

ECOSYSTEM-BASED ADAPTATION THROUGH SOUTH-SOUTH COOPERATION GOOD PRACTICE CASE STUDY

Great Green Wall Initiative

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The Sahel – located between the Sahara Desert to the north and the Sudan in the south – is vital for the future welfare of ~40 million people. However, poverty and food insecurity are pervasive in this region. Efforts to eradicate socio-economic challenges in the Sahel need to include strategies to manage natural resources and address the drivers of poverty. One such strategy is the Great Green Wall Initiative. This initiative improves livelihoods of rural communities by promoting sustainable agricultural development and improved land management practices.

Project outcomes

- Employment of ~400 people in eight nurseries in Senegal.
- Increased food production and household income– particularly for women –through combining tree nurseries with vegetable gardens in Senegal.
- Planting of 30,000 hectares of trees in Senegal.
- Increased tree cover by 50% over 50,000km² of marginal, degraded dryland in Maradi, Niger.
- Establishment of semi-annual market days to promote the adoption of the *zai* technique as an approach to conserve topsoil and water in arid farming systems.
- Establishment of a *zai* school to train local farmers on the use of the *zai* method of land preparation for climate-resilient agriculture and rangeland management.

Key lessons

- Communities living in arid and semi-arid regions (hereafter “drylands”) have succeeded in increasing their incomes by innovating and experimenting with agricultural and natural resource management practices.
- Innovation by researchers, farmers and/or project staff has contributed significantly to the success of projects that focus on drylands. Some projects are successful because they implement adaptive management, thereby allowing initiatives to innovate.
- Increased land productivity and improved goods and services provided by restored drylands contribute to increased income for rural households.



GOOD PRACTICE DESCRIPTION

LOCATION: Sahel-Saharan region, stretching from Dakar to Djibouti, including Burkina Faso; Chad, Djibouti, Eritrea, Ethiopia, Mali, Mauritania, Niger, Nigeria, Senegal and Sudan

IMPLEMENTATION PERIOD: 2007 - present

OPERATIONAL BUDGET: GEF: US\$100.8 million (GEF Trust Fund US\$81.3 million and LDCF US\$19.5 million)

KEY STAKEHOLDERS: The governments of Burkina Faso, Chad, Djibouti, Eritrea, Ethiopia, Mali, Mauritania, Niger, Nigeria, Senegal and Sudan

Background information and climate change vulnerabilities

The objective of the Great Green Wall Initiative (GGWI) is to provide people living in drylands, including nomadic communities, with additional livelihoods while enhancing their food security. The original concept of the GGWI was to establish a physical barrier of trees from Dakar to Djibouti, focusing on a strip of land 15 km wide and 7,100 m long. The purpose of this barrier is to slow the advancement of the desert and impede the hot winds that increase erosion, thereby improving the ecosystems of the Sahel. The concept has since evolved into a mosaic of interventions that consider sustainable livelihoods and the interests of the local populations. Each country addresses problems within its own local context, including inter alia: i) land degradation; ii) climate change adaptation and mitigation; iii) biodiversity; and iv) forestry. The GGWI is therefore a resilience programme with integrated actions that address challenges in sectors such as: i) natural resource management; ii) infrastructure; and iii) sustainability of rural production systems, including agriculture, breeding and forestry.

Intervention technologies

The GGWI implements activities that improve the ability of both human and natural systems to absorb or recover from the effects of a climate-related event. A mosaic of sustainable land use practices are being implemented based upon the following principles:

- diversify production to reduce economic risk (e.g. agroforestry and crops);
- implement safety nets (e.g. increased use of rangelands, consumption and/or sale of wild products collected from the landscape); and
- promote alternative or additional employment (e.g. off-farm labour, small forest enterprises).

Traditional land rehabilitation practices include the Sahelian *zai* technique, which is a popular adaptation method in arid and semi-arid areas of West Africa (areas with an average annual rainfall of ~300-800 mm). This technique includes digging holes (20-30 cm in width, 10-20 cm deep and spaced 60-80 cm apart) to retain manure and water in the plant root zone. In Burkina Faso, Niger and Mali, *zai* pits are filled with organic matter to increase the availability of nutrients for crops. The excavated earth is formed into ridges below the pits, which maximises the capture of rainwater. Stone lines and contour bunds are also constructed – usually collectively by village organisations, but sometimes can also be constructed by individuals. These techniques slow down the rate of water run-off, prevent erosion and increase the rate of groundwater recharge. The resultant improved infiltration of water and increased nutrient status of the soil are beneficial for crop growth. In combination with water harvesting techniques, degraded lands have been restored and facilitate higher levels of productivity. Thousands of hectares of degraded and unproductive land have been rehabilitated using this approach.



