



## Scaling up Smallholder Tree Enterprises in Tanzania

### Overview of Agroforestry Activities



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## 1. Background

Tanzania has an area of 945 200 km<sup>2</sup> and a population of 34.5 million people, 80% of which depends on agriculture for economic development. Agriculture productivity is very low and accounts for 50% of the Gross Domestic Product (GDP). It is estimated that over 42% of the land is arable and over 10 million hectares are presently under cultivation. In spite of these vast land resources, 51% of Tanzanians live below the poverty line with a per capita income of USD 210. A significant proportion of the rural population is faced with poverty, food insecurity, poor nutrition and health and is living with environmental degradation. Some of the government strategies developed to improve the livelihoods of the rural poor include:

- Rural Development Strategy 2001
- Agricultural Sector Development Strategy 2001
- National Forest Programme 2001
- National Beekeeping Programme 2001
- National Agroforestry Strategy 2002
- Tanzania Development Vision 2025 and
- National Strategy for Growth and Reduction of Poverty, (NSGRP) 2005.

Agroforestry is a potentially sustainable option for improving agricultural and livestock productivity, improving the quality of life and social well-being, reducing poverty and sustaining the environment in Tanzania.

## 2. Introduction

The Agroforestry Research and Development Project in Tanzania was initiated in 1986 and is part of the Southern Africa Development Community (SADC) regional programme (Agroforestry Project for Sustainable Rural Development in the Zambezi Basin) which is funded by CIDA, Canada. This project covers five countries - Malawi, Tanzania, Zambia, Zimbabwe and Mozambique and is being implemented by the World Agroforestry Centre in collaboration with government and non-governmental institutions. The project in Tanzania collaborates with the Ministry of Agriculture and Food Security and the Ministry of Natural Resources and Tourism.

The goals of the project are to promote food security, environmental resilience and to improve income particularly of small scale, resource poor farmers through use of agroforestry technologies and innovations.

In Tanzania, the project was initiated to address massive environmental degradation due to deforestation. This has led to declining soil fertility resulting in poor productivity, fuel wood shortages, lack of dry season fodder for domestic animals and loss of natural woodlands. The project operates in Tabora and Shinyanga regions in Tanzania.

### **Location**

The project was previously located in two locations at Lubaga centre, 4 km from Shinyanga town in the Shinyanga region and at Tumbi Agricultural Research Institute 16 km from Tabora town along the Tabora-Urambo road. The SADC/ICRAF Project is currently based in the Tabora region of Tanzania. The project's main office is located at the Zonal Irrigation Office, Kilimatinde road in Tabora town and at the sub-field office at the Agricultural Research Institute (ARI) at Tumbi, 16 km from Tabora town along Tabora-Urambo road.

### **Areas of operation**

The project's focal areas for scaling up in Tanzania are Uyui (Tabora rural), Nzega and Igunga districts in Tabora region, and Shinyanga rural in Shinyanga region.

## **3. Strategies for scaling up**

The purpose of scaling up is to increase the adoption of diversified and improved agroforestry technologies and options in order to reach more resource poor farmers with particular emphasis on reaching an audience of at least 40% women farmers.

The scaling up strategies of the project are:

- Capacity building (including training) at all levels
- Establishing and strengthening of strategic linkages and partnerships with public and private sectors and civil society
- Creating sustainable seed delivery systems for agroforestry
- Developing policy frameworks for the adoption of agroforestry
- Improving farmer experimentation and participation in agroforestry development with special focus on women's involvement
- Adding value and improving the marketing of agroforestry products and services so that greater socio-economic benefits can be derived
- Resource mobilization

It is anticipated that this will lead to the adoption of agroforestry practices by over 200 000 farmers across the Western and Lake Zone regions in Tanzania by the end of the project in 2006.

## **4. Agroforestry technologies being promoted**

**Rotational woodlot and boundary planting** using leguminous trees species such as *Acacia crassicarpa*, *Acacia leptocarpa*, *Acacia julifera*, *Acacia polyacantha*, *Acacia nilotica*, *Leucaena* spp, and non-leguminous trees such as *Azadirachta indica* for the rehabilitation of ecosystems and improving soil fertility and income.

