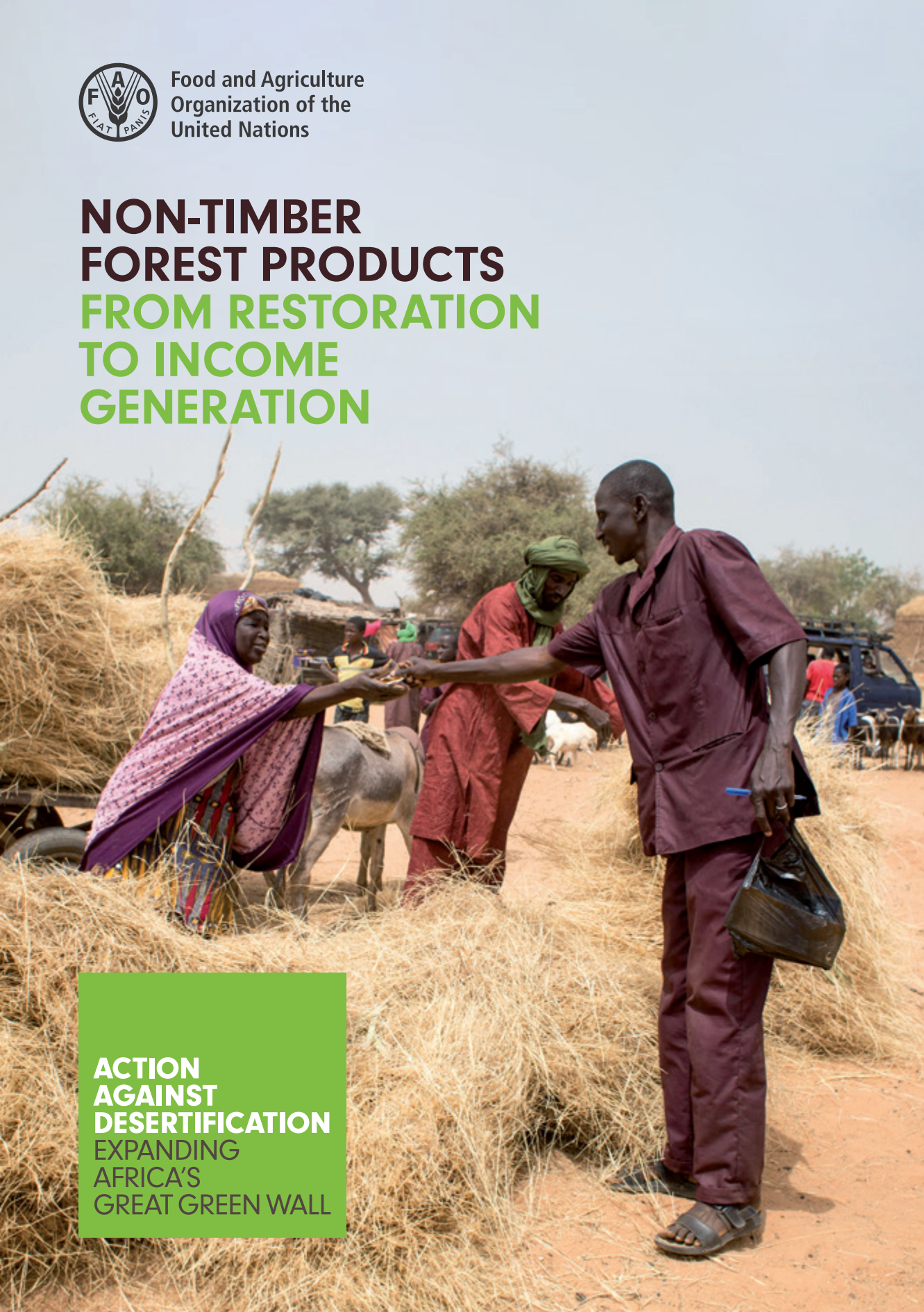
Food and Agriculture Organization of the United Nations

NON-TIMBER FOREST PRODUCTS FROM RESTORATION TO INCOME GENERATION



ACTION AGAINST DESERTIFICATION
EXPANDING AFRICA'S GREAT GREEN WALL

NON-TIMBER FOREST PRODUCTS FROM RESTORATION TO INCOME GENERATION

Food and Agriculture Organization of the United Nations
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ACRONYMS AND ABBREVIATIONS

AAD	Action Against Desertification
ACP	Africa, Caribbean and Pacific Group of States
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GGW	Great Green Wall
GGWSSI	Great Green Wall for the Sahara and the Sahel Initiative
NGARA	Network for Natural Gums and Resins in Africa
NTFP	non-timber forest product
USD	United States dollar(s)
XOF	West African CFA franc(s)

Introduction

The degradation of Africa's drylands cannot be tackled without unleashing the land's economic potential; rural communities, therefore, need to obtain economic benefits from restoration work. Action Against Desertification in Support of the Great Green Wall for the Sahara and the Sahel and South–South Cooperation in ACP Countries (AAD), a project implemented by FAO and partners (Box 1), stimulates economic growth by developing forest products that are useful for communities, create jobs and generate income. Many of these commodities can be produced without damaging the ecosystems in which they grow, provided such production is based on the sustainable management, protection and restoration of dryland landscapes. Locally established green enterprises can provide many income-earning opportunities, thus incentivizing communities to participate in restoration and sustainable management (Berrahmouni, Regato and Parfondry, 2015).

Non-timber forest products (NTFPs) are useful substances, materials or commodities obtained from forests that do not require the harvesting of trees. In the past, forest departments and other government agencies have tended to pay only limited attention to NTFPs and forest ecosystem services, but this is changing. NTFPs are now more widely viewed as crucial for sustainable forest use, providing benefits for local communities and wider societies and offering an important means for development, especially in drylands.

The Great Green Wall for the Sahara and the Sahel Initiative (GGWSSI) is Africa's flagship initiative to build prosperity and resilience in more than 20 countries around the Sahara. It was initiated to combat the effects of climate change and desertification and to address food insecurity and poverty. Endorsed by the African Union in 2007 as a game-changer in Africa's drylands, the initiative aims to transform the lives of millions of people by creating a great mosaic of green, productive landscapes across North Africa, the Sahel and the Horn of Africa. The core area of the Great Green Wall (GGW) covers 780 million hectares in arid and semiarid zones around the Sahara, an estimated 21 percent of which is in need of restoration (Berrahmouni *et al.*, 2016).

Forests and woodlands in African drylands provide a wealth of products essential for the livelihoods and well-being of local people. Many NTFPs have significant economic potential in GGW countries: each year, for example, African countries export 100 000 tonnes of gum arabic, a product in high demand in the food industry. The oil of *Balanites aegyptiaca* is used for cooking, as well as in cosmetics and soap, and sales of honey provide many communities with valuable revenue. People eat the leaves of the baobab tree (*Adansonia* spp.), and the fruits and leaves of the gao tree (*Faidherbia albida*) are used as fodder for animals.

