

RESILIENCE-BUILDING – EASIER SAID THAN DONE

With view to climate change, raising the resilience of rural households and local communities is becoming ever more important. Practising Climate-Smart Agriculture and establishing early warning systems are two elements employed in this context. However, limitations quickly become clear in practical implementation. Taking experiences from the Concern-led „Building Resilience in Chad and Sudan“ programme, our authors reports on success factors and obstacles.

By Cecilia Benda and Anastasia Marshak

Increasing erratic climate patterns, a rise in temperatures and more frequent extreme weather events have been witnessed throughout the Sahel. Boosting the region's capacity to respond to such changes is vital to enhancing food security and household and community resilience to the effects of climate change. In order to adapt the food production systems to these trends and make them less vulnerable to the impact of climate change, Concern Worldwide launched the Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) programme in Chad and Sudan.

DROUGHT-RESISTANT VARIETIES IN WEST DARFUR

Climate Smart Agriculture (CSA) is a fundamental component of the programme (see Boxes on page 28) and also a core element of Concern's Resilience Strategy. It includes the use of high quality seeds that are better suited to the changes in climate con-

ditions. Within the programme, Concern has been partnering with the Sudan Agricultural Research Corporation since 2015 in order to promote and increase access to two drought-tolerant and quick-maturing varieties of millet and sorghum, Ashana and Butana respectively. These varieties mature in 70 days only compared to between 90 and 120 days with traditional varieties. A seed bank system was established in Bangadeed community and through it, 50 farmers were provided with Butana and Ashana mother seeds to have them test and multiply seeds for further distribution. Farmers were sensitised to the importance of growing varieties that are adapted to the changing climate and having a range of

different crops in the farm to enhance the resilience of the farming

system. Trainings on seeds multiplication and cooking demonstrations were organised to make people familiar with the taste and texture of the new varieties. After the first season, farmers brought back a certain amount of seeds to the seed bank to ensure that other farmers could benefit from further distributions. The following season, Concern bought Ashana and Butana seeds from the seed bank and distributed them to vulnerable farmers in other villages at seed fairs. This approach was deemed successful for timely procurement and suited to stimulate local economy.

Good acceptance thanks to visible success

After some initial reluctance, at 97 per cent, the seeds repayment rate is currently very high, showing farmers' commitment to the Seed Bank system. After two years of promoting the new varieties, farmers are beginning to adopt them. People appreciate the taste, the colour and the overall quality of the flour obtained from their grains. Farmers have witnessed higher yields with the new varieties, especially after the 2016 El Niño event that caused rains

The Nursery and Resource center in Djedidé, Sila Region, Chad.

Photo: Cecilia Benda



to stop earlier. Only those who used improved seeds managed to have a decent harvest, whereas local varieties failed almost completely. Having recently increased their cereals production, farmers feel more food secure. They reported a longer period during which they had enough food at home. Many households even managed to sell surplus production.

Thanks to the awareness creating activities, sorghum has seen a surge in popularity, and the revived interest is promoting household diet diversification. Having become aware of the new varieties, many people from other villages have visited the seed bank to request seeds, and those unable to pay have managed to exchange grains for seeds. Butana and Ashana grains have started to appear in nearby markets, although in small quantities given the limited supply. Still, they fetch high prices and are sold very quickly as their popularity grows.

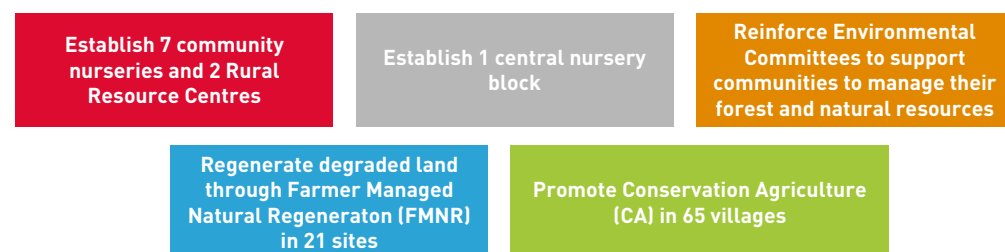
Future steps

Farmers often rely on “normal” grains bought in the market rather than on high quality seeds for planting. The programme is currently working to obtain quality certification for seeds produced by farmers, and to develop a packaging system for seeds with appropriate logos, batch and certification numbers. This will improve visibility and provide quality assurance to farmers, thus encouraging them to obtain improved seeds, along with expanding access to market channels, like local agro-dealers and traders. The seed bank committee will also undergo further capacity building on business management to improve its capacities to run the business in a sustainable manner. These are all regarded as necessary steps to capitalise on what has been achieved so far to ensure that positive results on food security and access to high quality seeds for resource-poor households can be sustained in future.