**Improved fallows** using *Gliricidia sepium*, *Sesbania sesban*, *Tephrosia vogeli* and *Tephrosia candida* for improving soil fertility and increasing food production.

**Fodder banks** using *Gliricidia sepium*, *Acacia angustissima* and *Leucaena pallida* for the improvement of livestock nutrition

**Processing and domestication of indigenous fruits** for improving nutrition and income generation (adding value).

**Domestication of medicinal trees** for the conservation of valuable indigenous trees and improved health.

## **5. Partners**

### ***Active partners***

- Ministry of Agriculture and Food Security
  - National agricultural research institutes, particularly Tumbi ARDI
  - National extension services
  - Projects such as Participatory Agriculture Development Empowerment Project (PADEP), Sasakawa Global 2000
- Ministry of Natural Resources and Tourism
  - Tanzania Forestry Research Institute (TAFORI)
  - Tree Seed Agency
- Sokoine University of Agriculture
- District councils (Uyui, Tabora Municipality, Nzega, Igunga and Shinyanga rural).
- Non-governmental organizations
  - World Vision, Tanzania
  - Tanzania Women Leaders in Agriculture and Extension (TAWLAE).
  - MVIWATA (a network of farmers groups in Tanzania).
  - Heifer Project international
  - AFRICARE
  - ADAP (Association of the Development of Protected Areas), a Geneva based organization
- Association of Tobacco Traders in Tanzania (ATTT).
- VI Agroforestry Project, Musoma and Mwanza
- Catholic Church (CARITAS)
- Tabora NGO Cluster (HIV/AIDS)
- Small Scale Industry Development Organisation (SIDO)

### ***Potential partners***

- Tabora Development Foundation Trust (TDFT)
- Moravian Church in Western Tanganyika (Development Projects Department)
- Mogabiri Extension and Training Centre
- Buhemba Rural Agricultural Training Centre (BRAC)
- Golden Pride Project (Resolute Tanzania Ltd)
- PELUM Tanzania
- SOMMORS (Sustainable Management of the Malagalasi and Moyowozi Ramsar Sites)

## **6. Achievements so far**

### **Capacity building**

Over 108 training events have been held since 2001 and about 4637 farmer trainers and 864 partner staff have been trained on various aspects of agroforestry in Tabora and Shinyanga regions. The training sessions were conducted in collaboration with partners, district councils and government ministries (agriculture, education and natural resources). About 30% of the trainees were women.

Exchange visits and farmer tours have been conducted for farmers, teachers and extension agents within Tabora and Shinyanga to learn more about agroforestry and how it can solve their problems and meet their needs.

The programme has also supported the training of individual scientists:

- Two PhD students were trained and have successfully completed their studies. Another PhD student is in the final stages of completion.
- The project has also supported the training of BSc and MSc students through its scholarship programme.

### **Establishing demonstration plots, tree seed supplies and seed orchards**

The project has managed to establish at least 55 demonstration plots in schools, with communities and at research stations.

It has established 102 new seed stands in Uyui, Nzega, Shinyanga and Igunga districts in order to ensure sustainable supply of tree seeds. The tree seed stands were established at primary schools, individual farms and at research sites.

In order to provide seeds to farmers, the project procured over 2.1 tons of tree seeds from the Tree Seed Agency and individual farmers in the 2004 season. The seeds were procured and distributed to 3668 farmers, 46 schools, and 2 religious institutions in order to establish their own tree nurseries.

### **Establishing nurseries**

Over 1379 individual farmers, 80 group, and 100 institutional tree nurseries have been established in Uyui, Tabora, Igunga, Shinyanga and Nzega Districts. The major problems encountered in these nurseries include lack of polythene tubes and watering cans; damage to seedlings by chickens, rats, cutworms, caterpillars, grasshoppers and termites; fungal diseases; theft of seedlings; lack of water; saline water at some sources (Igunga); labour shortage during watering; poor germination of tree seeds; lack of markets for tree seedlings; and generally a lack of technical know-how.