A co-benefit of the above rehabilitation technique is that the on-farm trees that grow from seeds are eaten by livestock and deposited in the manure used in the *zai* pits. The seedlings are protected and managed, promoting new agroforestry plots or “regreening”. The newly established trees and bushes are important in restoring the productivity of degraded farmlands and provide multiple benefits, including : i) fodder for livestock; ii) fruit; iii) firewood; iv) poles for construction; v) improved micro-climate for agriculture; vi) improved soil fertility; vii) higher groundwater levels; and viii) decreased soil erosion.

Trees are better able to withstand climatic variability than annual crops and can be grown as a permanent source of valuable products. Furthermore, they require minimal maintenance and are able to tolerate drought once established. Income from sales of wood and other tree products enable farmers to buy food from more reliable sources – i.e. grown in areas that have consistent rainfall events. In addition, trees act as a natural barrier against desert winds and help to reduce evapotranspiration. Other benefits of tree planting include reduced erosion, enhanced biodiversity and the provision of additional sources of fodder

Since 2008, Senegal has been a pioneer of the GGWI, employing ~400 people in eight nurseries. During August each year, ~1,000 people are mobilised to plant out rows of ~2 million seedlings over one month. These newly planted seedlings are protected by fencing for a period of six years. During particularly harsh years, the protected parcels of planted land are made accessible to livestock. Six indigenous tree species have been chosen by local people and scientists for their hardiness and their economic value, these include *Acacia senegal*, which can be tapped for its gum Arabic: a stabiliser and emulsifying agent. The desert date, *Balanites aegyptiacus* is a source of food, forage, cooking oil, medicine and cosmetics. Another focus of the GGWI is to teach villagers to plant market gardens and use drip irrigation, whereby a small elevated water tank is connected to perforated pipes that deliver small amounts of water to crops.

With the support of multiple international organisations and conventions – including FAO, the European Union and UNCDD – the focus of GGWI was expanded in 2010 to include activities such as: i) recuperation and protection of degraded silvopastoral ecosystems; ii) increased knowledge on the environment, natural resources and human capital; iii) development of business opportunities, mechanisms and instruments to secure reliable incomes and more adequate livelihoods; and iv) management of silvopastoral ecosystems and safeguarding of diversified and sustainable production.

Description of the results

One of the most successful activities has been the establishment of tree nurseries combined with vegetable gardening by women’s organisations in four locations in Senegal’s GGWI area. These activities have increased household income and food production, and have significantly improved livelihoods within the selected areas. In Mbar Toubab, over 130 women are participating in the market gardening and have produced lettuce, tomatoes, onion, potatoes, okra, aubergines, watermelons, carrots, cabbages, turnips, mango and orange trees. Furthermore, research has been undertaken on improved nursery and planting techniques by introducing locally adapted crop species, as well as management and harvesting methods.

As of 2014, Senegal has planted 30,000 hectares – the majority of which is planted with *Acacia* species. Preliminary results indicate that clumps of four to eight small trees can have a positive effect on temperature. In addition, the trees slow the rate of soil erosion caused by the wind thereby reducing the dust and restricting the sand-laden winds from the Sahara. The regreening of these areas also has a positive effect upon wildlife with the reappearance of migratory birds.

In Niger, Mali and Burkina Faso, natural regeneration is managed by farmers. The widespread adoption of farmer managed natural regeneration (FMNR) is attributed to small initial investment from the farmers – i.e. benefits are obtainable at minimal costs. There are no expenditures beyond additional labour and it is therefore cost-effective for poor farmers. Progress is particularly apparent in Niger, where tree density has increased drastically. In Maradi, Niger, farmers increased tree



cover by 50% over 50,000km² of marginal, degraded dryland. Natural regeneration activities within the region benefit both local communities and the environment by: i) increasing crop yield; ii) improving soil fertility; iii) reducing land erosion; iv) improving fodder availability; v) diversifying income-generating activities; vi) cutting the wood collection time for women; vii) strengthening resilience to climate change; and viii) increasing biodiversity.

The most innovative projects are designed by the pastoralists. For example in Niger, settlements sites have been established for migratory pastoralists. These sites include health and education services, as well as trees and market gardens. Combining nomadic and sedentary lifestyles is considered the most risk-averse survival strategy as it limits the opportunity for tension between nomads and local sedentary communities as a result of overgrazing.



