indispensably accompanied by the sensitivities of households to droughts and by their capacities to cope with water scarce periods. Therein, qualitative and quantitative socio-empirical techniques were applied by the team of researchers to understand and quantify key socio-economic control variables that determine the vulnerability of a household. As a result, the research team constructed the Household Drought Risk Index (HDRI) (Figure 3). Therein, environmental measurements of the drought hazard are combined into a composite indicator with socio-economic variables that represent people's sensitivities to droughts and their ability to cope with drought situations. The latter is composed of a specific set of social, human, financial, physical and natural capital that any Namibian/Angolan household can utilize during drought periods. The final drought risk estimation provides the national and regional development and relief agencies (e.g. Namibian Directorate for Disaster Risk Management and Protecção Civil Angola) with comprehensive and consistent information on drought risk to be incorporated into existing strategies.

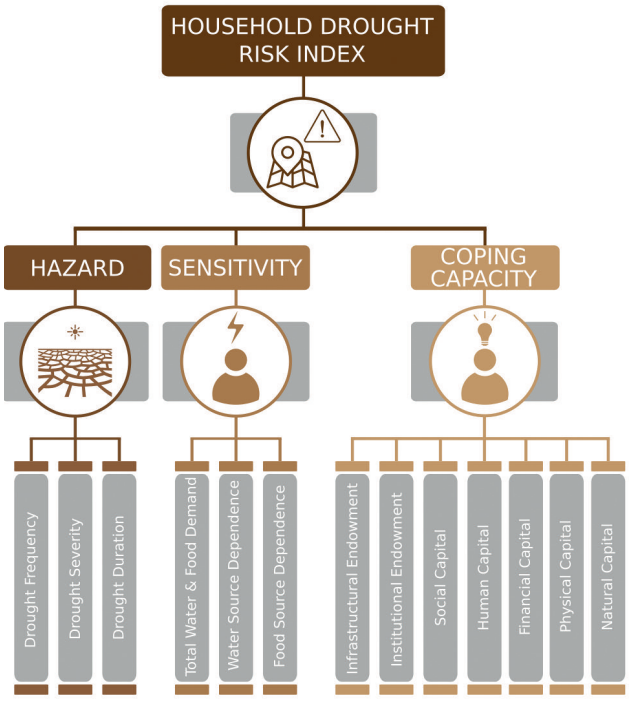

Figure 3: Structure of the Household Drought Risk Index (HDRI), distinguishing between dimensions and indicators from both, the environmental and socio-economic domain.

Towards improved technologies: Promotion of a Multi-Resources-Mix

The research on drought risk shows that higher water use efficiencies can create local water buffers and therewith reduce the dependency on critical water and food sources. For this purpose, the combined strengths of both, large-scale and decentralized water and food supply systems, can serve as an efficient solution in the long-term to reduce drought risks, provided they are adapted to the environmental and societal preconditions.

The key challenges for households during drought periods are failing water and food sources. These undermine a household's ability to provide essential nutrition and drinking water to the family, which results in second-order effects of e.g. mental and physical illness, social conflicts or even crime. In order to prevent the failure of traditional water and food provisioning systems, large-scale and decentralized infrastructures and technologies that go hand in hand are required to support the population. In Namibia, the tap-water system constitutes an important backup resource for households. This pipeline network and its operation may serve as a blueprint for Angola (e.g. Kunene Transboundary Water Supply Project). With respect to establish food secure conditions, the logistics and trading opportunities for smallholders must be improved to enhance the capacity of local market structures to supply the population. Improved access for consumers and smallholder traders is needed. Market barriers need to be reduced via adequate infrastructure and through the setup of market information systems.

Complementary to these centralized solutions, decentralized technologies for remote areas with desalinated groundwater, improved wells (Figure 4) and purified rain or floodwater are suitable opportunities. These techniques make use of local water resources that are refilled during the rainy season and thus are made available during the dry season. Adequate storage technologies, purification techniques and protection mechanisms against contamination are available and must be implemented. The investment and operating costs for decentralized techniques require suitable financing schemes, either via subsidized loans or in combination with business scenarios. The latter may even contribute to enhanced food security through the support of subsistence agricultural activities, e.g. via water-saving irrigation systems and gardening activities, as well as improved post-harvest management via upgrades of grain storage facilities (Figure 5).