AAD promotes community-based restoration approaches along value chains – from the seed to the market – for several economically significant NTFPs in eight countries (Burkina Faso, Ethiopia, Fiji, Gambia, Haiti, Niger, Nigeria and Senegal) in Africa, the Caribbean and the Pacific. This publication presents five main NTFP value chains – for fodder, honey, gum arabic, balanites oil, and restoration seeds and seedlings – in six countries in African drylands. It describes how AAD is promoting these NTFPs along entire value chains, from land restoration using targeted species, to harvesting, processing and marketing. Boxes 2 and 3 describe selected NTFP value chains in Fiji and Haiti.


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BOX 1

ACTION AGAINST DESERTIFICATION IN SUPPORT OF THE GREAT GREEN WALL: **THE DEGRADATION OF AFRICA'S DRYLANDS CANNOT BE TACKLED WITHOUT UNLEASHING THE LAND'S ECONOMIC POTENTIAL**

Action Against Desertification is a project implemented by FAO and partners and funded by the European Union to support local communities, governments and civil society to restore degraded lands in six African countries – Burkina Faso, Ethiopia, Gambia, Niger, Nigeria and Senegal – as well as in Fiji in the Pacific and Haiti in the Caribbean.

AAD places communities at the heart of restoration work by providing scientific plant expertise while focusing on community needs for useful species and preferences in restoration to support their livelihoods. AAD brings its activities to scale using mechanized land preparation, which is essential to meet the massive needs for restoration in the target areas. In many contexts, land degradation is not yet irreversible; stopping it, however, requires large-scale restoration to enable small-scale resilient farming supported by communities' experiences. AAD is restoring 35 000 hectares of heavily and moderately degraded lands through the planting of seeds and seedlings of a wide range of well-adapted useful native species of trees, shrubs and fodder grasses.

The AAD approach considers NTFPs as part of the solution for development in rural communities. Along with on-the-ground restoration activities, AAD promotes the diversification of economic activities by reinforcing NTFP value chains with direct links to restoration. The project supports local communities and producer organizations in the sustainable production, processing and marketing of NTFP products. Ecology works hand in hand with economy in these efforts, protecting the environment while supporting livelihoods, boosting incomes and creating jobs, in particular for women and youth. Based on the availability of natural resources and marketing opportunities, and on people's needs and lifestyles, communities and producer organizations across the eight AAD countries selected the following products as priorities for development: honey; edible fruits (baobab, *Ziziphus, Neocarya*); oil (*Balanites aegyptiaca*); fodder (gao, *Philiostigma*, grasses); gum arabic and resins (acacias, *Commiphora*); palm and bamboo (*Oxythenantera, Pandanus*); small-ruminant leather; briquettes (household energy); sandalwood (oil and incense); and restoration seeds and seedlings (which can be a source of income for communities).

AAD has supported several events related to the development of NTFPs, including regional conferences of forest and farm producer organizations in Kenya and the United Republic of Tanzania, a workshop on commercial gums and resins in Africa, and training on the FAO Market Analysis and Development approach in Burkina Faso, designed to help local communities set up small businesses. AAD supports the Network for Natural Gums and Resins in Africa (NGARA), particularly through the development and implementation of NGARA's framework of priorities for 2017–2030. NGARA brings together stakeholders in the gums and resins sector, including farmers, collectors, traders, governments, non-governmental organizations, exporters and importers, with a common desire to improve the production and quality of locally produced gums and resins.

BOX 2

IMPORTANT NON-TIMBER FOREST PRODUCTS IN THE PROJECT INTERVENTION AREAS IN FIJI

- **Sandalwood** (*Santalum yasi* - also called *Yasi* in Fiji) is small shrub or tree with a highly valued aromatic wood, which is commonly used in traditional events in Fiji, as well as its locally extracted oil. The tree is easy to grow and has a great potential to be used as an agroforestry tree species (Goswami and Singh, 2014).

- **Wild native yams** (*Dioscorea* spp – Tivoli, Tivoli ni Rotuma and Tivoli ni Samoa) are important dietary supplements to local communities. They can be planted around big trees such as breadfruit, Ivi (Tahitian chestnut) or Tarawau (*Dracontomelon vitiense*).

- **Voivoi** (*Pandanus tectorius*) is a palm-like plant that is very important in the Pacific region cultures and traditions. Most parts of the plant are used in Fiji, commonly by local weavers to make traditional mats. It is often planted in gardens in an agro-forestry system. Because of its ability to protect slopes from soil erosion, it is recommended to plant *Pandanus* with Vetiver grass along permanent hedgerows and river embankments (FPAM, 2014).

- **Yaqona** (*Piper methysticum*, called *Kava* in Fiji) grows naturally and is cultivated throughout the Pacific. A traditional drink is made from its roots. Kava is used for medicinal, religious, political, cultural and social purposes in Fiji. In one of the AAD intervention areas, yaqona production is the main source of income for 44% of the population (Sacande *et al.*, 2018).

- **Tahitian chestnut** (*Inocarpus fagifer*, or *Ivi* in Fiji) is a tall tree that is traditionally used in Fiji for its leaves, bark and nut. The seed kernels in particular are an important food in Pacific countries. The tree is planted in agroforestry systems for soil stabilization, provides shade and windbreak for crops.

Photos (from left to right): Sandalwood; Pandanus plants in Fiji. ©FAO/Moctar Sacande

BOX 3

IMPORTANT NON-TIMBER FOREST PRODUCTS IN THE PROJECT INTERVENTION AREAS IN HAITI

- **Tamarind** (*Tamarindus indica*) is cultivated in the world's tropical areas for many uses. Its fruit is a pod with an edible pulp: in Haiti, the pulp is commonly processed into juices, jams and wines.
- **Yellow mombin** or hog plum (*Spondias mombin*) and the **red mombin** or cirouelle (*Spondias purpurea*) are found in Haiti's jardins creoles agroforestry systems. Both are used for their edible fruit pulp and the production of juices, jams and wines.
- **Vetiver** (*Chrysopogon zizanioides*) is a bunch grass with fragrant roots; it occurs naturally in southwestern Haiti and is also cultivated there. The highly valuable oil extracted from vetiver roots is sold to the perfume industry; Haiti is the world's biggest producer of this oil. Vetiver also has a very strong deep root system, which makes it well suited for protecting soils against erosion and for stabilizing stream banks and terraces.
- **Almond** (*Prunus dulcis*) trees are scattered throughout Haiti. Almonds are used in many ways, including in sweets, medicines, cosmetics and wines.

Photo: Ripe fruits of the Tamarind tree (*Tamarindus Indica*). ©FAO/Roberto Faidutti

Fodder

1

2

Fodder crops are crops that are cultivated primarily for animal feed. By extension, natural grasslands and pastures are included, whether they are cultivated or not. Fodder comprises grasses, crop residues and parts of trees and shrubs such as leaves, flowers and fruit that are harvested and used as feed for livestock and other domesticated animals. In drylands, natural vegetation is the main source of fodder.