### **Producing training and extension materials**

The programme produced 18 different training materials for farmers and extension agents. These training materials have been reproduced and distributed to over 13,000 farmers. They include training guide booklets in Kiswahili on nursery establishment and management, improved fallows, rotational woodlots, fodder banks and domestication of *Sclerocarya birrea*. Leaflets on *Gliricidia sepium* in Swahili and *Acacia crassicarpa* have also been produced and used in training.

### **Creating agroforestry awareness**

The project in western Tanzania has managed to reach over 233 728 farmers (15 000 directly by the World Agroforestry Centre (Prong 1) in Tabora, through partners (Prong 4), NAFRAC 83 000 in Shinyanga, VI Musoma 20 000, VI Mwanza 29 228, World Vision (Mwakalundi) 12 000, ATTT 45 000 and about 10 000 pupils and 19 500 farmers through schools.

## **7. Adaptive and applied research**

### ***Domestication of fruit and medicinal trees and product development***

- **Evaluation of indigenous fruits and medicinal tree germplasm:** these include establishment of provenance trials from range-wide collections of germplasm of *Sclerocarya birrea* and *Strychnos cocculoides*.
- **Evaluation of priority medicinal tree species:** these include *Terminalia sericea*, *Albizia anthelmintica*, *Turraea fischeri*, *A. anthelmintica*, *Securidaca longipedunculata*, *Combretum zeyheri*, *Cassia abbreviata*, *Entada abyssinica* and *Entandrophragma bussei*.
- **Marketing research of indigenous fruits products:** established collaboration with CP Wild of South Africa to improve the processing and marketing of various products by women groups.

### ***Diversifying agroforestry technology options***

Various trials were initiated and continue on-farm and on-station. They include:

- Evaluation of *Moringa oleifera* (drumsticktree) under various agroforestry systems in Tabora, Tanzania.
- Species elimination/screening trial for newly introduced Australian acacias
- Evaluation of *Sesbania sesban*, *Acacia angustissima* and *Gliricidia sepium* for improved fallows technology in Tabora and Uyui districts, Tabora region, Tanzania.
- Influence of coppicing fallows of *Acacia crassiparva*, *Acacia angustissima*, *Leucaena pallida* and *Gliricidia sepium* on maize yield.
- Nutrient and water dynamics in rotational woodlots in Tabora.
- Evaluation of three *Cajanus cajan* accessions for grain production and soil fertility improvement.
- Evaluation of the effects of *Centrosema pubescens* and *Macrotylom axillare* in fallows for soil fertility improvement and grain yield of a subsequent maize crop. Intercropping pigeon peas (*Cajanus cajan*) with maize (*Zea mays*) for grain production and soil fertility improvement.
- Providing schools and farmers with herbaceous legume species that have been found to grow well in the Tabora region and that can be used to improve soil fertility and have potential to provide quality fodder, *Centrosema pubescens*, *Macroptilum atropurpureum*, *Lab lab* spp (*Mucuna*), *Clitoria ternatea* and *Stylosanthes hamata*.

## 8. Resource mobilisation

This is a challenging task especially with regard to bilateral funding. We are developing several project concepts and proposals in areas of carbon sequestration, processing and marketing of agroforestry products, integration of honey in agroforestry and planting of high value trees on farms.

- We have managed to develop the first draft of an agroforestry business plan for Tanzania.
- In collaboration with our partners, we managed to secure funding of \$100,000 for two years from FARM Africa to improve the processing and marketing of agroforestry products by women groups.

The following concept notes have been submitted to various donors:

- Intensifying the benefits of agroforestry technologies on the livelihoods of farm families in Tanzania submitted to USAID.
- Turning over a new leaf for more sustainable supply of medicinal tree products in Africa submitted to IDRC.
- Processing, commercialization and domestication of indigenous fruits and medicinal plants of the miombo woodlands for improved household income, nutrition and health in Tabora and Shinyanga regions submitted to USAID.
- Integration of policies and laws on agroforestry scaling up/out and biodiversity conservation in the degraded miombo woodlands of western Tanzania submitted to USAID.
- Scaling up and out 'Ngitili' an indigenous participatory conservation practice in the semi-arid landscape of Tanzania submitted to USAID.
- The impact of land use change on water resources: an example of water use by Acacia species planted in western Tanzania submitted to USAID and Third World Academy of Sciences.
- Accelerating the impact of agroforestry technologies on smallholder farmer livelihoods in Tanzania submitted to the Canadian High Commission, Tanzania.
- Sustainable utilization and conservation of forest resources through planting of high value tree species – timber, fruit and medicinal – on farms submitted to AFORNET.
- Inventory on the potential abundance of indigenous fruits in the miombo woodlands of western Tanzania submitted to Switzerland.

