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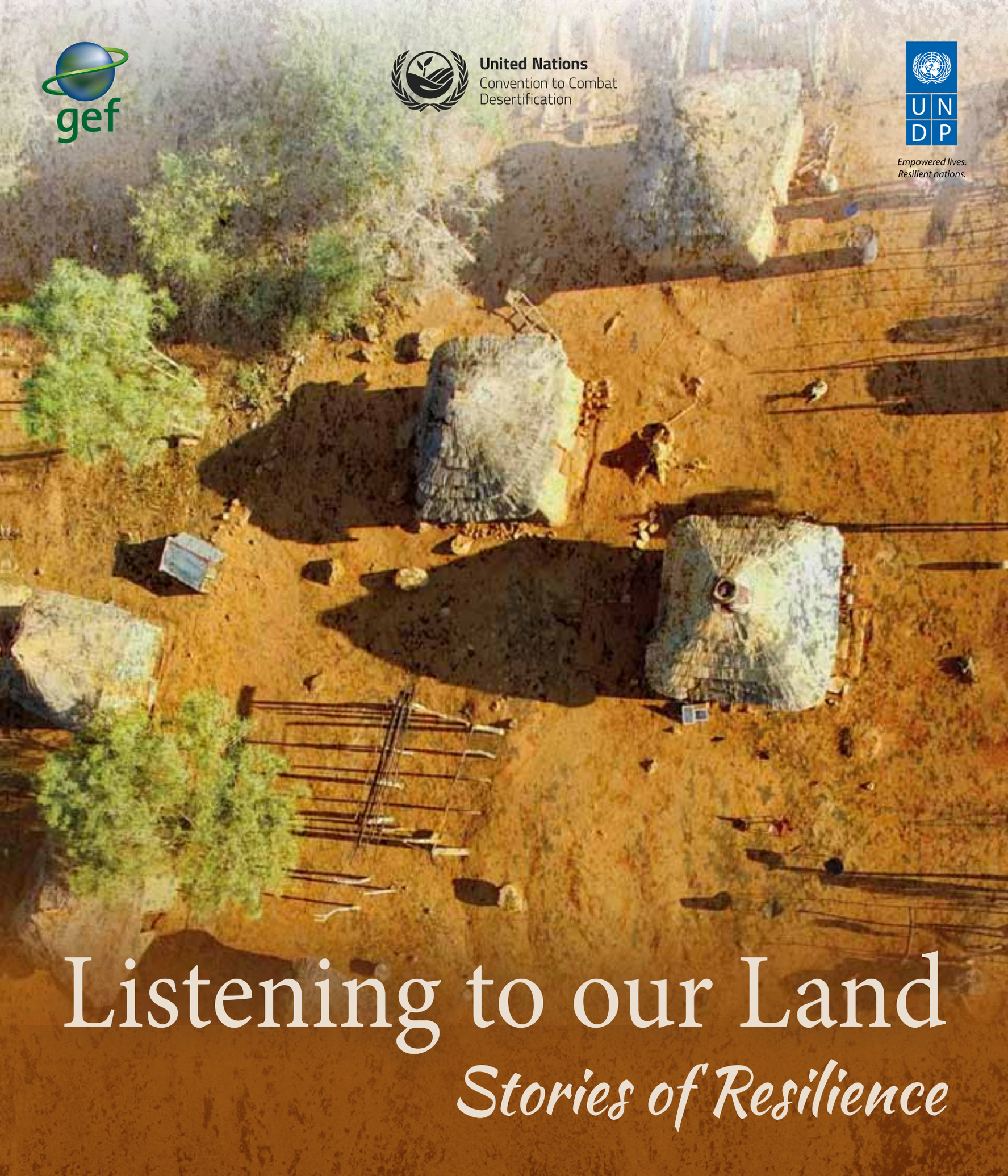

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Stories of Resilience

UNDP partners with people at all levels of society to help build nations that can withstand crisis, and drive and sustain the kind of growth that improves the quality of life for everyone. On the ground in more than 170 countries and territories, we offer global perspective and local insight to help empower lives and build resilient nations. www.undp.org

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Resilient nations.

The Global Environment Facility (GEF) was established on the eve of the 1992 Rio Earth Summit to help tackle our planet's most pressing environmental problems. Since then, the GEF has provided over $17 billion in grants and mobilized an additional $88 billion in financing for more than 4000 projects in 170 countries. Today, the GEF is an international partnership of 183 countries, international institutions, civil society organizations and the private sector that addresses global environmental issues. www.thegef.org

United Nations
Convention to Combat Desertification

The United Nations Convention to Combat Desertification (UNCCD) is the only legally binding international agreement on land issues. The Convention promotes good land stewardship. Its 196 Parties aim, through partnerships, to implement the Convention and achieve Sustainable Development Goals. The end goal is to protect our land from over-use and drought, so it can continue to provide us all with food, water and energy. By sustainably managing land and striving to achieve land degradation neutrality, now and in the future, we will reduce the impacts of climate change, avoid conflict over natural resources and help communities thrive. www2.unccd.int

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Foreword

Dr Naoko Ishii
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Achim Steiner
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Monique Barbut
(Executive Secretary, UNCCD)

Productive land is a critical natural asset for rural communities in developing nations, providing them with a wide range of ecosystem resources, such as water, fertile soils, plant and genetic diversity – on which they depend daily for survival. For many communities, the land is also an integral part of their cultural identity, helping to maintain social cohesion and stability, in addition to building resilience to socio-ecological shocks and risks such as those caused by climate change. But land is a vulnerable resource that must be managed and restored to ensure a sustainable future.

Globally, land degradation adversely affects approximately two billion hectares of land – about one quarter of all landscapes that are under human use. The deterioration of soil fertility, loss of forest cover, and erosion of rangelands causes biodiversity loss and compromises the flow of ecosystem services that enable food production and support the livelihoods of millions of people. If current trends in land degradation are not reversed, an estimated 135 million people may be displaced by 2045 because of desertification, with cascading social, economic, and environmental consequences.

The scale of the problem is immense, but so is our determination and commitment to address it. We believe that the tools we have at our disposal for addressing land degradation are better now than ever before – the stories in this book are evidence of that.

The Global Environment Facility (GEF) is a financial mechanism for implementation of the UN Convention to Combat Desertification (UNCCD). Since 2006, the GEF has invested more than US$876 million in over 190 programmes and projects that encourage Sustainable Land Management (SLM) as a comprehensive and socially-inclusive way to improve land stewardship in support of achieving multiple goals of the 2030 Agenda for Sustainable Development. In particular, SDG target 15.3, to combat desertification and restore degraded land and soil, provides the core vehicle for this effort. As an implementing agency of the GEF, and as a key partner for

the UNCCD, UNDP currently provides support to implement 85 SLM projects in 53 countries, with a total resource envelope of about US$357 million and leveraging co-financing in the order of US$1.38 billion. This work is complemented by local and community-led efforts, supported by the UNDP-managed Equator Initiative and the GEF Small Grants Programme (SGP).