AGROFORESTRY SYSTEMS FOR CHAD'S SILA REGION

Concern has worked in the Sila region in eastern Chad since 2007 with emergency responses as a consequence of the Darfur conflict and food insecurity crises. After a fragile calm had returned to the region, in 2012, Concern began to address causes of food insecurity and malnutrition with the Community Resilience to Acute Malnutrition programme integrating Health and Nutrition, WASH (Water, Sanitation, Hygiene), Food Security, Disaster Risk Reduction and Gender. Since 2015, the

CSA and agroforestry activities in the BRACED programme in Chad



BRACED programme has continued to promote resilience and has reinforced the Climate-Smart Agriculture component to adapt to the on-going trend of erratic rainfall patterns, increase in temperatures and land degradation across the region. For this purpose, a partnership has been entered with the World Agroforestry Centre (ICRAF). Trees are perennial “crops” which, once established, have better chances to withstand erratic rainfall and yearly climatic variations compared to annual crops, thus promoting more stable productions and diversified incomes from the sale of their produces. Agroforestry is therefore considered part of Climate-Smart Agriculture (CSA).

In Chad, the CSA interventions that main-

Community resilience is the ability of all vulnerable households or individuals that make up a community, to anticipate, respond to, cope with, and recover from the effects of shocks, and to adapt to stresses in a timely and effective manner without compromising their long-term prospects of moving out of poverty.

Core definition of Community Resilience for Concern

ly focused on agroforestry and Conservation Agriculture (CA) have covered 65 villages (see Figure). ICRAF’s technical know-how has been drawn on e.g. to establish nurseries, Concern’s staff and community members have been trained on agroforestry techniques, and access has been increased to improved trees’ genetic materials (e.g. trees with increased pests and diseases resistance, or reduced periods before starting to produce fruits) and for the domestication of indigenous trees species already adapted to the local environment. A wide range of exotic and indigenous fruit trees were raised in community nurseries, including: moringa; Citrus spp.; mango, guava; papaya; *Balanites aegyptiaca*; *Ziziphus mauritiana*, tamarind, Acacia spp. and marula tree. Community nurseries produced over 5,000

trees seedlings in the first year. They were purchased by Concern and distributed to community members.

Initial successes

The tangible benefits that agroforestry can bring to vulnerable households are yet to materialise, as trees are still young and have not started producing yet. Nonetheless, some quick wins have already emerged. For example, moringa has been promoted, a fast-growing tree producing highly nutritious seeds and leaves within less than one year of planting. The “Arboloos” initiative foresaw one moringa per household where fruit trees were planted on closed latrines as part of the CLTS (Community-Led Total Sanitation) approach with the aim to combine sanitation and nutrition outcomes. Cooking demonstrations were carried out with care groups to promote moringa consumption, and now women have started to prepare meals with moringa leaves. Farmer Managed Natural Regeneration (FMNR), an agroforestry practice promoting the protection and regeneration of trees on the farm, is also spreading quickly amongst farmers, who are starting to realise the value of trees in terms of biomass and firewood.

To make the measures sustainable, BRACED worked with local innovators and lead farmers, recognised experts in farming, with a good capacity to teach others and willing to take risks by embarking on new practices, also called early adopters. Having them involved in trainings and participatory on-farm research trials is promoting knowledge transfer and inspiring other farmers to try and adopt innovative technologies, thus ensuring continuation of activities after BRACED.

The water challenge

However, the main challenge for ensuring the success of agroforestry is water. Farmers constantly cite access to water as a limiting factor for their ability to continue or expand agrofor-

estry, and investments need to be considered in water infrastructure, such as improved wells or rainwater harvesting systems. Concern has established protected wells at each community nursery and is currently working on promoting other water infrastructures.

