

How can remote farmers get access to improved seed to respond to climate change?

by Christian Steiner¹

Helvetas Mozambique addresses climate change through its Food Security and Value Chain (SAAN) Project in Nampula and Cabo Delgado Province, 2009-2011, building on lessons learnt from the SDC financed Rural Development Programme (2005-2008). This article focuses on challenges and strategies which are currently being developed to promote the use of improved seed to adapt to shorter rain seasons, financed through the EU Food Facility (2010-2011).



I. The challenge of climate change in Northern Mozambique

Water is one of the scarcest natural resources in Northern Mozambique, and will become even scarcer with climate change. A majority of rural livelihoods, which are among the poorest in the world, depend entirely on rain-fed subsistence agriculture. Many families run out of food every year during the so-called hunger period from November to February (see table 1), and are forced to apply survival strategies such as reducing the number of meals per day, lowering the quality of their diet and even selling production assets. Some have to withdraw their children from school and send them to work for food in other families. An estimated 500'000 people are living in

chronic food insecurity and 25.5% of Mozambican children below the age of five are underweight².

The climate in Northern Mozambique is mostly tropical, characterized by two seasons, a cool dry season from May to October and a hot and humid season from November to April. Climate projections by the National Institute of Disaster Management (INGC) predict that rainfall might increase by up to 25% by 2080, but during a period shortened by up to 2 months (INGC, 2009). Frequency and intensity of climate hazards such as droughts, heavy rains and floods are likely to increase. Soil moisture content before the start of the main cropping season is expected to drop because of increased evapotranspiration during the dry season.

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² Human Development Index Report of the United Nations, 2006

Seasonal calendar in Cabo Delgado / Nampula Province	N	D	J	F	M	A	M	J	J	A	S	O
'Hunger period'	■	■	■	■								
Rain and Cyclone Season	■	■	■	■	■	■						
Land preparation for first cycle production	■											
Planting maize		■	■									
Land preparation for second cycle			■									
Planting cowpeas				■								
Harvest						■	■					

Table 1: Seasonal calendar in Cabo Delgado / Nampula Province, Mozambique

2. Adaptation measures and coping strategies

To be able to adapt to less predictable rainfall patterns and a shortened rain season, subsistence farmers require:

- **Timely access to quality seed** with good germination potential to make sure they can **take advantage of the first rainfalls**; and
- Improved crop varieties with **shorter production cycles** and increased drought resistance to **guarantee the necessary production** in less time.

Unfortunately, the production, certification, collection, processing, storage and distribution of quality seeds is a costly undertaking in areas with scattered population and poorly developed infrastructures as is the case for Northern Mozambique. The use of quality seed is therefore almost exclusively limited to cash crops such as tobacco and cotton, which do not directly contribute to the food security situation, while the current food crop production of maize and cowpea by small-scale farmers is characterized by its general lack of access to quality seed, forcing farmers to recycle degenerated grain with long production cycles and modest yields of 0.7-0.9t/ha, compared to 1.2t/ha in average in South-East Africa.

Furthermore, to be able to cope with a prolonged dry season and prevent food and seed shortages, rural communities require:

- Improved low cost post-harvest technologies to **safely store sufficient food and seed reserves**; and

- A **social safety net** focusing particularly on the most resource-poor and vulnerable groups.

During the dry season, farmers use traditional storage techniques to create food stocks to bridge the recurrent 'hunger period' and eventually retain sufficient grains for the next cropping season. However, the traditional storage facilities do not keep this surplus produce long enough. Insects, rodents, humidity and physical damage cause losses of up to 45% within 6 months and are responsible for 22% of households running out of stocks for periods longer than 2 months each year (Helvetas 2006).

3. Participatory Innovation Development of post-harvest technologies

In 2001, Helvetas introduced metal silos³ to improve post-harvest storage, but the galvanized iron silos proved economically non-viable in Northern Mozambique. A native farmer named Gilberto Tethere in Cabo Delgado Province, however, convinced of the design and potential benefits of the metal silo, reconstructed it using locally available materials and applying traditional construction techniques. This 'Silo Tethere' (see figure 1) was tested during the Rural Development Program (2005-2008) and became since a key element of the low-cost technology portfolio of Helvetas Mozambique⁴.

³ Post-harvest technology promoted with great success in Central America since the 1980s, www.postcosecha.net

⁴ see also <http://www.youtube.com/user/HelvetasMozambique>



Figure 1: Design of the 'Silo Tethere'

The basic design of the 'Silo Tethere' is a woven bamboo structure, meticulously covered with clay both in- and outside. The shape is cylindrical and the two openings (for filling and emptying) are closed with tightly fitting clay-covered hatches. It stands on a base that incorporates vermin traps to protect the seeds from rats and mice, and under a simple shelter to maintain cool, dry and even conditions. The clay carcass of the silo seals the seeds in an almost hermetic chamber and improves the effect of the organic, herbal repellents (produced from ashes, eucalyptus tree and other plants, and used to inhibit insects such as the granary weevil (*Sitophilus granaries* L)).