DRYLANDS ARE LIVESTOCK PRODUCTION AREAS *PAR EXCELLENCE*. Livestock keeping is the main source of livelihood for 40 million people in the Horn of Africa and the Sahel, where pastoral and agro-pastoral systems are the main livestock production systems. The livestock sector's contribution to gross domestic product (GDP) in these countries is very high (Box 4), including through the production of skin, hides and leathers (Box 5). The sector is also directly dependent on the biomass produced in agro-sylvo-pastoral systems for use as feed.

Demand for fodder is very high throughout the GGW core area, putting pressure on natural vegetation and agricultural land. This pressure, combined with poor management practices, has caused the degradation and decline of large areas of natural pastures.

Conflicts are common between pastoralists and crop farmers, especially during seasonal and annual transhumance (that is, the movement of livestock from one grazing area to another). Conflicts often arise when livestock trespasses on farms in search of food.

Should the decline of fodder continue, it has been estimated that, by 2030, the availability of feed and other necessary resources will be insufficient to maintain most pastoralists and agropastoralists in sub-Saharan dryland countries, even at 50 percent of the poverty line (de Haan *et al.*, 2016).

Solutions to this looming disaster may be found in restoring and enriching degraded pastoral landscapes with native fodder species (Table 1). The AAD restoration model combines the planting of herbaceous and woody fodder species, particularly in the GGW core area in Burkina Faso, Mali, Niger, Nigeria and Senegal, where


3


4

communities have shown a very high preference for fodder species. Restoration with grass fodder species can require 5–10 kg of seeds sowed per hectare (Sacande and Berrahmouni, 2016). It is important, therefore, to ensure that farmers have access to sufficient numbers of well-adapted, high-quality seeds and knowledge of how best to sow them. The inclusion of high-quality herbaceous fodder species, combined with woody species, is a key innovation brought by AAD to large-scale restoration in the GGW core area for the following reasons:

- **Fodder grasses** are fast-growing and capable of supplying feed within a year of planting. This is key to engaging pastoral communities in restoration activities. Grass fodder is also one of the most profitable forest products and can provide significant income. Harvested grass and tree fodder can be fed directly to animals as green feed, and it can be stored if harvested dry or dried after harvesting.

- **Fodder trees** and shrubs are usually easy to grow, require little land, and provide numerous byproducts. One of their main benefits is that they contain high levels of protein, which is especially important in the dry season when the protein content and nutritional value of grasses is low (and must be compensated by other sources). In extensive animal production systems in African drylands, fruits and leaves from trees and shrubs account for 40–50 percent of total available feed (Speedy and Pugliese, 1992).

THE FODDER VALUE CHAIN

1. Women sowing fodder seeds after the soil has been prepared. AAD project, Djibo, Burkina Faso.
©FAO/Giulio Napolitano

2. Local herders collect grass from a plot restored through the AAD project in Koyli Alpha, Senegal.
©NOOR/Benedicte Kurzen for FAO

3. Grass fodder being transported in Tera, Niger.
©FAO/Moctar Sacande

4. *Faidherbia albida* tree pods sold as fodder, Tera, Niger.
©FAO/Moctar Sacande

Fodder

TABLE 1. Key plant species supporting fodder production

SPECIES	DISTRIBUTION	DESCRIPTION	MAIN USES
Herbaceous fodder			
Andropogon ganyanus Poaceae	Native to most tropical and subtropical savannas in Africa	Tall perennial tussock-grass up to 2.5 m in height	• One of the best grass-fodder species • Stems used for handicrafts
Schoenefeldia gracilis Poaceae	Sahelian/soudanian zone across the region, from Mauritania to northern Nigeria and eastwards to the Red Sea; also India	A tufted annual grass, culms slender to 1 m high; sandy areas and soils, and hard pans	• Excellent fodder for cattle, sheep and goats. • Also used as building material (thatching huts) and for various domestic items
Panicum laetum Poaceae	Sahelian zone from Mauritania to northern Nigeria, extending to the Horn of Africa; also Tanganyika	An annual grass, tufted with culms ascending or erect to 70 cm in height; moist soils	• Grain food (wild fonio) • Fodder
Alysicarpus ovalifolius *Leguminosae/ Fabaceae*	Dispersed across the region, from Mauritania to northern and southern Nigeria; widespread in tropical Africa and Asia	Annual herb, sprawling or erect to about 60 cm; occurs in savanna ground and as a weed in cultivated areas	• Fodder • Medicine
Pods/fruits			
Piliostigma reticulatum Leguminosae/ Fabaceae	Drylands in sub-Saharan Africa, from Senegal to the Sudan	Tree up to 10 m in height	• Fodder from leaves and pods • Pods provide protein-rich feed for cattle during the dry season
Leaves			
Faidherbia albida Leguminosae/ Fabaceae	Native to Africa and the Middle East	Thorny tree up to 20 m in height	• Commonly used in agroforestry systems (nitrogen-fixing) • Leaves and pods used for fodder • Medicinal uses (roots)
Afzelia africana Leguminosae/ Fabaceae/ *Caesalpinioideae*	Sudanian savanna and fringing forest from Senegal to southern Nigeria, and across central Africa to South Sudan and the Democratic Republic of the Congo	Large tree, commonly to 15 m tall but sometimes to 30 m on moister sites	• Important commercial wood for construction, furniture, domestic items and musical instruments • Leaves used as fodder • Young leaves, young fruit, aril and young seeds used as food • Bark, roots, leaves, shoots, fruit pods and the ash created by burning fruit pods used in medicines
Khaya senegalensis Meliaceae	Across western Africa, from Senegal to Uganda	Fast-growing tree with shiny foliage, up to 35 m high with wide dense crown and thick stem	• Often planted to provide shade • Leaves used for fodder • Bark used in medicine; wood used in carpentry and other items • Has high spiritual value for some cultural groups, who consider it a magic tree

Source: Sacande, Sanogo and Beentje (2016).

BOX 4

IMPORTANCE OF THE LIVESTOCK SECTOR IN AFRICA'S GREAT GREEN WALL

The production of meat, milk, skins, hides, leather and other animal products is an important source of food security, nutrition and income in East and West Africa. Livestock raising is the main source of livelihood for 40 million people in the Horn of Africa and the Sahel, and it provides a significant share of the incomes of an additional 40 million people in these two regions.

The production of meat and milk typically comprises 5–15 percent of the GDP of countries in the Horn of Africa and the Sahel and up to 60 percent of agricultural GDP. Regional demand for milk and meat is expected to double by 2030. Although the number of livestock is increasing in the region and contributing substantially to agricultural GDP, the sector's contribution to human consumption is insufficient to meet growing demand for meat and milk because of low productivity and high demographic growth. Thus, there a trade deficit in livestock products, and imports of livestock and livestock products are expected to increase (de Haan *et al.*, 2016).

People in the GGW core area who raise livestock, whether in livestock-only grazing systems or mixed crop–livestock systems, are usually poor and highly dependent on the environment. They are also very vulnerable to shocks. In most cases, grazing systems are nomadic, transhumant or seasonally mobile, and this mobility is key to the people's resilience.