This publication tells stories of people's work on the land. Through descriptions of their relationship with their land and their efforts to improve its quality through sustainable land management practices, this book highlights the impacts of SLM projects supported by UNDP and funded by the GEF in eight selected countries. Each story has been chosen to demonstrate the effectiveness of a particular approach to SLM, reflected through the personal perspectives of project beneficiaries. These accounts present evidence that investing in improved land stewardship is an effective tool for restoring and maintaining productivity and resilience of the land, strengthening adaptation to climate change, reducing conflict over natural resources, and helping communities thrive.

These stories also show that SLM ensures that meeting future needs for fuel, food and fibre is possible without degrading the finite land resource base. This is the concept of Land Degradation Neutrality, to which parties to the UNCCD committed in 2016. UNDP has recently formed a partnership with the Global Mechanism of the UNCCD, to provide technical support for reducing or reversing land degradation through the newly established Land Degradation Neutrality Fund.

UNDP and the GEF are fully committed to continue the collaboration with all our partners to combat desertification, restore degraded land and soil, and strive to achieve a land degradation-neutral world.

Introduction

Land: our home, our future

Land degradation: global trends

- During the last 40 years, nearly one third of the world's fertile topsoil has been lost to erosion, and top soil loss continues at a rate of more than 10 million hectares per year
- Up to 40 percent of the world's agricultural land is seriously degraded
- Two thirds of land in Africa is impacted by land degradation (affecting at least 485 million people, or 65% of the population of the continent)
- Globally, up to 5% of potential agricultural gross domestic product (GDP) is being lost due to land degradation

Sources: www.thegef.org; www2.unccd.int

Since the earliest times, people have depended on land, and the resources it provides, to meet their basic needs and support productive and peaceful lives. In turn, human activities have played an integral part in shaping landscapes and ecosystems – even some landscapes considered wild and 'pristine' bear hidden evidence of past human settlement or use, such as ancient ruins, stone tools, shards of pottery, and iron-smelting sites.

In the modern context, land resources are the basis of production activities that contribute to food security, provide employment, and shape the development path of a country. People are potent agents of change, and their development choices and land-use practices inevitably impact, to some extent or another, on biodiversity and the capacity of ecosystems to provide the goods and services on which a sustainable future depends.

Today, the impact of human activities on the Earth's ecosystems is all too evident. Burgeoning population growth, over-consumption, intensive agricultural practices, the use of damaging extractive technologies, growing conflict over rights to land, forced migration of people, and increasingly unpredictable and extreme climatic patterns, are pushing the planet to its limits, causing land degradation on a vast scale.

Land degradation: a barrier to sustainable development

Land degradation now affects about one quarter of the world's land area, with direct impacts on the health, well-being and livelihoods of an estimated 1.5 billion people – many of whom are rural, poor and directly dependent on nature to meet their daily subsistence and livelihood needs. Land degradation also leads to loss of biological diversity, which, itself, holds enormous value for all societies.

Historically, many rural communities have a deep connection with their land, and have evolved traditional systems of land stewardship that are sensitive to the environment. But, balancing consumption of natural resources with the capacity of the Earth to provide them, is growing increasingly difficult –

especially as changing lifestyles, altered market forces, and pervasive poverty drives people to adopt coping responses that cause biodiversity loss and damage to ecosystems, and deplete the productive capacity of land.

Land degradation is a barrier to sustainable development that destabilizes communities by causing food shortages and social insecurity, making people vulnerable to environmental and economic shocks and disturbances, including those caused by climate change. Land degradation is also a driver of forced migration, when people abandon lands that have become unproductive. In turn, it is worsened by large-scale movement and re-settlement of people linked to natural and social disasters, such as famine, floods and civil war.

Society can choose how to respond to these challenges.

Finding practical solutions

Currently, the global cost of land degradation reaches about US$490 billion per year – much higher than the cost of action to prevent it. Despite concerted efforts by the international community and national governments, degradation of the world's ecosystems continues apace and there is an urgent need to scale-up corrective action and make it more effective.

For many countries, the challenge of preventing and reducing land degradation comes down to a trade-off between meeting people's immediate needs (or the country's short term goals for economic growth), and investing in long-term sustainability (of both the environment and social well-being). Sustainable Land Management (SLM) offers a comprehensive approach to the management and governance of land resources that makes significant and lasting differences in the near future and over the long term. SLM provides a diversity of practical tools for managing soil, water, vegetation and animal resources in ways that are ecologically sound, socially and culturally sensitive, and cost-effective. It also promotes a land stewardship mindset that aims to integrate people's co-existence with nature over the long term, so that the provisioning, regulating, cultural and supporting services of ecosystems are ensured.

Impacts on People

- About 40% of the world's degraded lands are found in areas with the highest incidence of poverty
- Many of the world's 836 million people living in extreme poverty depend directly on land and its resources for food, water, fuel, shelter and reduced vulnerability to climate change
- Over 250 million people are directly affected by desertification and another one billion are at risk
- An estimated 135 million people may be displaced by 2045 as a result of desertification if current trends in land degradation are not halted and reversed

Sources: www2.unccd.int; www.undp.org (various publications)

In most developing countries, SLM opens up multiple opportunities, both for restoring health to the environment and bolstering the livelihoods and quality of life of the people who depend on it. SLM enables farmers to enhance the productivity of their land and maximise yields, without degrading land and water resources, or causing negative downstream impacts. It also ensures improved management of agro-ecosystem services across production systems, reduces pressure on land resources, and helps improve and sustain economic productivity. Many countries are willing and ready to adopt SLM approaches, but face economic, institutional or other kinds of barriers to doing so, and lack the knowledge and technological innovations to overcome them.

UNDPs support for Sustainable Land Management

Promoting SLM is a key strategy identified in UNDPs Biodiversity and Ecosystems Global Framework (2012 -2020), which guides its work to harness the potential of well-managed ecosystems to support sustainable development. Under Signature Programme 1, UNDP is committed to stepping-up efforts to integrate sustainable ecosystem management into development planning and production activities, in order to maintain ecosystem services, safeguard biodiversity and sustain societies. As part of this process, UNDP, in partnership with the GEF, helps countries to implement the UN Convention to Combat Desertification (UNCCD) to achieve simultaneous environmental and social benefits.