Communities have raised worries about the financial sustainability of the community nurseries, and for this reason, a value chain and market survey will be conducted to identify opportunities for income generation, thus motivating communities to become self-sufficient. Chad has no specific policy on agroforestry, and the lack of institutional knowledge greatly limits the resources allocated for promoting it across the country. Dialogue with relevant public institutions has been initiated to ensure that agroforestry will be included in future environmental and agricultural policies and also to reduce local-level barriers to its implementation. More advocacy work will be needed to achieve these objectives.

EARLY WARNING SYSTEMS IN CHAD: FORECASTING FOOD SECURITY

Early warning is a key component in eliciting and informing a timely response to a drought to protect lives and livelihoods before they are threatened. To that end, since 2012, the Feinstein International Center has been working with Concern Worldwide to develop and test a model that uses local and historical rainfall in the Kimiti Department in Chad to predict future crop production, which is linked to food security. Our modelling approach borrows from the field of machine learning using historical remote sensing rainfall data (data obtained from satellites for the local region from 2000–2016). We combine this with crop productivity data provided by the Kimiti Department's government agriculture services for the planting period (June–September) to predict future millet productivity (kg/ha). We use millet as the indicator crop in the model because it is the main cereal crop in Kimiti.

The model looks at the amount and distribution of rainfall throughout the five main growth phases of millet because the requirements for water, nutrients, and sun vary during each phase. In addition, it uses a moving start date to account for the large variation in sowing time based on the timing of the first rains. Remote sensing data is particularly valuable because it is available in real time and hence can provide an initial prediction of harvest quality a few months in advance of official national predictions. The millet productivity data, in turn,

ENHANCING THE ADAPTIVE AND ABSORPTIVE CAPACITIES OF HOUSEHOLDS

Exposing farmers to climate-smart agriculture practices like agroforestry enhances their **adaptive capacities**, or their ability to adapt existing systems to better cope with future shocks and stresses, by providing new tools and innovative technologies to mitigate risks of climate change. **Absorptive capacities**, “the ability to ‘absorb’ or cope with a shock when it happens”, usually through better anticipation, preparedness, and reduction of vulnerability to that specific shock, are being encouraged as well through increased and diversified productions and alternative income opportunities derived from the sales of agricultural surplus and trees products.

ABOUT BRACED AND BRICS

The BRACED programme, funded by the Department for International Development (DFID) of the UK government, aims to build the resilience of more than five million vulnerable people against climate extremes and disasters. The programme comprises 108 organisations forming 15 consortia that implement 15 projects across 13 countries in the Sahel, East Africa and Asia. Amongst the BRACED consortia, the BRICS (Building Resilience in Chad and Sudan) programme is led by Concern in partnership with ICRAF (World Agroforestry Center) in Chad, the Feinstein International Center of Tufts University in both Chad and Sudan and the Almassar Charity Organisation as a sub-partner in Sudan.

can serve as a proxy of food security because most households depend primarily on rain-fed agriculture and have limited access to agricultural inputs. We argue that in a context where, according to our survey results, 89 per cent of the population are directly or indirectly reliant on agriculture for food or income, and the majority of the population (75 per cent) consume what they grow and have limited alternative employment opportunities, cereal crop production can serve as an appropriate proxy for food availability and potential access.

While we have seen some success with the model, some limitations remain.

- When developing models, the more data you have the more accurate your model is. Forecasting models therefore require hundreds or thousands of data points. In this case the more years of rainfall and crop production data we have, the more accurate the model can be. Currently we have only 14 years of data. To address this, we used a statistical technique called repeated cross-validation, which allowed us to create “new” data points and increase our total number of observations. As we continue to add data annually, the information should become more accurate and precise.
- The model does not apply to all households. For example, households who have access to market gardens or cereal plots near the seasonal rivers would be less affected by rainfall deficits. Pasto-

ralists, who mostly rely on markets for cereals, are less impacted by local production shocks, although a production deficit would affect supply and prices.

While we are improving technical aspects of the model, it has to be borne in mind that the political and economic context in which the model operates plays an important role in the interpretation of and responsiveness to the prediction. The model must be useful to a wide range of potential users, including local communities and decision-makers at the departmental, regional, and national level, in order to elicit an appropriate response to a potential emergency.

The model was registered as an official source to inform the ‘Cadre Harmonisé’ (CH), a regional framework aimed to prevent food crisis by quickly identifying affected populations and proffering appropriate measures to improve their food and nutrition security. The CH uses food and nutrition security outcome indicators, corroborated by relevant contributing factors, to establish where the food and nutrition insecure areas are within the Sahel and West African Countries.

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