As part of the AAD project, FAO carried out socio-economic baseline assessments in six GGW countries. The findings of the study (Sacande *et al.*, 2018) highlight the importance of livestock as a source of financial capital and a contributor to the livelihoods of rural communities. Households almost always cited livestock grazing as one of the top two primary sources of income, in variable proportions with crop farming. In Widou, Senegal, for example, livestock grazing was the main source of income for 90 percent of households.

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BOX 5

HIDES, SKINS AND LEATHER: A KEY SECTOR IN NIGERIA

Farm animals constitute a traditional source of hides and skins in Nigeria, but they are typically reared for meat and milk, and hides and skins are mostly produced as byproducts. On the other hand, the international trade of skins, hides and leather is potentially far more profitable. Hides come from bovine animals, and skins are obtained from ovine and related animals (e.g. sheep and goats). Three major products are obtainable from these byproducts: dried or wet salted raw hides and skins; wet blue leathers; and tanned leathers. Hides, skins and leathers are economically important in many GGW countries. The Sudan and Nigeria are by far the biggest producers of skins and leathers from goats in sub-Saharan Africa, but production is also significant in Burkina Faso, Ethiopia, Mali and Niger.

In Nigeria, small-scale farmers commonly rear small ruminants as part of their integrated farming systems. Nigerian sheep and goat breeds have low genetic diversity, but they play a key role in the supply of animal protein for human nutrition and other products, including leather. The rearing of sheep and goats provides direct and indirect sources of livelihood and employment for more than 1 million people.

Nigerian tanneries process more than 45 million animal skins annually, about 30 percent of which are imported from neighbouring countries. Of these 45 million, 40 percent are collected during the short festival season of Muslim Sallah (Ed el Kabir). The leather products industry – comprising the production of raw materials (animals, hides and skins) through to the manufacturing of various finished leather products (e.g. shoes, handbags and upholstery) – has tremendous potential to generate foreign exchange and create employment, especially for women.

The Sokoto red goat (also known as the "chèvre rousse de Maradi" in Niger), which is wide spread in the Sokoto region of Nigeria and the Maradi of Niger, is particularly important in the leather industry. It is raised exclusively in sedentary livestock systems because it is poorly adapted to the hardship of the Sahelian climate and transhumant systems. The Sokoto red goat is a small animal (about 60 cm in height and 25 kg in weight). Milk and meat production is considerable, but the animal's real importance is in its leather, which is highly appreciated worldwide.

Skin and leather value chains are highly dependent on the state and productivity of agropastoral and agrosilvopastoral landscapes. One of the major constraints on the sector has been the challenge of feeding livestock year-round. Interventions to promote improved livestock grazing practices and increase fodder production – such as large-scale land restoration using edible grasses and other fodder species – could provide a major economic boost.

Sources: FAO (2015); USAID (2002).

Photo: ©FAO/Giulio Napolitano

A VILLAGE COMMUNITY MEMBER HARVESTING HAY IN DOUMBA RESTORED PLOT, AAD PROJECT, NIGER.

Fodder

FODDER IS PRODUCED IN ALL THE AAD INTERVENTION AREAS IN AFRICA, WHERE LIVESTOCK GRAZING IS OF GREAT ECONOMIC IMPORTANCE.

AAD is promoting this value chain by helping communities restore degraded pastoral lands, providing high-quality seeds and seedlings of well-adapted fodder tree, shrub and grass species, and assisting in large-scale soil preparation. The AAD approach has obtained the buy-in and contributions of agropastoralists and pastoralists, in places where it has never previously occurred. Implemented at scale, this restoration method brings multiple benefits to communities, providing more feed for livestock and arable recovered land for farmers and thus reducing conflicts over natural resources.

In Burkina Faso, more than 480 kg of seeds of herbaceous fodder species (*Andropogon gayanus, A. pseudapricus, Eragrostis tremula, Panicum laetum, Pennisetum pedicellatum and Senna tora*) and 12 multifunctional tree species were planted in 2017 to restore 2 754 hectares of degraded land across 45 sites. A year after planting, an average of 1.2 tonnes of fodder grasses was harvested per hectare from restored plots. More than 32 tonnes of fodder were harvested on just 14 of the sites, generating revenues of XOF 1.6 million (USD 3 000), equivalent to additional income of XOF 80 000 (USD 150) for each of the 20 participating farmers. This is comparable with traditional annual yields of millet and maize (0.53–0.85 tonnes per hectare and 1.22–1.69 tonnes per hectare, respectively) in Burkina Faso and Niger (FAO, 2016).

Similar activities were carried out in Niger. A project beneficiary in Baguira in the municipality of Tera, for example, reported that he was able to feed 22 cows, 15 sheep, 106 goats and 2 donkeys all year and still sell surplus fodder, earning himself XOF 100 000 (about USD 190) over the year.

RESTORATION

5-10 kg

OF SEEDS ARE TO RESTORE ONE HECTARE OF DEGRADED LAND USING MIXED GRASS FODDER SPECIES

HARVESTING AND PROCESSING

1.2 tonnes

ON AVERAGE, OF FODDER FROM GRASSES WAS HARVESTED PER HECTARE AFTER THE FIRST YEAR ON RESTORED SITES IN BURKINA FASO, IN 2017

MARKETING

USD 150-190

WAS THE AVERAGE ADDITIONAL INCOME REPORTED BY AAD-PARTICIPATING FARMERS FROM THE SALE OF SURPLUS FODDER IN NIGER AND BURKINA FASO

Honey


1


2

Honey is the "natural sweet substance produced by honey bees from the nectar of plants (...) which the bees collect, transform (...) deposit, dehydrate, store and leave in the honey comb to ripen and mature" (FAO, 2001).

Honey is widely known and consumed throughout Africa. The most widely used honeybee species is *Apis mellifera*, which is indigenous to Africa. Its primary natural ranges in Africa are savanna and semiarid lands, including in the GGW core area.

BEEKEEPING IS AN INTEGRAL PART OF SUSTAINABLE NATURAL RESOURCE MANAGEMENT in the Sahel, where it has been practised since ancient times using traditional hives made of mud or woven grass.

Honey producers must ensure that their bees have access to flowers, water and shelter/shade, and beekeeping therefore provides an incentive for farmers to protect and manage flowering trees, grasses and shrubs. This is a key reason why AAD is promoting beekeeping in communities: because beekeeping is highly valued, it helps ensure the appropriate management of restoration sites, the sustainable management of village woodlots, and actions to prevent forest fires. Beekeeping is feasible in arid and otherwise marginal environments when drought-resistant, nectar-bearing trees are able to reach deep water tables (Bradbear, 2004). Many flowering dryland trees are sources of nectar and pollen for bees and can be used in restoration. AAD has selected species with honey-producing potential for use in large-scale restoration. Table 2 lists some of the key melliferous tree and shrub species used by the project; other important species are acacias (including *A. senegal* and *A. seyal* – Table 3) and *Balanites aegyptiaca* (Table 4).

Honey production has many advantages. For example:

- Honey contributes to nutrition and food security, and its production is an excellent way by which rural communities can generate and diversify incomes without harming ecosystems. Few microorganisms grow in honey; thus, sealed honey does not spoil and can be conserved for long periods.