In the past decades, many such innovative experiences in the improvement of post-harvest techniques have already been developed in several countries of Sub-Saharan Africa, of which unfortunately a majority has failed to become widely adopted and disseminated. Many failures can be attributed to a lack of gender sensitivity, over-estimation of post-harvest losses and under-estimation of aspects such as production, extension and credit availability (FAO, 1998).

In the case of the 'Silo Tethere', the participatory innovation development process however led to some promising design elements which distinguish it from other improved granaries and might be favorable to its wider dissemination:

1. The initiative to improve the traditional storage system came from a local farmer making use of **indigenous knowledge and experience**.

2. The structure combines the proven design of the metal silo with the use of **locally available low cost material**.
3. The techniques required for the technological enhancement rely entirely on **existing local construction knowledge** and are easily replicated.
4. The material and labor costs of approximately USD 15 for a storage capacity of 250 kg are **economically viable**.

4. Seed Chain Development

Building on the availability of a proven low-cost technology, the challenge remains to design a dissemination strategy and working approaches that add further value to the technological improvement and tackle problems which go beyond the simple reduction of post-harvest losses.

Helvetas Mozambique has been supporting both governmental and local civil society organizations to establish and develop a community-based seed multiplication scheme (see figure 2) in line with the National Poverty Reduction Strategy (PARPA II, 2006-2009) and other relevant policy papers. The core idea of the project is to strengthen farmers' associations to become certified seed multipliers / producers and to link them with Community Development Councils (CDCs) to establish and run seed-banks using the low cost technology 'Silo Tethere'.

The impact hypothesis is to break the poverty cycle at three levels simultaneously:

1. By **increasing the availability of open-pollinated quality seed**, subsistence farmers **will reduce the habit of recycling** the left-over's from their previous harvests without losing their seed autonomy.
2. By **establishing self-sustaining community seed banks**, food insecure families **will improve their access to seed** through a revolving scheme of credit 'in kind'.
3. By **using quality seed**, subsistence farmers **will increase their current food crop yields** by 100%, allowing them to improve their food security and dedicate a growing part of their resources to cash crop production for income generation.