Listening to our Land: Stories of Resilience

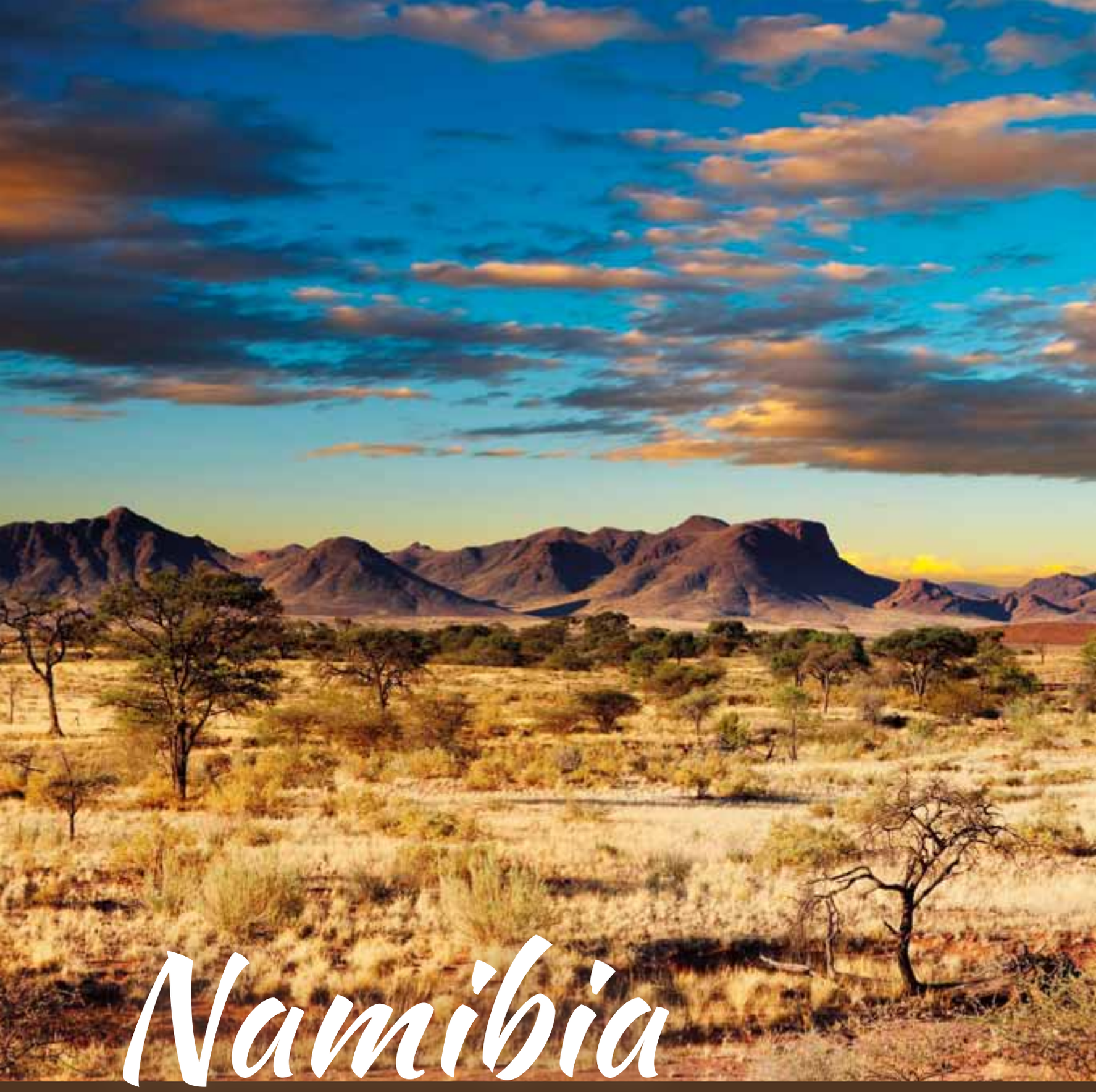
This publication features eight stories drawn from countries across the world, to demonstrate how addressing land degradation through SLM promotes the objectives of the UNCCD and contributes to achievement of multiple Sustainable Development Goals (SDGs). Through the experiences of people who earn their livelihoods by tending the land, the stories

reflect how SLM is improving living conditions of communities and strengthening environmental resilience. They also highlight the importance of improved land stewardship in striving to achieve land degradation neutrality (LDN), by restoring productivity and fertility to degraded land and preventing future degradation. This is the essence of target 15.3 under SDG 15 (Life on Land), which works towards meeting growing demands for food, water and other land resources, without depleting the systems that provide them.

The common thread running through these '*Stories of Resilience*' is that SLM has wide scope to provide multiple benefits that empower people and nations to restore life to their land, accelerate inclusive social transformation, reduce resource-use conflicts, and cope with the disturbances created by natural disasters and socio-political crises. These benefits are presented at the back of the book in 'balance sheets' that reflect how the featured projects contribute to achieving targets under SDG 15 and other SDGs, and build strong partnerships for attaining 'the Future we Want.'

> *"... Land needs to be remembered, needs to be listened to, needs to know we can still speak its language."*
>
> – ABORIGINAL ELDER, AUSTRALIA*

* Source: www.CreativeSpirits.info
Aboriginal culture - Land - Meaning of land to Aboriginal people, August 2017



Namibia

Beating the bush

In cattle country

Meet Jaqueline Tjaimi and Rinouzeu Karizembi, the only two women in the nine-member management committee of the African Wild Dog Conservancy, from the Otjozondjupa region of eastern Namibia. Like most people of the Herero tribe, these women are pastoralists – arable agriculture in this region is limited, due to the arid nature of the Kalahari landscape. As young farmers – both women are in their thirties – they hope to one day make a better living from raising livestock, but they are also acutely aware of the constraints presented by the environment, the impacts of livestock on the landscape, and a changing climate.

In the village of Okondjatu, where Jaqueline and Rinouzeu live, land is used on a communal basis, and cattle and other livestock graze on communally-managed rangelands. In the past, elders and traditional leaders demarcated land for different uses, and often set aside grazing land for times of drought, when grass and fodder became scarce. With the erosion of these traditional systems of natural resource governance over time, an open-access approach to land use became common and the impacts are starkly evident – both environmentally and socially. Uncontrolled grazing, increasing herd sizes, and unequal access to rangeland resources, has caused significant degradation of communal rangelands, as evidenced by severe bush encroachment. An invasive thorn tree species called blackthorn (*Senegalensis mellifera),* is taking over thousands of hectares of

land and out-competing the local tree and grass species, with disastrous consequences for pastoralists. Bush encroachment also impacts on scarce water resources, as infiltration of rainwater into the soil and groundwater is reduced on degraded lands.

"*These bushes choke up the landscape, and stop cattle from accessing grazing land,*" says Rinouzeu. When asked what she thinks causes the encroachment by thorn bushes and what can be done about it, Jaqueline hesitates to link land degradation directly to livestock management practices, but points out, *"In my experience, there tends to be less grass if there's a lot of livestock, especially cattle; and, where the cattle are fewer, the rangelands are much healthier. I think it's better to sell off some cattle and put the money in the bank, that way you can buy more land elsewhere if you want to increase the size of your cattle herd."*

Striking this balance is a lot more complex than this, as pastoralism and cattle ownership go beyond simple economics – cattle are also a cultural status symbol in Namibia, and men with a lot of cattle are respected as community leaders. Cattle are also considered an 'insurance policy', so selling them off for no reason other than to put money in the bank, is hardly an option most pastoralists would consider.

Jaqueline Tjaimi

Knowledge and understanding of the interactions between livestock husbandry and land degradation is, however, increasing, and pastoralists like Jaqueline and Rinouzeu are aware that for pastoralism to remain viable as a livelihood, the 'old way of doing things', as they say, has to change. Deliberate and urgent action needs to be taken to reduce and avoid the impacts of current land-use practices on the environment.