Other bee products, such as wax, pollen, propolis, royal jelly and venom, can also be sold for their medicinal and traditional uses.

→ Beekeeping benefits both biodiversity and agriculture by enhancing the pollination of wild and cultivated plants. This increases crop yields and thereby contributes to food security. Because bees and other pollinators are increasingly under threat from human activities, the United Nations designated 20 May as World Bee Day to raise awareness of the important roles played by bees in food security and biodiversity.

→ Beekeeping and honey can be produced in many places (e.g. cultivated land, forests, grasslands and wastelands) using minimal space, which reduces the risk of land-related conflict.

Africa produced 188 966 tonnes of honey in 2016. Ethiopia is the continent's largest honey producer, at 47 700 tonnes (about one-quarter of Africa's total production) in 2016 (FAO, 2018). Like many other African countries, however, Ethiopia falls far short of its full potential in honey production in terms of both product quality and yield, hindered by the type of hives used and poor processing and storage methods and facilities. A modern beehive produces up to 23 kg of honey per year, compared with 6 kg produced by traditional beehives. Beekeeping accounts for 1.3 percent of Ethiopia's agricultural GDP, and one in ten rural households keeps honeybees.

THE HONEY VALUE CHAIN

1. Installation of new beehives in by village community members during their training in Burkina Faso. ©FAO/Moctar Sacande
2. Training of beekeepers from AAD intervention areas in Soum and Seno provinces, Burkina Faso. ©FAO/Moctar Sacande
3. Honey stored and bottled by a producer organization based in Kaya, Burkina Faso. ©FAO/Marc Parfondry
4. Honey produced from shelter belt plantations in the GGW area by the Forestry Research Institute, an implementing AAD partner in Nigeria. ©FAO/Moctar Sacande


©FAO/Simon Maina

TABLE 2. Key plant species supporting beekeeping and honey production

SPECIES	DISTRIBUTION	DESCRIPTION	MAIN USES
Pterocarpus erinaceus Leguminosae/ Fabaceae	West Africa, from Senegal to Cameroon and the Democratic Republic of the Congo	Tree up to 12 m	• Flowers from August, making it an early source of pollen and shade for bees • Hard timber used to make furniture and other items; also sold as a dye for its red colour • Resin used in medicine
Ziziphus mauritiana Rhamnaceae	Widespread in savannas and cultivated land in eastern, southern and western Africa, the Mediterranean, and the world's tropical areas. Invasive in some areas of the Pacific	Spiny shrub or small tree 3–5 m high	• Mostly used for its fruit, which is consumed in juice or cakes. Ziziphus honey is highly valued • Provides shade and makes good live fencing • Hard timber used to make tools
Dichrostachys cinerea Leguminosae/ Fabaceae	Widespread in tropical Africa as well as the Arabian Peninsula, tropical Asia and Australia	Shrub or small tree, with short lateral shoots appearing as thorns	• Wood used for tools and charcoal • Bark used for its fibre • Roots and leaves used in medicine
Dombeya quinqueseta Malvaceae	Across western, central and eastern Africa, from Senegal to Ethiopia and the Democratic Republic of the Congo	Tree or shrub up to 4 m high	• Bark fibre used for rope-making
Acacia mellifera (Black thorn) Leguminosae/ Fabaceae	Found in the arid and semiarid areas of Africa and the Arabian Peninsula	Shrub or small tree growing to 9 m in height Has an extensive root system that spreads out to large volumes of soil, aiding survival in dry areas	• Flowers attractive to bees, which produce a high-quality honey (hence the name mellifera) • Leaves, pods and young shoots are nutritious and used as fodder by livestock and wild animals • Timber hard and used for construction and fencing

Source: Sacande, Sanogo and Beentje (2016).

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Honey

HONEY IS ONE OF THE MAIN NTFPs IN THE GGW CORE AREA, AND AAD PROMOTES BEEKEEPING AND HONEY PRODUCTION IN ALL ITS INTERVENTION AREAS.

The project is supporting communities to carrying out large-scale land restoration using carefully selected plants suitable for honey production. In the GGW core area, at least 12 major flowering tree species with potential to support honey production, such as acacias (*Acacia mellifera, A. nilotica*, *A. senegal, A. seyal* and *A. tortilis)*, *Balanites aegyptiaca* and *Ziziphus mauritiana*, can be used in restoration. In Burkina Faso, honey produced in AAD intervention areas is generating extra income of USD 73 per farmer per year.

AAD is helping in the development of honey-producing enterprises and producer organizations, providing farmers with equipment such as modern hives, tools, protective clothing, honey extractors and storage tanks. Farmers are also receiving training in beekeeping and honey production to help increase honey yields and manage and protect the flowering vegetation on which the value chain relies.

© FAO/Moctar Sacande

RESTORATION

12 native tree species
AT LEAST, ARE BOTH MAJOR FLOWERING HONEY PLANTS AND CAN BE USED IN RESTORAATION IN THE GGW CORE AREA

HARVESTING AND PROCESSING

23 kg of honey
CAN BE PRODUCED BY A MODERN BEEHIVE IN ETHIOPIA, COMPARED WITH 6 KG PRODUCED BY TRADITIONAL BEEHIVES

MARKETING

USD 73
WAS THE AVERAGE ADDITIONAL ANNUAL INCOME REPORTED BY HONEY PRODUCING FARMERS IN AAD INTERVENTION AREAS IN BURKINA FASO

Gum arabic

1

2

Gum arabic (or acacia gum) is a hardened edible plant exudate obtained from the stems of *Acacia senegal* and *A. seyal* trees (Table 3). *A. senegal* produces about 90 percent of the gum arabic sold commercially and produces superior-quality "hard" gum. Gum from *A. seyal*, also called gum tahla, is more friable.

GUM ARABIC IS A COMPLEX BRANCHED POLYSACCHARIDE composed of galactopyranose units and small quantities of glycoprotein, which give it its emulsifying properties. It is used widely in the food industry as a natural food additive[1]. Gum arabic is a common ingredient in the soft drinks industry, where (in essence) it binds the sugar to the drink, and it is an important component of chocolates and sweets, such as the Cuberdon, a famous Belgian candy.

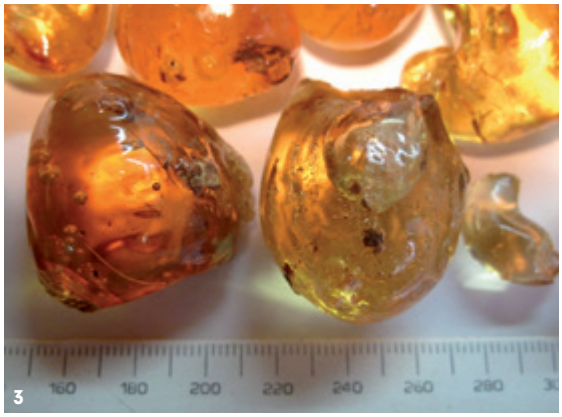
Gum arabic is the most commercially important plant based gum worldwide. Plants (either wild or domesticated) are the only sources of the product, which has never been synthesized successfully because of its complex composition and multiple biochemical properties. Women dominate the gum arabic sector, underlining the value of this product as an entry point in efforts to improve the livelihoods of women.