## 9. Constraints to scaling up

- Lack of adequate human and financial resources for agroforestry research and development activities
- Inadequate coordination of research and development activities
- Few partners, many of whom are unreliable and incapable
- Lack of awareness among stakeholders and farmers
- Long distances between sites



- Inadequate availability of quality germplasm (seeds and other planting materials)
- Drought
- Policy conflicts

### ***Lessons learnt so far***

- Involvement of farmers in planning and implementation at grassroots is vital for the success of the project.
- To sustain technology transfer, special emphasis should be put on partner staff and the training of farmers as trainers.
- Schools are good learning centres for changing the communities and training farmers of the future.
- Demonstration plots are practical and simple tools for effective training of rural communities.
- Activities that generate income and diversification are more attractive to farmers and likely to be adopted faster.

## **10. The way forward for scaling up smallholder tree enterprises**

Realignment to the new World Agroforestry Centre vision:

- Purpose: A massive increase in the culture of working trees on working landscapes by smallholder rural households that helps ensure the seven family securities.
- Our mission: to advance the science and practice of agroforestry to help realize an *Agroforestry Revolution* throughout Tanzania and its neighbours.

The World Agroforestry Centre agenda for Tanzania is scaling up agroforestry technologies (goods and services) to meet the seven family security needs of food, nutrition, health, fodder, shelter, energy, income, and a restored environment. Our portfolio for a successful smallholder tree enterprise is based on the fact that Tanzania miombo woodlands is home to the **Big Five Agroforestry Tree Types**: Fertilizer trees, Fruits and nut trees, Medicinal trees, Fodder trees, and Timber and Fuelwood trees that can improve food security, rural prosperity and environmental protection.

Our work is based on the Centre's four themes of:

- Land and People
- Trees and Markets
- Environmental Services
- Strengthening Institutions

### ***For food security***

We will continue searching and deploying fertilizer trees both as improved fallows combined with tree intercropping. Species will include *Gliricidia sepium*, *Sesbania*

*sesban*, *Tephorsia candida*, *Cajanun cajan*, *Acacia angustissima*, *Leucaena pallida*, Herbaceous legumes *Centrosema pubescens*, *Macrotylom axillare*, *Macroptilium atropurpureum* and Lab lab spp. We will encourage the use of Mijingu rock phosphate and quality protein maize (QPM) from Sasakawa and *Cajanus cajan*. We will encourage farmers to start with 2000 m<sup>2</sup> and gradually expand to 4000 m<sup>2</sup>.

### **For nutritional security**

Eighty-three indigenous tree species have been identified in the Tanzania miombos which bear edible fruits and nuts throughout the year. The rural communities recognize and consume a variety of these edible fruits, which are normally gathered and eaten within the locality while some are sold in the local markets. We will continue the deployment of a variety of indigenous fruits trees like *Vitex doniana*, *Adansonia digitata*, *Parinari curatellifolia*, *Strychnos cocculoides*, *Vitex mombassae*, *Sclerocarya birrea*, *Flacourtia indica*, *Tamarindus indica*, *Berchemia discolor*. This also includes exotic fruit species including mangoes, *Annona senegalensis*, *Syzigium guinense* pawpaws, passion fruits, citrus and guava and vegetable trees such as moringa, baobab and other indigenous vegetables for a continuous supply of leaves for vitamins and minerals to add to the diet. We will begin with 20 trees on 200 m<sup>2</sup> on boundaries and gradually expand as market opportunities arise. We will also collaborate with partners providing modern beehives for honey production and improved dairy livestock and chickens.

