Building Resilience to Drought and Climate Change in Sudan

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Drought, population pressures, and conflict are degrading lands and undermining the resilience of ecosystems. Severe drought across many parts of Sudan is affecting several million people, many of whom are at acute risk of food insecurity. Low and sporadic rainfall has severely affected water resources and agricultural production, particularly in the traditional rainfed sector.[1]

Population and economic pressures have driven people to intensify cultivation of drylands, extend cultivation into more marginal areas, overgraze rangelands, and overharvest vegetation. These factors have degraded lands, reduced the availability of water, and depressed the production of food, fodder, and livestock. Competition for these lifelines has been a source of conflict and has contributed to the tragic violence that has engulfed parts of Sudan.[2]

Climate change is an additional source of uncertainty and risk. Sudan has experienced more than 20 years of below average rainfall during which there have been many localized droughts, as well as a severe and widespread drought from 1980 to 1984. These conditions can be expected to worsen during future climate change, with the country's climate becoming even drier.[3]

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Sudan's rural communities are adapting in order to reduce their risks in a harsh, variable, and changing environment. While the adaptations are not necessarily driven by climate change, they are nonetheless building resilience to it. The measures being adopted include using water harvesting and special irrigation methods, expanding food storage facilities, managing rangelands to prevent overgrazing, replacing goats (which are heavy grazers and are sold at a lower value) with sheep (which have less impact on grassland and are sold at higher value), planting and maintaining shelterbelts, planting backyard farms or *jubraka* to supplement family food supplies and incomes, supplying microcredit and educating people about its use, and forming and training community groups to implement and maintain these various measures.[4]

Environmental Strategies for Increasing Human Resilience in Sudan is a regional assessment that was undertaken by the Sudan Higher Council for Environment and Natural Resources in collaboration with the Stockholm Environment Institute–Boston Center and with the participation of researchers from the University of Khartoum and experts from local nongovernmental organizations (NGOs). The assessment examined three cases of community efforts to improve livelihoods and manage natural resources that succeeded in increasing the overall resilience of the communities. All three projects were prompted by the adverse

consequences of Sahel-wide droughts in the early 1980s. The vulnerability and adaptation of these communities were assessed in terms of their financial, physical, human, social, and natural capital, taking into account productivity, equity, and sustainability as well as risk factors. This involved the collection and analysis of "resilience indicators" data and an analysis of national and local institutions.[5]

The first assessment looked at 17 villages of Bara province in North Khordofan. Located in the Sahel zone, which has undergone a general decline of rainfall since the late 1960s, the area is marked by high rainfall variability. The severe 1980–84 Sahel-wide droughts deeply affected family and tribal structures among pastoralists and agro-pastoralists, deepening poverty, marginalization, and food insecurity. Thousands of people ended up in refugee camps surrounding towns and cities.[6]

The project in Bara aimed to sequester carbon by setting up a resource management system that prevents degradation and that rehabilitates or improves rangelands to reduce the risks of production failure so as to limit outmigration and stabilize population. The measures undertaken included the following:

- establishment of local institutions such as Village Community Development Committees to coordinate natural resource management and community development activities;
- development of land use master plans to guide future resource use and implementation of sustainable rotational grazing systems;
- establishment of community mobilization teams to conduct outreach and training;
- rangeland rehabilitation, including land management, livestock improvement, agroforestry, and sand dune fixation to prevent overexploitation and restore rangeland productivity;
- water harvesting and management, rural energy management, and diversification of local production systems and income-generating opportunities to reduce pressure on rangelands; and
- creation of water management subcommittees to better manage wells.[7]

Original expectations for the project were more than met: the achievements to date include revegetation and stabilization of 5 kilometers of sand dunes to halt desert encroachment; construction of 195 kilometers of windbreaks to protect 30 farms from soil erosion, restocking of livestock by replacing goat herds with sheep, establishment of 17 women's gardens to produce vegetables for household consumption and to sell at local markets, and establishment of five pastoral women's groups to support supplemental income-generating activities such as sheep fattening, handicrafts, and milk marketing.[8]