Acacia forests are not only important for producing gum arabic and other livelihood products: they also sequester huge amounts of carbon and provide important ecosystem services, such as water conservation, erosion control and soil improvement, and they

TABLE 3. Key plant species for gum arabic production

SPECIES	DISTRIBUTION	DESCRIPTION	MAIN USES
Acacia senegal Leguminosae/ Fabaceae	Native to semiarid regions of sub-Saharan Africa, from Senegal to Mozambique	Small, thorny deciduous tree or shrub up to 6 m in height	• Gum arabic, fodder (leaves and pods), wood, fibre for rope-making (bark), honey and medicines (gum)
Acacia seyal Leguminosae/ Fabaceae	From Egypt to Mozambique and west Senegal	Thorny tree up to 10 m in height	• Gum arabic, medicines (bark and gum) honey and fodder

Source: Sacande, Sanogo and Beentje (2016).



also produce feed for livestock. Their conservation, sustainable management and restoration, therefore, are important climate-change adaptation and mitigation strategies.

In many places, capacity development and improved local-level coordination are needed if communities are to obtain maximum benefit from gum arabic production. The main challenges in production and commercialization are the unsustainable management of resources; pricing; and quality. In most producing countries, the lack of value adding in the sector severely limits the economic returns that countries and local communities obtain from the gum arabic sector and from other gum and resin products. This particularly affects women, who are the main collectors and local processors of gum arabic. Thus, increasing capacity to improve resource management, product quality and marketing is an urgent need.

Gum arabic can be harvested 6–8 years after tree planting and two weeks after the first scarification to initiate bleeding. A single tree can produce 100–1 000 g of gum per year, although individual trees in the Sudan have been observed to produce up to 10 kg per year. It is important to use appropriate techniques and equipment to harvest gum from acacia trees to avoid killing or damaging them and to maximize the quality of the gum. Harvested gum must be cleaned, dried and sorted (Poda *et al.*, 2009).

African countries export 100 000 tonnes of gum arabic annually, mostly to Europe and the United States of America, and demand is increasing. The major production areas of gum arabic in drylands correspond with the GGW core area: it is a very valuable resource for the rural communities there. More than 15 countries in sub-Saharan Africa produce gum arabic (NGARA, 2017), both for export and local use.

THE GUM ARABIC VALUE CHAIN

1. *Acacia senegal* is one of the most important species used by the AAD project to restore degraded land. Djibo, Burkina Faso.
   ©FAO/Giulio Napolitano
2. Gum arabic being tapped by scoring the bark of an acacia tree, Thikene Ndiaye, Senegal.
   ©FAO/Seylou Diallo
3. Dried gum arabic.
   ©FAO/Moctar Sacande
4. Gum Arabic is one of the main ingredients in the original recipe of the famous Belgian cuberdon.
   ©FAO/Marc Parfondry

[1] Gum arabic is classified under code 414 in the International Numbering System for Food Additives and under E414 in the European Union's system (FAO, 2017).

BOX 6

MAJOR GUMS AND RESINS PRODUCED IN THE GREAT GREEN WALL CORE AREA

With adequate investment, the production of gums and resins offers a great opportunity for economic development in local communities while encouraging the protection and management of the trees they depend on. In the Great Green Wall (GGW) core area, 35 species have been identified as potential producers of commercial gums and resins. These products include the following:

- **Gum arabic**, harvested from the stems of *Acacia senegal* and *A. seyal* trees, is the most commercially important gum in the GGW core area. It is used widely in the food industry as a stabilizer, and it is produced in more than 15 countries in sub-Saharan Africa.

- **Other gums** produced in the GGW core area and used in the pharmaceutical and food industries include gum polyacantha, harvested from *Acacia polyacantha*, gum karaya, obtained from *Sterculia* species (with *S. setigera* the main source in western, central and eastern Africa), and gums harvested from *Combretum* and *Albizzia* species.

- **Frankincense** is an aromatic resin that oozes naturally or is tapped from *Boswellia frereana*, *B. papyfera*, *B. neglecta* and *B. sacra*. It is produced mainly in Somalia and to a lesser extent in Ethiopia and the Sudan.

- **Myrrh**, which is derived from *Commiphora myrrha*, is used as a perfume, incense and medicine. It is produced in countries in the Horn of Africa.

- **Opoponax** is produced from *Commiphora guidotti* (scented myrrh) and *C. holtziana* (medicinal myrrh). It is a major export item from Somalia.

Sources: NGARA (2017).

Photos (from left to right): ©Alland & Robert; ©FAO/Giulio Napolitano

Gum arabic

GUM ARABIC HAS MANY USES OUTSIDE THE FOOD INDUSTRY, INCLUDING TRADITIONALLY (E.G. IN INKS, PAINTS, GLUES AND TRADITIONAL MEDICINES) AND IN THE PHARMACEUTICAL INDUSTRY (E.G. IN PILLS, SYRUPS AND OTHER MEDICINES) AND OTHER INDUSTRIES (E.G. IN COSMETICS, GLUES, TEXTILES AND PESTICIDES).

Production is growing, and the global market is expected to increase by about 8 percent per year in the period 2017–2021 (Technavio, 2017). Africa supplies over 98 percent of the world's gum arabic demand, with Chad, Nigeria and the Sudan the main exporters. Gum arabic exports make significant contributions to the GDPs of some countries: Chad, for example, exported 30 000 tonnes of gum arabic in 2013, comprising 7 percent of its GDP (Baguirmi and Adoum, 2014).

Communities in the GGW core area in Burkina Faso, Mali and Niger have identified *A. senegal* as their preferred species for restoration, and this species comprises 30 percent of all seedlings planted in those areas under the AAD (Sacande and Berrahmouni, 2016).

Box 6 describes some other gums and resins produced by African dryland tree species used in the pharmaceutical, food, cosmetics and perfume industries.

AAD is supporting gum arabic value chains by:

- → **Helping** communities in the large-scale restoration of degraded landscapes, including through the use of carefully selected high-quality seeds of gum-producing species.
- → **Providing** training on value adding, including improved techniques for harvesting, grading and cleaning to meet market requirements (e.g. in raw, granular or powder form).
- → **Supporting** the Network for Natural Gums and Resins in Africa (NGARA), including through the organization of workshops on gum arabic and other NTFPs and the development of NGARA's framework of priorities for 2017–2030.