### **For health security**

There are over 300 medicinal trees in Tanzania. About 80% of rural people in Tanzania depend on traditional healers and traditional herbs for their health care needs. We will continue integrating trees into existing farming systems. These will include medicinal tree species mentioned as top priorities: *Securidaca longipedunculata*, *Zanha africana*, *Cassia abbreviata*, *Entada abyssinica*, *Turraea fischeri*, *Albizia anthelmintica*, *Entadophragma bussei*, *Combretum zeyheri*, *Zanthoxylum chalybeum* and *Terminalia sericea*. We will deploy moringa trees to produce seeds for water purification and food and other medicinal trees for malaria treatment, those used in the management of HIV/AIDS and trees for stomach discomforts, bronchial ailments and skin diseases. We will start with 10 trees on 50 m<sup>2</sup>.

### **For shelter and energy security**

Farmers have successfully adopted rotational woodlots involving Australian acacias (*A. auriculiformis*, *Acacia crassicarpa*). We will continue their deployment and include promising indigenous timber and fuelwood species such as *Afzelia quanzensis*, *Albizia lebbeck*, *Acacia Senegal*, *Senna siamea*, *Acacia polyacantha*, *Balanites aegyptica*, *Pterocarpus angolensis*, *Terminalia sericea* and *Brachystegias spp.* We will also try *Grevillia* and *Casuarina spp.* and *Acacia mangium* for timber and household construction. We will encourage the utilization of branches from the trees for fuelwood. We will start with 10 timber trees on 50 m<sup>2</sup> and expand plantings each year for five years to reach 250 m<sup>2</sup>.

### **For fodder security**

*Glyricidia sepium*, *A. angustissima*, *L. pallida* are now being used for fodder. We will continue their deployment along promising herbaceous legumes of *Centrosema pubescens*, *Macrotylom axillare* and *Macroptilium atropurpureum* to ensure dry season forage for ruminant livestock, particularly goats and dairy animals. We will continue promoting Ngitili, a natural vegetation regeneration system based on indigenous knowledge. We will encourage planting 100 fodder trees per year for five years to occupy 250 m<sup>2</sup> on boundaries of the farm.

### **For income security**

Domestication and commercialization of indigenous fruits trees is an emerging industry for Tanzania, which has a high diversity of indigenous fruits. We will continue the improvement in processing and marketing of agroforestry products by women groups. We will also continue planting the most promising trees for generating income. We will expand on the existing *A. auriculiformis* and *Acacia crassicaarpa* plantings with new species and include indigenous timber species such as *Azalia quanzensis*, *Pterocarpus angolensis*, *Terminalia sericea*, *Brachystegias spp*, *Senna siamea* and indigenous and exotic fruit trees. We will work with other partners in promoting modern beehives to improve honey production and dairy animals. We will start with 100 m<sup>2</sup> of the most promising species and gradually expand as experience demonstrates to reach 250 m<sup>2</sup> over time.

### **For environmental security**

We will continue promoting Ngitili for degraded land rehabilitation. We will encourage the establishment of soil conservation measures such as contour bunds across the farm in combination with trees, shrubs and grasses that can provide products for achieving the other securities. We will establish a water harvesting system over a 50 m<sup>2</sup> holding area for household water needs and tree nursery in addition to community-based watershed management and biodiversity conservation.

We will continue to:

- Develop capacity building including training at all levels for partners and farmers.
- Provide technical support and disseminate knowledge to farming communities through farm interchange visits to learn from the best farmers in the area
- Establish and strengthen strategic partnerships and work with international and national research centres, extension and educational systems, government departments, the NGO community, and private sector and civil society to realize our Smallholder Tree Revolution
- Create sustainable seed delivery systems for agroforestry and ensure the availability of high quality germplasm supplies of the most promising trees. We will develop farmers and community-based seed supply systems and assist the poorest households in purchasing the seed/seedlings
- Explore a policy framework for the adoption of agroforestry
- Diversify farmers options to improve farmer experimentation and participation in agroforestry development while specially focusing on women's involvement

- Improving and adding value to agroforestry products and services and marketing so that greater socio-economic benefits can be achieved
- Resource mobilization

***Future plans***

- Formation of consortium for scaling up in Tanzania.
- Conduct impact assessment of agroforestry innovations
- Synthesis and documentation of scaling up experience
- Finalize the agroforestry business plan for Tanzania