Finding communal solutions

The response to bush encroachment nationally has been to undertake mechanical clearing of large areas, especially on commercial cattle farms, using the cleared biomass for economically productive purposes. This strategy for restoring and rehabilitating degraded rangelands is, however, an expensive exercise, and tools and technical skills on how to do it properly are limited at the local community level.

Building on the highly successful wildlife conservancy model, the government has invested in establishing Community Forests, and work is under way to harmonize forest and wildlife-based conservancy systems. This includes establishing mechanisms to compensate people for stock and crop losses due to drought, flood, and wildlife damage. The African Wild Dog Community Forest, located in Otjozondjupa region – with a conservancy group of the same name – covers an area of 473,244 hectares. Once the Community Forest has been legally proclaimed, the African Wild Dog Conservancy will have legal control over a much larger area than they do currently (38,192 hectares).

The dry forest resources of the African Wild Dog Community Forest are largely used as communal rangelands for 112 villages and settlements. Much of the area is currently affected by bush encroachment caused by unregulated grazing, and conflict over access to grazing land. Even prior to the legal recognition of the Community Forest, the African Wild Dog Conservancy is working proactively to pilot sustainable land and forestry management practices – the key pilot program is on de-bushing the degraded area and turning the harvested material into fodder for livestock.

"The quality of the rangelands is already improving, so even though at the moment we're still at a trial stage, it is clear that the potential benefits of de-bushing are great, and once we get official clearance for our Community Forest, we will roll this programme out," says Jaqueline.

The primary rangeland management practice that the African Wild Dog Conservancy plans to introduce is the regulation and control of grazing. The current practice is such that anyone can demarcate and fence off a portion of the communal grazing land to create an 'enclosure' for their livestock, excluding others from accessing and using the fenced area. This has resulted in conflicts over communal grazing land and has marginalized, in particular, poorer members of the community, including unmarried women and poorer men, who lack the financial muscle and political influence to gain control over communal land resources.

"Smallholder farmers like us suffer, because we cannot afford to sell any of our already-few cattle to fence off land for grazing, so during times when grazing is scarce, our cattle die. When the Community Forest comes under our legal control, we will be able to put in place a fairer system for allocating use of our communal rangelands – everyone will have some access to grazing resources. Ensuring fairer access to grazing land might also help persuade cattle owners to rethink the size of their herds, and could be a useful incentive for them to reduce their stock numbers – stock owners with large herds would otherwise have to spend more money on purchasing supplementary feed, as our rangelands are not big enough to support large herds," Rinouzeu argues.

Wild futures

With the legal declaration of the Community Forest, the African Wild Dog Conservancy will be empowered not only to manage their rangelands more sustainably, but also to implement alternative income-generating initiatives that can create employment and help communities diversify their income streams and reduce their dependency on cattle production. This area is home to the endangered African Wild Dog *(Lycaon pictus)* – hence the name of the Community Conservancy and the Community Forest. Among the plans for the area is to integrate wild dog conservation into sustainable use and management of forest resources, as part of an eco-tourism strategy and a long-term income-generation plan for the communities in the catchment area.

Capacity building initiatives implemented by the Namibian government, with support from UNDP and the GEF, are key to facilitating the realization of these ambitious plans. "*With the knowledge we're gaining from the nine-step process of establishing the Community Forest, we will become better land and natural resource managers, because we're understanding how we need to treat our land and the trees and animals on it,*" says Rinouzeu – and Jaqueline agrees. These pioneering women envision the African Wild Dog Community Forest as a diversified, communally-managed landscape that supports sustainable use of local natural resources for subsistence livelihoods, and protects biodiversity and wildlife for the benefit of people and the land.

> "... we will become better land and natural resource managers, because we're understanding how we need to treat our land."
>
> – RINOUZEU KARIZEMBI

Rinouzeu Karizembi

Background to the story

When most people think of Namibia, they think of wide open spaces, heat, deserts, and other-worldly landscapes. But, with an estimated 2.9 million cattle, Namibia is also 'cattle country' and driving through it, one cannot help but notice how proud Namibians are as pastoralists and beef producers, with signs proclaiming 'Beef Master Country' and 'Best Beef Producer 2016/2017' at farm gates. Large, fenced, private cattle ranches lie alongside the thousands of kilometres of road that cross the country, often side-by-side with game farms or wildlife ranches, which are also symbolic of Namibia. Cattle production has an annual value of around N$900 million (US$69 million), and is an important contributor of income at both household and national levels, making up just over two percent of national agricultural GDP.

Bush encroachment in Namibia affects an estimated 26 to 30 million hectares of land – it is a primary driver of desertification and is responsible for annual losses in the order of N$80 million to the beef industry. It is particularly prevalent in the central and eastern parts of the country, in the Otjozondjupa and Omaheke regions, where the density of thorn bushes has risen to between 4,000 and 12,000 plants per hectare. According to researchers, rangelands that have been over-run by these dense thickets of bush can lose up to 100 percent of their productivity and usefulness.

Through a partnership with UNDP, the GEF and other partners, including the European Commission, the Namibian government implemented a Country Pilot Partnership on Integrated Sustainable Land Management (SLM), between 2005 and 2012. The programme of work included several sub-projects that aimed to address the root causes and effects of land degradation in Nambia's drylands through implementation of cost-effective, innovative and appropriate sustainable land management techniques that have environmental and economic benefits, especially for local communities. Subsequent initiatives supported by UNDP and other partners, build on the investments made through the Partnership.

Collectively, these projects have worked to combat desertification and land degradation by ensuring the conservation, restoration and sustainable use of forests and drylands in Namibia. Similarly, they contribute to poverty alleviation, improved resilience and capacity of communities and ecosystems to adapt to climate-induced risks, reducing inequalities and building strong institutions (see page 57).