RESTORATION

30% of all seedlings
PLANTED FOR RESTORATION IN THE GGW CORE AREA IN BURKINA FASO, MALI AND NIGER WERE *ACACIA SENEGAL* TREES, AS CHOSEN BY LOCAL COMMUNITIES

HARVESTING AND PROCESSING

100–1 000 g of gum
CAN BE PRODUCED BY A SINGLE TREE EACH YEAR. IN THE SUDAN, MAXIMUM YIELDS OF 10 KG PER TREE HAVE BEEN RECORDED

MARKETING

8.26% per year
IS THE EXPECTED GROWTH RATE OF THE GLOBAL GUM MARKET BETWEEN 2017 AND 2021

Balanites oil


1


2

***Balanites aegyptiaca* (Table 4) is a high-value multipurpose tree and also one of the most common species in the northern Sahel. It has considerable potential to improve soil quality by increasing nutrient levels. It is also very tolerant of drought and overgrazing, and it can survive up to two years without rainfall and live for up to 100 years.**

BALANITES OIL IS OBTAINED FROM THE KERNELS OF THE *BALANITES AEGYPTIACA* FRUIT, WHICH ARE ALSO CALLED "DESERT DATES". The oil is edible and also used in cosmetics, and it can be mixed with other oils to produce soap. The oil-extraction process produces a protein-rich oilcake suitable as animal feed.

Balanites trees begin flowering and setting fruit after 5–7 years; maximum seed production occurs when the trees are 15–25 years old (Chothani and Vaghasiya, 2011). The balanites fruit is harvested from November to February; a single tree can produce up to 100 kg of fruit per year.

The processing of balanites oil is labour intensive. The nuts are removed by pulping the fruit, and dried. They are then crushed to extract the kernels (or almonds). One of the major challenges constraining oil production is the difficulty in cracking the kernels, which are very hard.

TABLE 4. ***Balanites aegyptiaca***

SPECIES	DISTRIBUTION	DESCRIPTION	MAIN USES
Balanites aegyptiaca Zygophyllaceae	Believed to be indigenous to all drylands south of the Sahara, extending southward to Malawi in the Rift Valley and to the Arabian Peninsula	Spiny shrub or tree up to 10 m in height	• Used in agroforestry systems (and is nitrogen-fixing) • Leaves are used as fodder • The fruit, which is edible, is marketed. Oil can be extracted from its seeds • All parts of the tree are used widely in traditional medicines

Source: Chothani and Vaghasiya (2011).

3


4

The cracked kernels are sorted and cleaned manually and then cold-pressed into oil. An estimated 30–40 percent of the oil content of balanites kernels can be extracted.

Women's producer organizations are often involved in the production of balanites oil through informal networks of collectors and producers. The oil is produced in all African dryland countries, from Chad to Senegal, and the local and international markets are growing. Prices can vary from USD 3.5 to USD 14 per litre in local markets but can reach USD 75 in international markets (as observed on the websites of online retailers). Balanites oil therefore has tremendous potential to generate foreign exchange and create employment, especially for women.

Balanites oil has the following uses:

- **Traditional medicines.** The oil is known for its antiviral and antimicrobial properties and is used to treat tumours and wounds. It is also taken as a laxative and for treating haemorrhoids, stomach ache, jaundice, yellow fever, syphilis and epilepsy (Chothani and Vaghasiya, 2011).

- **Cosmetics.** The oil is used in skin treatments and is also commonly mixed with other oils in the manufacture of soap.

- **Food.** The oil's high smoke point makes it suitable for cooking, and it can also be eaten raw.

THE BALANITES OIL VALUE CHAIN

1. Fruit and leaves of *Balanites aegyptiaca.*
©FAO/Marc Parfondry

2. Balanites nuts being crushed to extract the almonds. The almonds will then be pressed to extract the oil.
©FAO/Moctar Sacande

3. Balanites almonds.
©FAO/Moctar Sacande

4. Balanites oil and soap produced by a women's producer organization in Kaya, Burkina Faso.
©FAO/Marc Parfondry


©FAO/Moctar Sacande

Balanites oil

BALANITES AEGYPTIACA, A MULTIPURPOSE TREE WITH GREAT POTENTIAL TO BE USED IN THE RESTORATION OF DEGRADED LAND

Balanites aegyptiaca is an important multipurpose tree, and its oil is an important product for generating income. Because of its adaptability and many benefits, it has been selected by AAD as a key species in large-scale restoration (Sacande, 2017).

AAD is supporting selected community enterprises – including women's and mixed-gender producer organizations – in Burkina Faso, Niger, Nigeria and Senegal. Among other things it is helping these enterprises set up facilities for oil processing and soap manufacture and providing training in market analysis, business planning and product marketing.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RESTORATION

2 years
IS THE PERIOD FOR WHICH A *BALANITES AEGYPTIACA* TREE CAN SURVIVE WITHOUT RAINFALL. THE TREE CAN LIVE UP TO 100 YEARS

HARVESTING AND PROCESSING

100 kg
OF FRUIT CAN BE HARVESTED FROM A TREE EACH YEAR. THE FRUIT IS HARVESTED FROM NOVEMBER TO FEBRUARY, ON TREES FROM 15 TO 25 YEARS OLD

MARKETING

14 USD
IS THE PRICE AT WHICH A LITRE OF OIL IS COMMONLY SOLD ON LOCAL MARKETS. IT CAN REACH 4-5 TIMES THIS PRICE ON INTERNATIONAL MARKETS

Seeds and seedlings for large-scale restoration

Tree, shrub and grass seeds and seedlings are the main planting materials used in landscape restoration in the GGW core area. Seeds can be sown directly at restoration sites or planted in nurseries to produce seedlings that are later planted in the field.

IN A RAPIDLY CHANGING CLIMATE, IT IS CRUCIAL THAT GENETICALLY DIVERSE SEEDS FOR RESILIENT LANDSCAPE RESTORATION ARE AVAILABLE in sufficient quantities and accompanied with knowledge about the conditions in which they will survive and thrive. Seed sourcing needs to be properly planned well ahead of the intended time of planting or seeding to ensure the identification and production of plant materials that are most suitable for the sites and changing climatic conditions and to meet restoration objectives (Bozzano *et al.*, 2014).

The average tree-planting density in forestry and agroforestry systems in the Sahel is 300–1 000 seedlings per hectare; combined fodder seeds are sown at a rate of 5–10 kg per hectare. Given that 166 million hectares are to be restored in the GGW (Berrahmouni et al., 2016), it is clear that, to reach this target through large-scale land preparation and enrichment planting (which are needed on most of this area, even though other approaches may also be used such as assisted natural regeneration), a tremendous quantity of woody and herbaceous seeds and seedlings is needed. The capacity of national forest seed centres to mobilize tree, shrub and grass seeds is low in the GGW countries – the average combined production of seeds in Burkina Faso, Ethiopia, Kenya, Mali, Niger and Senegal is estimated at 25 tonnes per year. There is, therefore, a very high unmet demand in the region for seeds and seedlings for restoration.

TREE SEED COLLECTION,
AAD PROJECT, TERA, NIGER
©FAO/Giulio Napolitano

Seeds and seedlings


1


2

THE SEEDS AND SEEDLINGS VALUE CHAIN

1. Seeds being collected from a Balanites tree, AAD project, Tera, Niger
©FAO/Giulio Napolitano

2. *Acacia nilotica* seeds collected through the AAD project.
©FAO/Moctar Sacande

3. Bags of restoration seeds of native species in the National forest seed center of Niger, supported by AAD.
©FAO/Giulio Napolitano

4. Community tree nursery for the Great Green Wall, AAD project, Koyli-Alpha, Senegal.
©NOOR/Benedicte Kurzen for FAO

The collection of high-quality seeds, and the production of high-quality seedlings, requires the use of appropriate techniques. With training, village technicians and other community members can earn significant sums from seed collection and seedling production. High-quality seeds and seedlings for restoration, therefore, are NTFPs with strong potential to generate income for rural communities.