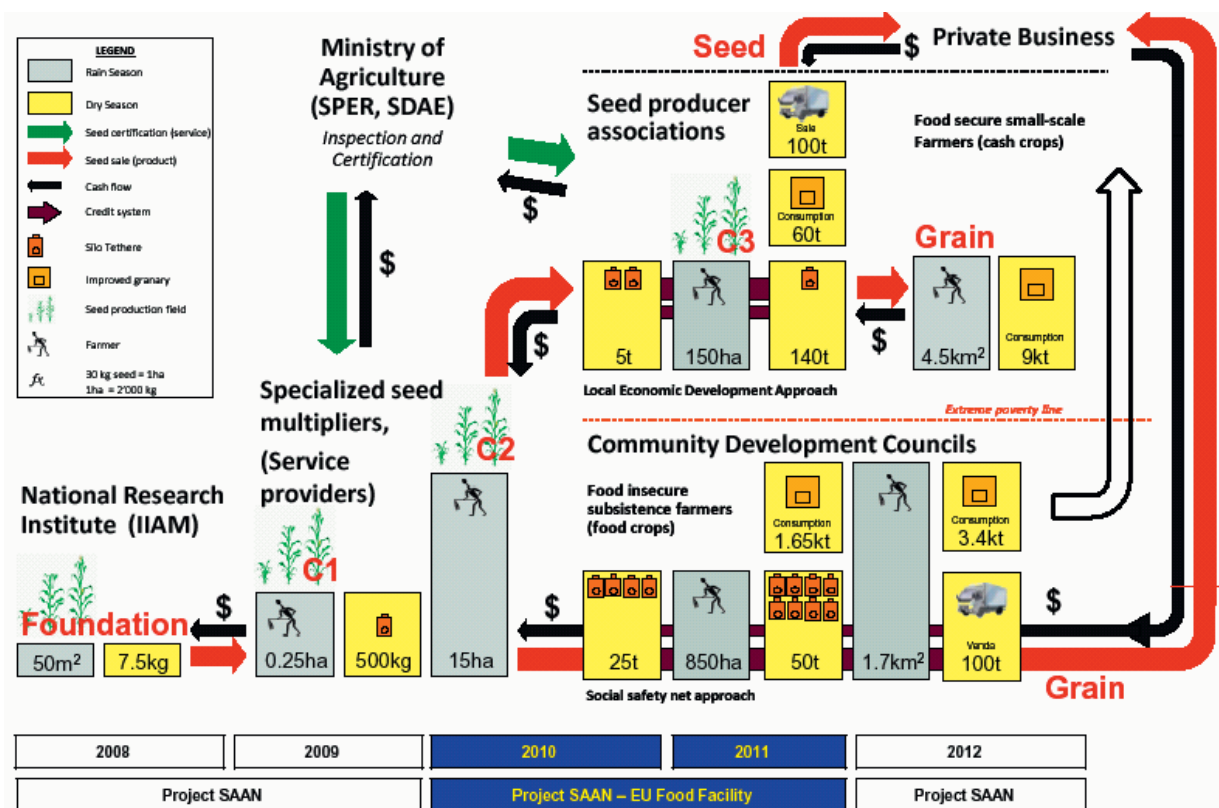


Figure 2: Design of community-based seed multiplication scheme

4.1 Research – Extension Interface

Desired situation:

The National Institute for Agricultural Research (IIAM) develops and tests open-pollinated varieties of different crops and produces foundation seed.

The Provincial Services for Rural Extension (SPER) guarantee the inspection and certification of the seed multiplication fields, and the District Services for Economic Activities (SDAE) give technical assistance to the seed multipliers/producers.

Specialized seed multipliers establish themselves as service provider associations to run a community-based extension system, multiply foundation seed under certified conditions and train community development councils in post-harvest technologies.

Entry points for project support:

- Networking among different stakeholders at Provincial and District level to facilitate information exchange and promote joint planning, monitoring and evaluation of the seed chain.
- Institutional development, capacity building and linkage of specialized seed multipliers as service provision associations at District level.

4.2 Social safety net approach

Desired situation:

Community Development Councils develop self-sustaining seed banks for food crops with a revolving seed scheme, focusing on the most vulnerable community members (food insecure subsistence farmers). Beneficiaries form solidarity groups for credit guarantee and return the double amount of produce after harvest. After two production cycles, the seed bank management committee resells the grain to purchase a new lot of initial seed (C2) from the seed multipliers.

Entry points for project support:

- Strengthening of civil society in local governance processes through training of Community Development Councils and supporting their participation in district planning and advocacy.
- Finance and monitor training of CDC seed bank management committees through the service provision associations.
- Allocate an initial lot of second generation seed to the seed banks, through a credit contract established between the primary producers and the CDCs.



Figure 4: Illustration of a farmers' association selling seed

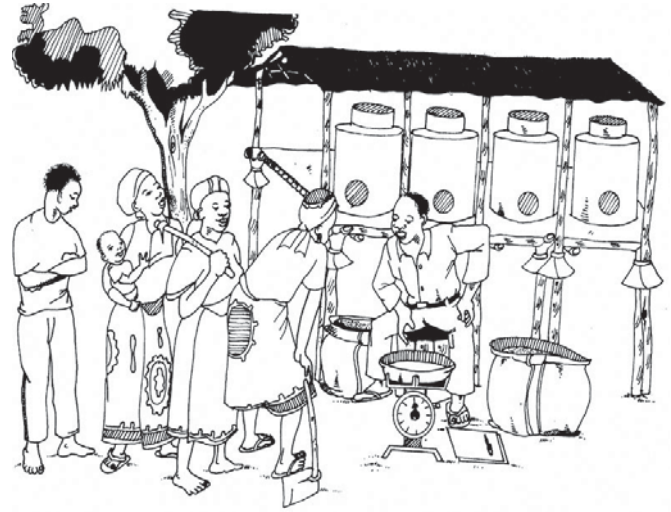


Figure 3: Illustration of a CDC distributing seed

4.3 Local Economic Development approach

Desired situation:

Seed producer associations purchase second generation seed (C2) of both cash (sesame, groundnuts) and food crops (maize, cowpeas) from the specialized seed multipliers and subcontract their member associations to multiply the seed under certified conditions.

Intermediaries and commercial seed companies establish seed production contracts with seed producer associations and purchase/commercialize the certified third generation seed (C3).

Farmers' associations run seed banks for their own members and for sale within their communities (food secure small scale farmers = seed customers).

Entry points for project support:

- Finance and monitor training of seed producers through the service provision association of the specialized seed multipliers.
- Support commercialization and social marketing to stimulate demand among farmers to become clients in a market for quality seed.

5. Social Marketing Strategy

To create a sustainable demand for quality seed, the project started to develop a social marketing strategy. The purpose of a social marketing strategy is to create, communicate and deliver tangible benefits to influence voluntary behavior change, in this case of small-scale farmers from recycling of their grain to acquisition and use of quality seed.