Digging Deeper

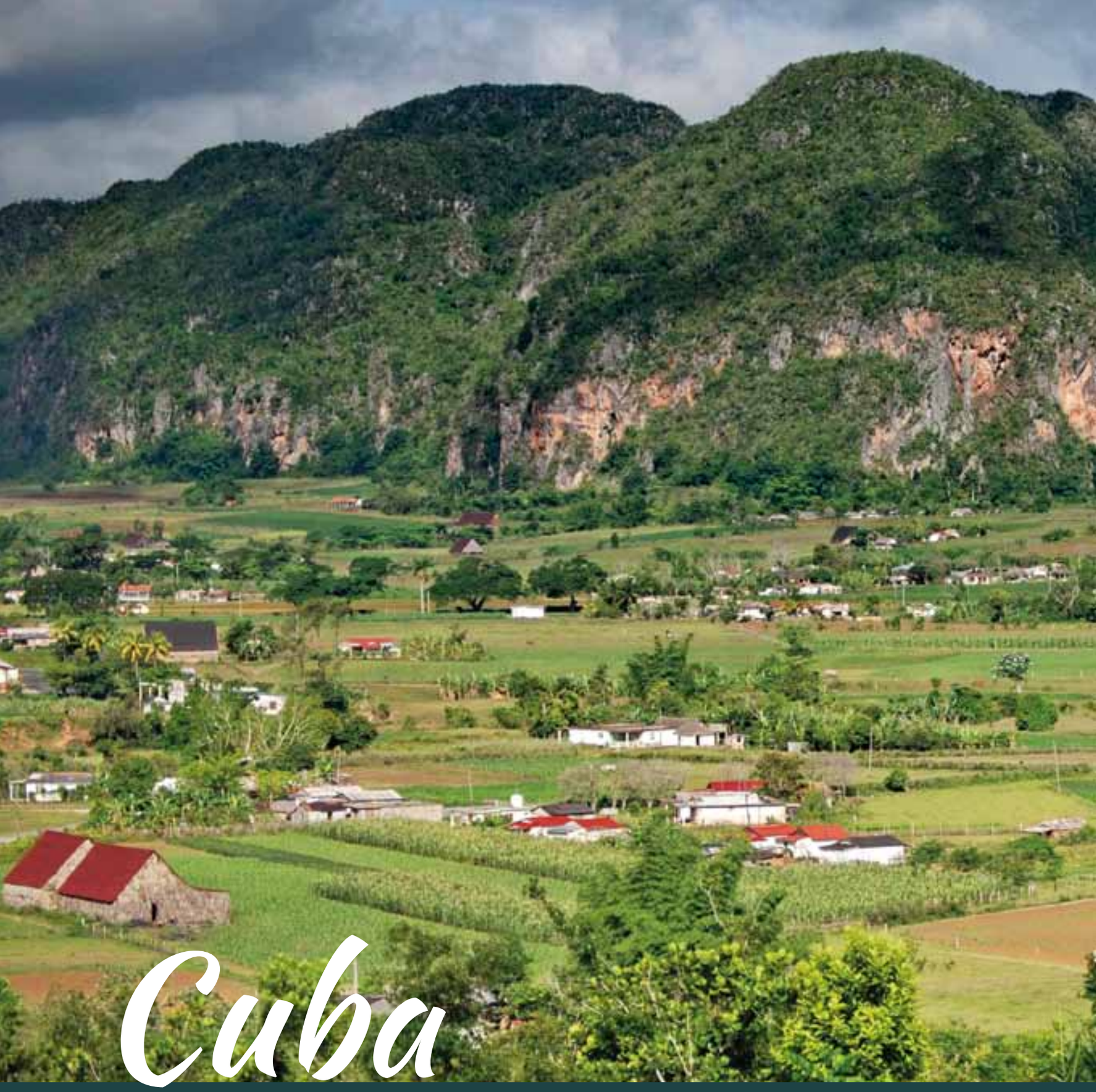
Thinking 'outside the box'

About 70 percent of Namibia's population is directly dependent on subsistence agriculture and livestock husbandry for their daily survival. Such reliance, combined with unsustainable harvesting of wood for energy, building and fencing needs, has led to pervasive land degradation, posing an acute challenge to rural livelihoods. Soon after independence, the Government of Namibia identified land degradation as a serious problem requiring remedial intervention, and recognized that integrated ecosystem management strategies were needed to address the underlying causes.

Building on the achievements of the Country Pilot Partnership for SLM, another GEF-financed project, '*Sustainable Management of Namibia's Forested Lands*' (known as the NAFOLA project), is supporting the government's efforts to establish Community Forests and Conservancies across the country, and build the capacity of local communities to manage these Community Forests sustainably. The underlying principle of the Community Forest model is that if local people have the legal right to use, access and benefit from sustainable management of community forests or woodlands, pressure on these resources will be reduced. Empowered communities will be incentivized to adopt improved landscape management practices, and adopt alternative income-generation opportunities that can improve their quality of life while maintaining the integrity of these ecosystems.

A 'bush-to-fodder' programme is being piloted in Okondjatu village to produce dry season fodder from encroacher species, using mechanical equipment. In this pilot, different feed rations are being tested on livestock in a communal setting. The aim is to promote the use of locally-produced feed for rural communities – and, eventually, for the larger Namibian market – whilst restoring the grazing capacity and biodiversity of the rangelands. This practice holds significant potential to generate income for communities from wood and fodder production, and to provide supplementary feed for livestock – with proven benefits for the condition and productivity of the animals that have taken part in the feeding trials. Although in its early stages, the initiative is popular with community members who are keen to expand the programmme once the Community Forest has been legally proclaimed.

Wildlife conservation and eco-tourism programmes centred on the iconic African Wild Dog, and sustainable harvesting of non-timber forest products such as Devil's Claw (an indigenous plant with medicinal properties), are currently under discussion as alternative, nature-based income-generating opportunities.



Cuba

Harnessing nature's power

'Tierra Brava'

Onay Martinez Diaz is one of more than 12,000 farmers who have benefited from the Country Pilot Partnership on Sustainable Land Management (SLM) in Cuba. Onay previously had a successful career as a computer engineer working in the city, but, he had been raised in the countryside and always retained a deep connection to the land and a desire to nurture life from it.

"*It is a kind of love story*," says Onay of his encounter with the sustainable land management approach. "*A friend lent me a book on sustainable land management – I couldn't put it down, and read it cover-to-cover in two days.*"

Onay Martinez Diaz

Onay's 22-hectare farm, located in Pinar del Río province, about one hour from Havana to the west, is named '*Tierra Brava*' (meaning 'brave land'). Listening to the story behind the creation of this beautiful, totally organic farm, makes it is easy to understand the choice of name.

The farm is bustling with life; a cornucopia of fruit trees, sheep, fish, and birds. Underground, it is equally busy and alive. "*Look at this*!" Onay says, as he points to his mango field and proudly lifts up a handful of soft, rich humus that has been nurtured by worms, micro-organisms and mulch, untouched by chemicals. "*This is aromatic, fertile soil!*"

But, things could have been different here…

In 2008, two hurricanes hit Cuba, devastating the Pinar del Río area. The government introduced a policy to create opportunities for people to farm this ravaged and unproductive landscape, and, fortunately, the start of the Country Pilot Partnership on SLM coincided with this major land reform initiative.

After a lengthy process, Onay was allocated the land on which we now stand. Before this, the land was not only ruined by severe weather events, but was also infested with an invasive alien plant species known as *marabú* bush (*Dichrostachys cinerea)*. The initial business of establishing '*Tierra Brava*' was daunting. Problems abounded: weeds, pests, and poor soil – only a thin centimeter of it covering hard clay. Lack of information on how to tackle these challenges made the task of turning this wasteland into a productive farm even more difficult.

> "I am not a farmer … I am an Ecosystem Manager."
>
> –ONAY MARTINEZ DIAZ

Nature's power

Onay's first thought was to request a large amount of diesel from the state enterprise, but he felt troubled by the idea of drenching his farm in poison, and was concerned about the cost. "*I had big problems*," Onay recounts, "*and I realized that I needed big solutions*!" The Country Pilot Partnership provided much of the information and many of the tools to generate the 'big solutions' through local support institutions, such as the National Association of Small Agricultural Producers and the Cuban Association of Agricultural and Forestry Technicians.