Figure 4: Improved well, that is protected from outside contamination to provide high quality drinking water during the dry season to local and rural communities (Photo: Luetkemeier 2014).

Figure 5: Improved grain storage facilities that protect the harvests from pests (Photo: Luetkemeier 2014).

Towards strengthened institutions: Support on the community level

Alongside infrastructural and technological improvements, local community solidarity in both, the rural and urban environments, is an essential backbone of households' coping capacities. The social network of households, in particular neighbourhood support and kinship/extended family relations play an important role when drought conditions appear. In kind support in the form of drinking water and food provision is a typical feature in northern Namibia and southern Angola. This traditional community solidarity must be preserved and yet supported by both, governmental bodies and traditional authorities, to strengthen the resilience of the Cuvelai people.

Knowledge on suitable mechanisms to support communities is already available. In Namibia, for instance, positive experiences were gained with the setup of local water committees to manage community taps. The lessons learned about the institutional design of these committees might serve as a promising blueprint to enhance water security in Angola, after the tap network is expanded. These activities should always take a pro-poor approach in the sense of suitable tariff systems (e.g. block tariffs) to not exclude those, who only have little monetary means available.

In addition, small-scale subsistence agriculture serves as a valuable entry point for collective action approaches. Forms of collective action (e.g. co-operatives, producer groups or machinery syndicates) as core components of Agricultural Innovation Systems have great potential to trigger agro-economic growth and improve rural incomes, if they are set up in a gender-sensitive and bottom-up manner. Recent research findings show, that these kinds of resilient agricultural co-operatives need to incorporate five essential factors for long-term success (Rajalahti et al. 2008):

- *Membership:* mutual trust to reinforce norms and ensure cohesion among members
- *Collective Skills:* social learning and knowledge sharing to build capacities
- *Networks:* link with external peer-groups or actors/experts for knowledge sharing and guidance
- *Innovation:* build adaptive capacities to improve productivity, quality and competitiveness
- *Governance:* adequate institutional structures, providing support and acknowledgement.

Regarding small-scale agricultural practices, the CuveWaters project (Liehr et al. 2018) revealed interesting results in the support of female community members to manage greenhouse gardens and to run small businesses to generate income for the employees and to provide high-value food items on local markets (Figure 6).

Figure 6: Female villagers who are part of a community-driven gardening project that produces vegetables for local markets (Photo: CuveWatersproject, 2011).

Conclusion: Continuous monitoring of drought risk conditions

The social-ecological conditions in the Cuvelai-Basin are continuously evolving and are never constant. While climate change will bring about more intense extreme events, the population will continue to grow and alter their natural environment, as will societal, agricultural and economic developments continue. Hence, this research provides a first integrated assessment of drought risk, but both, the environmental and socio-economic conditions, will change in the future. It is essential to continuously monitor key environmental and societal variables to update drought risk estimates. Qualitative as well as quantitative assessments, carried out by natural and social scientists and practitioners, are required to fulfil this task.

The social-ecological drought risk assessment procedure, developed in this research project, provides a well-founded methodological framework that (i) can be transferred to other countries and problem contexts and (ii) can be taken up by national agencies that are responsible for drought vulnerability and drought risk adaptation as well as drought relief measures. In this regard, the national statistics agencies (Namibian Statistics Agency and Instituto Naciobal de Estatística de Angola) may update the regular census or thematic surveys with specific questions to assess the sensitivities and coping capacities of the population. Furthermore, both meteorological services (Namibian Meteorological Service and Instituto Nacional de Meteorologia e Geofísica) may consider multiple and integrated environmental drought indicators that are in line with the proposed BDI. In addition, national bodies for drought relief and long-term adaptation (e.g. Namibian Directorate for Disaster Risk Management and Protecção Civil Angola) may consider integrating the outlined risk analysis into their existing assessment procedures.

Overall, the Angolan and Namibian population in the Cuvelai-Basin closely interact across the national border. Likewise water does not care about national borders and thus has to be managed in a joint and integrated way by all members of both societies. Hence, this research supports the establishment of CUVECOM to not just enhance water management in the basin, but to collaborate closer in infrastructural development as well as drought mitigation and adaptation. The research project SASSCAL may well support this process via application-oriented research for long-term drought risk reduction and adaptation.

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