The use of certification (such as the Organisation for Economic Co-operation and Development – OECD – Scheme for the Certification of Forest Reproductive Material) and other systems of product control can help ensure seed traceability and the adequate quality of materials. Two GGW countries – Burkina Faso and Kenya – are registered under the OECD Forestry Scheme, as of 2018.

Seedling production in nurseries requires good planning. Seedlings of fast-growing species such as acacias may be suitable for field planting 3–6 months after sowing; slower-growing species (such as *Balanites aegyptiaca*, *Tamarindus indica* and *Faidherbia albida*) may need 14–18 months in a nursery before out-planting (Sacande and Berrahmouni, 2016).


3


4

AAD is promoting the use of high-quality native forest and fodder seeds for restoration and ensuring that a wide range of useful plant species is available for use. To do so, it is helping develop the capacities of village technicians in seed collection and nursery techniques.

AAD is assisting communities to generate income through the sale of high-quality seeds and seedlings for use in the propagation of economically viable, locally adapted and biodiverse plant materials. In Burkina Faso, prices of forest seeds vary from USD 6 to USD 215 per kg, with most species sold for USD 50–60 per kg.

In Burkina Faso in 2015 and Niger in 2017, 100 small-scale farmers were trained by AAD in forest and fodder seed collection and in seedling propagation techniques in village nurseries. In Tera, Niger, village technicians involved in AAD created a union to work in and promote the development of a restoration seeds sector, with the aim of generating income and addressing the huge demand for high-quality seeds of native herbaceous fodder and woody species. They collected over 14 000 kg of quality seeds of 17 species that were planted in AAD prepared plots in 2018.

The project is maintaining a species database to enable the traceability of plant genetic resources and facilitate monitoring and reporting, and for other potential future uses.

HARVESTING AND PROCESSING

3–6 months
ARE NEEDED FOR THE NURSERY PRODUCTION OF FAST GROWING SPECIES, WHILE 14-18 MONTHS ARE NEEDED FOR SLOWER GROWING SPECIES

MARKETING

USD 50–60
PER KG IS THE PRICE AT WHICH MOST FOREST SEEDS ARE SOLD IN BURKINA FASO. PRICES VARY FROM 6 TO 215 USD PER KG

TABLE 5. Important native species used by AAD for large scale restoration in the Great Green Wall

SPECIES (TAXA)	LIFE FORM	SPECIES (TAXA)	LIFE FORM
Alysicarpus ovalifolius	grass	*Acacia nilotica*	woody
Andropogon gayanus	grass	*Acacia senegal*	woody
Andropogon pseudapricus	grass	*Acacia seyal*	woody
Aristida mustabilis	grass	*Acacia tortilis*	woody
Brachiaria ramosa	grass	*Adansonia digitata*	woody
Cenchrus biflorus	grass	*Adenum obesum*	woody
Chloris pilosa	grass	*Balanites aegyptiaca*	woody
Chrozophoro senegalensis	grass	*Bauhinia rufescens*	woody
Crotalaria macrocalyx	grass	*Combretum glutinosum*	woody
Cymbopogon giganteus	grass	*Combretum micranthum*	woody
Cymbopogon schoenamthus	grass	*Dalbergia melanoxylon*	woody
Dactyloctenium aegyptium	grass	*Faidherbia albida*	woody
Digitaria exilis	grass	*Grewia bicolor*	woody
Eragrostis tremula	grass	*Guiera senegalensis*	woody
Leptadenia hastate	grass	*Lannea microcarpa*	woody
Panicum laetum	grass	*Parkia biglobosa*	woody
Pennisetum pedicellatum	grass	*Piliostigma reticulatum*	woody
Schoenefeldia gracilis	grass	*Prosopis africana*	woody
Senna occidentalis	grass	*Pterocarpus lucens*	woody
Senna tora	grass	*Sclerocarya birrea*	woody
Stylosantes amata	grass	*Sterculia setigera*	woody
Waltheria indica	grass	*Tamarindus indica*	woody
Zornia glochidiata	grass	*Ziziphus mauritiana*	woody

Conclusions

Trees and forest areas provide a wealth of products that are essential for the people who live around them. Improved livelihoods and income generation opportunities from these products are necessary for local stakeholders to participate and allocate sufficient resources in restoration and sustainable management of degraded land. To be successful, Action Against Desertification is investing in entire market value chains, from seed to end-product, to ensure that communities in the GGW core area reap economic benefits from their involvement in the project. In describing five key NTFP sectors, this publication shows that, with sufficient support and investment, rural communities in the GGW core area have the potential to earn a decent income from land restoration.

The NTFPs described herein are needed and used locally, but they also have significant national and international market value. Generating income and providing other benefits is crucial for ensuring the commitment of local communities to restoration. When adequate support is lacking, some external operators take unscrupulous advantage of rural communities. Armed with relatively basic technical training, equipment and market knowledge, however, communities can increase the benefits they obtain by processing harvested raw materials into high-value end-products.

AAD is helping farmers and communities develop their capacity to restore and sustainably manage degraded land. Parallel to its large-scale restoration activities, AAD will continue providing technical support and strengthening the technical and organizational capacities of local communities, including community-based enterprises and producer organizations, to develop market value chains for the key products presented in this publication.

Developed at scale, the successful AAD restoration approach brings multiple benefits to dryland communities – turning the perceived curse of land degradation into a great opportunity. This integrated approach restores the productivity of degraded lands, thereby increasing biomass production, producing food and fodder, growing farmer incomes, and reducing conflicts over natural resources. Nevertheless, a great deal of work is still needed to achieve the objectives of the GGWSSI – in which ecology meets economy for the great benefit of rural communities and to alleviate the worst impacts of climate change.

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Key messages of Action Against Desertification:

LAND DEGRADATION IS NOT YET IRREVERSIBLE

10 MILLION HECTARES IN NEED OF RESTORATION EVERY YEAR FOR AFRICA'S GREAT GREEN WALL

LARGE-SCALE RESTORATION FOR SMALL-SCALE FARMING IS CRUCIAL TO STOP LAND DEGRADATION

LAND DEGRADATION CAN'T BE TACKLED WITHOUT UNLEASHING THE ECONOMIC POTENTIAL OF AFRICA'S DRYLANDS

INNOVATIVE MONITORING & EVALUATION ARE KEY TO ASSESSING PROGRESS TOWARDS ZERO LAND DEGRADATION

ACTION AGAINST DESERTIFICATION is an initiative of the African, Caribbean and Pacific Group of States (ACP) in support of the Great Green Wall for the Sahara and the Sahel Initiative and national United Nations Convention to Combat Desertification action plans. Action Against Desertification promotes sustainable land management and the restoration of degraded land in Africa, the Caribbean and the Pacific. It is implemented by FAO and partners with funding from the European Union in the framework of the Tenth European Development Fund.

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