Three hectares of the farm are now planted with soursop, which originates from the Caribbean region and is well-suited to the local climatic conditions. This plant has medicinal properties (it is used for hypertension and diabetes and holds potential for cancer treatment), in addition to being delicious to eat. Soursop is pollinated by a beetle which spends part of its lifecycle underground. If insecticide is used on the farm, it kills the pollinators, which would mean that people need to be hired to pollinate the flowers by hand – an extremely time-consuming (and expensive!) task. Onay quips, *"I told you I have only four family members working on this farm. But, actually, I have millions of insects and worms working for me. I consider myself an ecosystem manager rather than a farmer!"*

Strength in diversity

The biggest crop on '*Tierra Brava*' is mango, of which seven varieties are grown. This enables Onay to supply the market over much longer periods in the year, as the different varieties fruit at different times. In the mango fields, mixed silvo-pastoral approaches – using about 80 sheep – are being used, yielding an annual return of some 2.7 tons of lamb and mutton. "*I rotate sheep grazing areas so that they eat the dropped mangos and this interrupts the fruit fly pest life-cycle*," Onay explains. "*Sheep also eat weeds and browse on the lower branches, which controls fungi and reduces the need for fungicides*." Previously, Onay used 200 litres of diesel per month for cutting grass and other farm activities, but, since the introduction of sustainable silvo-pastoral techniques, diesel consumption on this farm has been reduced to a mere 60 litres per year. The mango fields also supply squash and vegetables for the table for Onay, his wife and two daughters, and his brother's family. Leguminous plants are grown under the trees to fix nitrogen in the soil and grass is crushed and left to decompose to add organic matter.

Looking at the plump fruits that festoon the trees, it is hard to believe that this is an entirely rain-fed farm. Onay's secret is a small rainwater-harvesting dam, which is designed to collect rainwater and force seepage through the soil on one side, to feed water underground to the cultivated fields. The dam is well-stocked with fish, which add nutrients to the water and provide food for the family to eat.

"*After only one year of adopting sustainable land management practices, I started noticing the changes*," Onay says. "*The first change was that birds started coming here in greater numbers. And as the birds came, the number of pests decreased.*"

Forewarned and forearmed, for the future

With support from the Country Pilot Partnership, an early warning system has been installed to help farmers plan their agricultural activities to coincide with optimal weather conditions – and to reduce risks caused by severe weather events. Weather data from the provincial meteorological centre is 'translated' into information that is useful for farmers, and relayed to them regularly through text messages on their mobile telephones. Onay explains, "*For example, if rain is predicted to fall in three days' time, even if it is before the planned harvesting date, I can decide to harvest early to reduce fruit spoilage as after the rain mangos can quickly rot.*"

"*What inspired me?*" Onay beams. "*It was the awareness of the fact that we have the choice to farm our land in a sustainable way, instead of simply going after short term gain. If I don't produce in an environmentally healthy way, I would be deceiving my children and leaving them a depleted piece of land.*"

Background to the story

Cuba is one of the so-called Small Island Developing States, but, when it comes to environmental sustainability, this country is growing into a giant. Despite 60 years of isolation and hardship caused by economic embargoes, followed by the later Soviet collapse, Cuba's creative and indomitable spirit has led it to walk an alternative path, seeking innovative solutions that turn challenges into opportunities. One of these challenges is land degradation, which affects three quarters of the land surface of the country, with serious impacts for the economy and food security.

In 2011, the Government of Cuba initiated a process to update its economic and social model, in order to promote development and improve people's standard of living, within environmentally sustainable limits. Farmlands and mixed cropland-natural vegetation mosaics cover just over half of Cuba's land surface, so revitalizing the agricultural sector was a critical part of this process. Borne partly out of need (due to previous isolation and the lack of availability of imported agricultural inputs), and driven by Government's inspired vision to link farmers to the land and 'harness nature's power', a national effort developed to shift towards low-input, sustainable farming methods.

The GEF-financed Country Pilot Partnership on SLM, which is supported by UNDP working in partnership with UN Environment and the UN Food and Agriculture Organization, is building capacity in Cuba to make these shifts. This initiative is fully aligned with the National Action Plan to Combat Desertification and Drought, and the National Programme on Soil Conservation and Amelioration. It serves as an effective vehicle for restoring degraded land, promoting transformative economic growth, strengthening food security, and building partnerships for achieving the Sustainable Development Goals (see page 58).