GOOD PRACTICE ANALYSIS*

Knowledge building

How has the project built upon or applied the findings of specific research projects? How has the project actively contributed to international understanding on Ecosystem-based Adaptation?

During the 1970's and 1980's, several projects in drylands did not perform adequately because they did not communicate with rural communities. Past initiatives did not include land users in the design and implementation of projects and promoted technologies that were not acceptable to resource-poor land users. However, there has since been a shift towards projects that include relevant communities. As a result, more attention is being paid to learning from success stories in natural resource management in the West African Sahel. These include:

- increased involvement of land users in all stages of the project cycle;
- new techniques for management of soil and water;
- new approaches to research and extension; and
- innovations in community-based natural resource management.

A flexible approach has been adopted which makes the most effective use of best sustainable land management practices learning from results and lessons.

The GGWI project provides a novel approach to funding and information-sharing. In this context, Senegal has created a framework for other countries to start GGWI implementation.

Political ownership, collaboration and approval

How has the project secured support from political-level stakeholders and aligned its activities with wider development agendas to trigger further collaboration opportunities?

The project is based on different regional and national ongoing efforts to improve livelihoods in the Sahel and Sahara regions. Each country has adopted various programmes and initiatives related to land degradation, climate change adaptation and mitigation, biodiversity and forestry within their own local context. Many of these projects have the same objectives. The aim of the GGWI is therefore not to duplicate but rather to improve the efficiency of these programs in arid and semi-arid systems. This is promoted by GGWI through encouraging synergy and coordination between the activities of various national and sub-regional bodies working against land degradation and desertification. In addition, the GGWI promotes collaboration at regional and national levels between organisations that share the common objective of reducing land and natural resource degradation.

Building local capacities

How has the project ensured that local capacity was built during implementation phase?

By encouraging decentralisation, the project ensures the participation of the local communities. This is enhanced through the promotion of: i) simple village structures (e.g. rural markets); ii)

* This analysis is based on the "principles of good practice" developed by the EU/FP7-funded project AfriCAN Climate (2011-2014). These principles represent critical cross cutting issues shared by the majority of climate change projects, regardless of focus, scope and scale. They are intended to encourage critical reflection and help project developers and decision-makers draw out relevant lessons. Source: <http://africanclimate.net/en/good-practice/8-principles-good-practice>



reinforced management training for members of village structures, including women; and ii) setting up a suitable institutional framework for fiscal and land use planning. Therefore decentralisation is a mechanism to strengthen the local resource management planning and develop control capacities.

Farmer innovations are central to the development of rehabilitation techniques. Innovative farmers are identified through a process of participatory rural appraisal. Exchange visits and study tours are then arranged whereby innovative farmers can learn from each other. Furthermore, knowledge is shared within communities through meetings and family networks. In addition, farmers have established semi-annual market days to promote the implementation of planting pits, which have been adopted by more than 100 villages in Burkina Faso. A *zai* school for training local farmers has also been established. This training programme includes 20 schools and approximately 1,000 members, who are trained to take responsibility for rehabilitating their own piece of degraded land.

Crop production farming systems are increasingly being established in less arid parts. To preserve crop diversity, crop production is often combined with pastoralism in mixed crop or in sedentary systems that use crops and livestock. Because crop failure frequently occurs in drought years, diversifying crops through mixed systems reduce the risk of production loss.

Inclusiveness

How has the project made provisions to include traditionally disenfranchised community members?

In Senegal – which is primarily a patriarchal society – gender inclusiveness has been promoted in politics and policy through measures such as the introduction of the gender parity law. However, at present the majority of women in rural communities remain disempowered as a result of limited access to financial capital or alternative livelihood options. Therefore, by combining the establishment of tree nurseries with vegetable gardens run by women's groups, this project promotes gender inclusiveness by generating benefits such as increased food production and income among women.

The success of vegetable gardens managed by women's groups in Senegal can be used as a model for other countries participating in GGWI to promote inclusiveness of previously disenfranchised members of rural communities.

Maximising co-benefits

How have the interventions of the project promoted additional benefits?

By supporting interventions that result in the generation of multiple benefits and useful products, this project has maximised co-benefits of investment. The generation of multiple benefits is exemplified by the example of *zai* pits, wherein manure containing seeds from established trees is used to enrich soils. The seedlings resulting from the germination of these seeds contribute to the "regreening" of degraded farmlands and ensure a sustained supply of non-timber forest products that will benefit farmers, such as firewood, fodder, fruits and fibre.