The second project, carried out by the British NGO SOS Sahel, focused on Khor Arba'at in Red Sea state, home to Beja pastoralist and agro-pastoralist tribal groups. It aimed to improve the livelihoods of tribal groups in farming, local water resources, and other natural resources. Rainfall is highly variable, with averages recorded between 1900 and 1980 ranging between 26 and 64 millimeters per year. The rocky and compact nature of soils, steep slopes, heavy downpours, and poor vegetation cover all contribute to the high rates of runoff. A traditional pattern of natural short-term recovery was shattered after the long drought and famine of the 1980s.[9]

Because the Khor Arba'at delta had been neglected by the government in recent years, local communities were eager to participate in a broad-ranging program that promised

to improve their livelihoods. The main objectives of the project were to rehabilitate the Khor Arba'at delta, to realize the full agricultural potential of the area for the benefit of tribal groups, to tailor the sustainable management of natural resources so as to meet local needs, to ensure the sustainability of food security, to set up an equitable water harvesting scheme, and to enhance grassroots participation in the overall development of the community. It was also hoped that success in this project could be replicated elsewhere.[10]

The third case study involved communities in North Darfur that implemented various measures to cope better with variable water resources and land productivity. This is one of the most drought-affected regions of the Sudan. The target group in this project was the most vulnerable households practicing subsistence farming and raising livestock in the area. Following the drought years of 1983–85, many people left their homes due to increasing poverty, famine, desertification, and land degradation. This was accompanied by tribal conflicts, the growth of shantytowns, and changes in the pattern of livestock raising and agricultural production. Most people lost more than half their cattle as well as large numbers of sheep, goats, and camels.[11]

Unlike the other two cases, these adaptation measures were initiated by the local community and only later were supported by external funding. The key measures undertaken included adoption of better water harvesting techniques and construction of terraces that helped farmers grow vegetables that can be harvested up to five months after the rainy season, restocking of gum trees (*Acacia Senegal*) and retention of part of the tree cover in agricultural fields with alluvial soils for the provision of fuelwood, and cultivation of clay soil, easing pressure on the sandy soil.[12]

Indicators on the sustainability of livelihood assets and adaptation measures showed improvement in all three projects as a result of the efficiency of the local Community Development Committees and the efforts of the Sudanese Environment Conservation Society–Kordofan Branch, which has been very active in supporting the continuity of measures and the dissemination of information on rainfall, new production inputs and technologies, and prices. Another key aspect of the success has been high loan repayment rates to the community revolving funds.

A number of key conclusions emerge from these three cases. First, successful strategies emphasize livelihoods and are embedded in community development efforts rather than being implemented in isolation. Typically suites of measures are implemented that provide the means to improve and diversify livelihood opportunities, advance sustainable management of natural resources, and hedge against risks of variable incomes and variable access to food, water, and other resources. Successful strategies that have added to human and social capital include training farmers in techniques to diversify their production activities and improve resource management, involving women in home gardening of vegetables, and aiding traditional farmers, fruit growers, and vegetable growers to form unions to help harvest and market products.[13]

Second, adaptation requires effective involvement of local institutions, tribal leaders, community-level committees, and NGOs. Such a participatory, bottom-up approach is essential to successfully engage at-risk groups in decisionmaking processes. Farmers, herders, women, and minorities gain a better understanding of their vulnerability, priorities, and adaptation needs.

It also facilitates cooperation within the community and the mobilization of local resources and indigenous knowledge. Local institutions can ensure continuity of development and adaptation activities after externally funded projects end.

Third, the sustainability of adaptation measures depends on enhancing the sense of responsibility among communities. To ensure proper implementation of policies, work should focus on improving communities' knowledge and capacity to manage their own natural resources. Regulations and policies that are based on real knowledge of communities and a sense of responsibility lead to positive results and improved performance. Central to the success of the interventions are efforts to strengthen institutions with training and resources, form new community institutions, empower local institutions with skills and information to plan and implement project activities, and promote the participation of community members in different sustainable livelihood activities and decisionmaking processes.

A final lesson is that adaptation falls short of what is needed. Existing efforts to cope and adapt are insufficient in the face of present-day risks. Drought already exacts an unacceptably high toll on the people of Sudan, and the suffering is likely to grow further with climate change. The adaptive responses that have been applied and shown to be successful in building resilience need to be replicated and expanded even as new approaches are explored and tried.

Children learn how to use an ox-plow in Twic County, southern Sudan. In this remote province, the use of animal traction in agricultural work is not yet common.

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