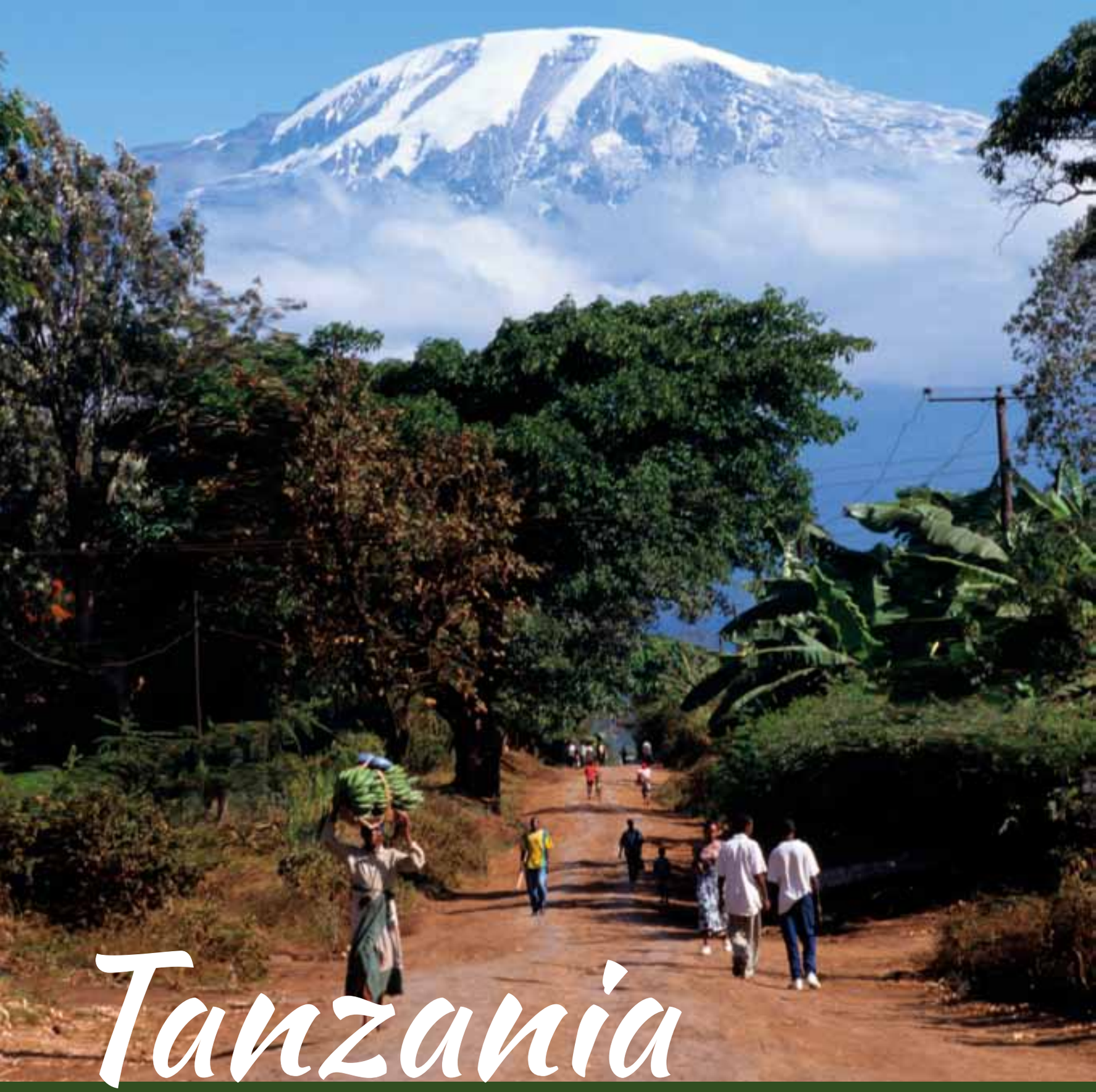
Digging Deeper

Speaking a common language – Sustainable Land Management

The Country Pilot Partnership comprises five projects to be implemented over 15 years, and lies at the core of Cuba's efforts to achieve land degradation neutrality. The programme has a two-pronged approach: the first is aimed at mainstreaming sustainable land management principles into policies in the agriculture, forestry, water, and economic planning sectors; whilst the second develops knowledge and builds hands-on capacity for implementing sustainable land management practices at farm level.

Central to these efforts has been the adoption of practices to return fertility to the soil and address related issues such as erosion, salinity, compaction, low organic content, and pollution from previous over-use of inorganic fertilizers – these are some of the 'big problems' described by Onay Martinez Diaz. Amongst the 'big solutions' the Partnership has helped develop are a shift from high-input monoculture to low-input, organic methods of growing a diversity of crops using mixed crop-livestock systems, green manuring, mulching, bio-fertilizers, bio-pesticides, intercropping, and mixed agro-forestry.

In Cuba, commitment to SLM is high, but uptake of best practices was initially impeded by limited knowledge of the drivers of land degradation, and weak ability to meet the costs of shifting land use practices to more sustainable alternatives. The first enabling step to overcome these obstacles was to build strong partnerships between government departments in all key sectors (agriculture, forestry, water management, spatial planning, economic and investment planning, education, science, technology and environment), and then to get government, scientists, civil society organizations, and farmers all talking the same language – Sustainable Land Management! This has been achieved through intensive awareness-raising, education, and practical skills-development programmes involving high-level decision-makers, production-sector role-players, farmers, technicians, teachers, and students. Sustainable land management principles have been incorporated into the national school curriculum and a master's-level university course has been developed. Through these enabling activities, and by demonstrating the real benefits of shifting to SLM at pilot sites, the Country Pilot Partnership has helped communities develop diverse approaches to sustainable farming – or, rather, ecosystem management – in support of the country's long-term vision to build a resilient and sustainable economy.



Tanzania

Restoring Kilimanjaro one step at a time

Into the garden

Devotha Tumainieli was born into a Chagga family in Mawio Village, Lawate Catchment, on the steep western slopes of Mount Kilimanjaro. She is a farmer, tending a small plot of two hectares to produce bananas for her family's table and as a cash crop. Like most of the farmers in this major banana-producing district – and much like her parents, and their parents before them – she uses a traditional multi-cropping system known as a homegarden. This complex system includes a scattered upper tree layer (made up of banana plants and other shade trees), below which various lower-growing crops, such as coffee, taro, medicinal plants, and vegetables are grown. As is usual in these homegardens, Devotha also keeps a few cows for milk.

Over the past decade, the productivity of Devotha's homegarden – and those of other farmers around her – declined dramatically, almost to the point where farming became non-viable. "*The banana plants were stunted and produced very few bunches. And those bananas that were produced were so small that they hardly provided enough food for the family. To feed our family of four in a single meal, we needed two whole bunches, whereas, years ago, even one bunch would have fed us adequately for two meals or more. The situation was so bad, that I thought there was no point in farming anymore*."

The volcanic soils of the region are naturally fertile, and the tried-and-tested Chagga homegarden system had sustained communities on the slopes of Kilimanjaro for hundreds of years. The Chagga people are profoundly attached to their environment – an attachment based on cultural, social, and symbolic values, as well as on survival instinct – and they know that their survival depends directly on the natural ecosystems of the mountain. The Chagga display a vast knowledge of their environment and their traditional practices show respect for natural resources.

So what had gone wrong?

Steps to sustainability

A complex set of factors relating to rapid population growth, structural market issues, and changed patterns of land use, had caused extensive deforestation, resulting in worsening soil erosion, declining soil fertility, and an increase in damaging surface run-off. For farmers like Devotha, this translated into decreased land productivity, greater food insecurity, and hardship. With support from a UNDP-supported and GEF-financed Sustainable Land Management (SLM) project (known as the Kilimanjaro SLM Project), the regional government provided training to farmers in sustainable farming practices to address these issues. Devotha Tumainieli jumped at the opportunity to enhance her traditional practices with new land management technologies that would enable her to restore the productivity of her homegarden. She describes what she learnt, "*I was trained to use bench terraces – which we call 'fanya juu' – to conserve soil and water. The terraces help to reduce the slope length and steepness and prevent the loss of soil downhill. We were also taught to grow grass along the terraces to hold the soil in place. Since I started this, I have gone back to farming with bananas. I have terraced an area of two hectares from which I expect to harvest about one ton of bananas – this yield is four times greater than before. The banana bunches are bigger than those grown in unterraced plots, and the fruit reaches double the price at the market. Depending on the season, I can sell a bunch of bananas from a terraced plot for between TZS 2,000 and 10,000 (about US$1 to US$5). People selling bananas grown in unterraced plots only get about TZS 2,000 to 5,000 for a bunch, so I can see that farming with terraces has given me a great competitive advantage.*"

Devotha Tumainieli

Since the adoption of sustainable land management measures, Devotha has diversified her crops to include vegetables such as beans and potatoes, and the grass she plants to stabilize the terraces provides fodder for her cattle. This represents an important cost saving to her, as previously she had to buy grass from the lowlands at great cost. Devotha's family is now more food secure and hers has become one of the most productive farms in the Lawate catchment. She was elected by her community to the local Environmental Conservation Committee, through which she champions SLM and advises other farmers on the use of soil and water conservation measures. With a sparkle in her eye, she says, "*I am optimistic that everyone in my area will soon adopt these practices – it will secure our income and food supply, and is better for the land.*"