The main and most powerful competitors for the decided behaviour are:

1. The **traditional habit of recycling grain** with its associated benefits (price & place convenience). This is a fair competition and evidently the benefits of the desired behaviour have to outweigh the cost of adopting it.
2. The **distribution of seeds free of cost** or subsidized through governmental and aid programs (price convenience). This is an unfair competition no matter how well intentioned, efforts have to be undertaken to link the seed chain with such programs to reduce their negative impact on the economical sustainability.
3. The **offer of hybrid seeds** (product convenience). In the current socio-economic situation of the target market, private seed companies have little interest and prospect of successfully developing a market for high-yielding varieties which depend on a minimum of production inputs, despite all the efforts undertaken by some donors and the Mozambican Government to launch a new 'green revolution'.

Based on the analysis of the competition, the main challenge appears to be the communication of the competitive advantage of regularly acquiring quality seed instead of recycling grain, which is free of cost and does not require any effort besides storing a minimum of production surplus at home.

Studies conducted with support of the Swiss College of Agriculture Zollikofen (Kaufmann, 2010) and the Swiss Federal Institute of Technology Zurich (Sutter, 2010) helped to better understand the traditional behaviors and have allowed to identify a set of wants and needs of the farmers, paying specific attention to gender.

Both studies have revealed that the local population is already aware of and affected by the changing climate patterns, and clearly recognizes the need of decreasing their climate vulnerability and increasing their adaptive capacity. Among all the potential benefits and competitive advantages of quality seed, taking into account the priorities of the local population, the unique selling proposition is **quality seeds for short cycle production of early maturing varieties**, clearly in response to climate change, where especially women farmers demand early maturing varieties specifically for their main food crops.

6. Prospects

Based on first insights and experiences in the project, the project team has identified the following prospects on which it will concentrate its efforts to further advance in the development of the working approaches:

6.1 Marketing Mix

The local seed production scheme requires a strong agent of change in form of a seed producer pushing his product towards the seed customer by creating the necessary demand for quality seed.

→ For the whole chain to develop and function properly, target market segmentation has to be done which identifies the main client segments with regard to their purchasing power and adoption barriers, and consequently allows farmers' associations to design and apply the appropriate marketing mix for each micro-segment, which could look as follows: (table next page)

6.2 Communication strategy

Illiteracy, weak communication infrastructure and several local languages and cultures make it difficult to design communication tools and methods to reach a broad audience and fully exploit and replication and up-scaling potential of the project.

→ A creative communication campaign needs to be designed identifying key messages for each target audience and media/communication channels,

Micro-Segmentation of Customers	Barrier	Marketing Mix (4 P's) - Sub-Strategy
1. Seed intermediary	Quality certification	PRODUCT: assure sufficient quantities with quality certificate
2. Medium-scale farmer	Availability	PROMOTION: make offer know, attract with purchasing discounts (e.g. for every 50kg seed purchased, 5kg for free)
3. Small-scale farmer (food secure)	Accessibility	PLACE: trust relationship between owner of seed and client (family, neighbor), possibility of payment in kind, e.g. grain for seed.
4. Subsistence farmer (food insecure)	Lack of credit	PRIZE: credit 'in kind' on a basis on one for two

Table 2: Marketing Mix

making the best possible use of the limited resources to break the perceived or potential barriers for the targeted behavior. Possible communication tools to be tested and up-scaled are comics in local language, radio-novels and short films, and local myths and story-telling can be identified as entry points.

6.3 Seed certification process

Local seed certification is a novelty in Northern Mozambique. First experiences have shown that some fields were not accessible for inspection during the rain season, that the costs of certification can only be supported for commercial production, that a delay in arrival of the inspectors can lead to significant post-harvest losses, and that farmers' due to economic constraints sell their seed production as grain.

→ The seed certification criteria and procedures defined by the Government need to be further adapted to match the real needs & wants which can differ according to the target market.

6.4 Saving & Credit scheme

The development of community-run seed banks, both through farmers' associations and Community Development Councils, is introducing first notions of credit management such as solidarity groups, interest payments and trust building.

→ Micro-finance actors could be identified to build upon these seed banks as an opportunity to introduce a saving & credit scheme.

6.5 Water for Food

The awareness raising on climate change, the need for adaptation and capacity to do so, will necessarily lead to an increased interest and demand for solutions with regard to water availability.

→ Integrated water resource management with a specific focus on water for food will become increasingly important for Helvetas Mozambique, and will lead to an increase in activities in the field of rainwater harvesting, water storage and small-scale irrigation systems, focusing on horticultural production to improve food security with regard to nutritional aspects as well.

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