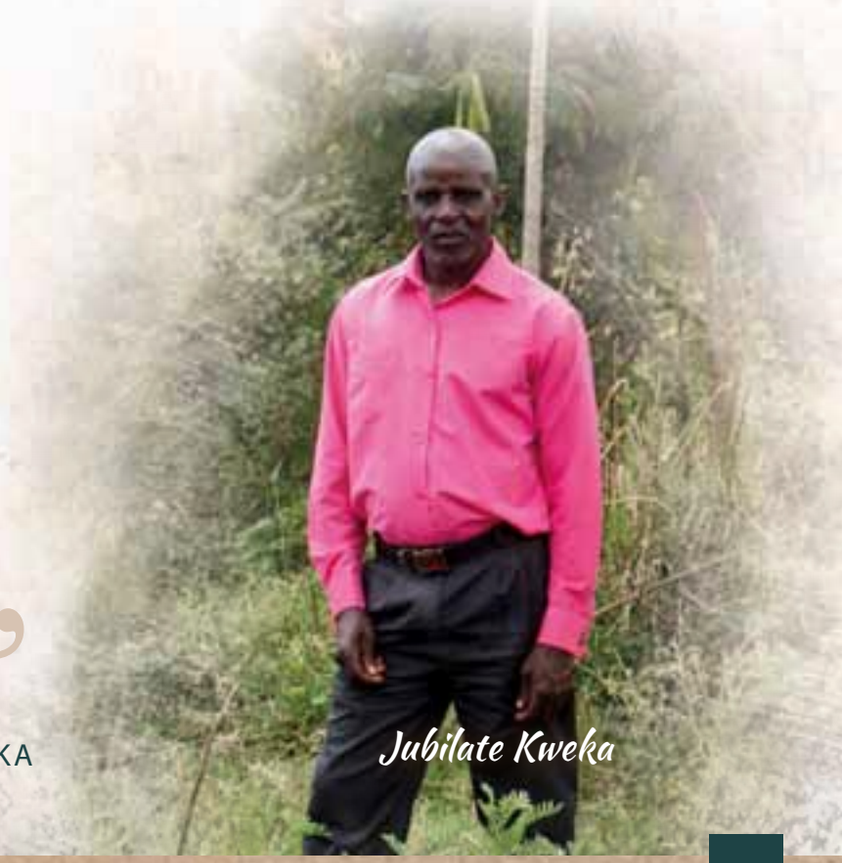
Spreading the benefit

The benefits of adopting sustainable land management practices are not only being felt in the highlands of Kilimanjaro, but also in the woodlands and savannas of the surrounding plains. Lower down in the catchment of the Mawoi Stream, in the semi-arid district of Hai, a group of elders in the vicinity of Roo Sinde village has taken decisive action to reverse the extensive degradation that has affected their area. Previously, these plains were watered by numerous perennial streams flowing down from the highlands, but five years ago, most of these had dried up. This was partly due to deforestation and desertification higher up in the catchment, but also because of local overgrazing, removal of natural forest along waterways, and the impacts of more frequent and intense droughts.

Jubilate Kweka, the chairman of the Mawoi Environmental Group, describes the situation, "*If you had come here only five years ago, you would not believe how it looked – there was no vegetation and the streams were all dry – even in the Nkotuma Conservation Area. But look now,*" he says, gesturing with a wide sweep of his arm to the surrounding landscape, "*the landscape is turning green, the trees are growing well and the streams are flowing again*! *This has happened because we have passed, and are enforcing, village bylaws to manage grazing, control tree felling, plant trees, and restore the degraded land.*" Guided by the SLM Project's technical experts and trained District officials, the 36 members of the Mawoi Environmental Group focused their rehabilitation activities on the severely degraded Nkotuma and Kiamboni Valleys, and the Mawoi Stream, because of its importance as a water source – both for the people of the area, and for sustaining the riverine forest, which has become an invaluable asset to this community.

Natural defenses

The Mawoi Environmental Group have established tree nurseries, using wild seed they have collected in patches of remaining forest, and seed supplied by forestry officials. The saplings are planted out to restore deforested areas, as well as in public spaces such as school yards. As part of their efforts to conserve remaining riverine forest, the community have joined forces with nature's own forest wardens – bees. Beehives have been suspended in forest trees along the river banks, where the trees provide the pollen needed by the bees, and the bees provide protection for the trees. With a chuckle, Jubilate explains, "*The logic is really very simple. Most people are naturally afraid of bees, and do not want to be stung. So, they tend to avoid places where there are hives. This deters would-be law breakers who might be tempted to cut down trees, and protects the forests and water sources*." As an important advantage, bee-keeping provides this ecologically-minded community with a valuable source of nutrition and an alternative income-generating activity that avoids future deforestation and land degradation. The use of the modern bee-hives and bee-keeping practices introduced by the SLM Project has increased honey yields, bringing greater food security, and economic stability to the villagers.



Jubilate Kweka

> "The landscape is turning green, the trees are growing well and the streams are flowing again."
>
> – JUBILATE KWEKA

Background to the story

Towering above the bustling town of Moshi in northern Tanzania, is the iconic, ice-capped peak of Mount Kilimanjaro – one of the most defining features of Tanzania's landscape, and the pivot on which a thriving tourism industry turns. Peaking at 5,895 metres above sea level, this volcanic massif is both the highest mountain in Africa, and the highest free-standing peak on Earth. It's diversity of ecosystems is exceptional, ranging from glaciers and alpine moorlands, through montane grasslands and rain forests on upper slopes, to woodlands on the foothills, and dry, open savanna on the surrounding plains.

Mount Kilimanjaro is the primary source of water for much of north-central and eastern Tanzania, and parts of Kenya. It also holds cultural and spiritual significance and provides food, fuel, and building materials for the local communities of Kilimanjaro Region. The capacity of the mountain to continue to provide these vital resources and ecosystem services is, increasingly, being compromised by extensive land degradation. The causes are complex and interrelated, including large-scale deforestation, rapid human population growth, shifts in land use and agricultural practices, changing market forces, and the impacts of climate change.

With support from the Kilimanjaro SLM Project, the Kilimanjaro Regional Government has worked to address land degradation through the adoption of sustainable land management practices and the creation of alternative income generating activities that do not cause deforestation. The project served to enhance local economic development, food security, and sustainable livelihoods, whilst combatting desertification in forest and woodland ecosystems in the Kilimanjaro Region (see page 59).

SLM is being scaled-up through ongoing GEF investments in UNDP- supported projects in the miombo woodlands of the Tabora and Katavi Regions, and the Uluguru and East Usambara Mountains.

Digging Deeper

Restoring productivity to traditional land-use systems

The Chagga people have been cultivating homegardens on the slopes of Mount Kilimanjaro for centuries. This traditional agroforestry system has been one of the most productive forms of agriculture in Tanzania, and is well suited to the soil, topography, climate, and traditional systems of land tenure and management. The multi-layer system maximizes both the use of limited land resources – especially in areas of high population density (on average 650 people/km^2 in the Kilimanjaro Highlands) – and returns from a diversity of crops. Minimal external inputs are needed, and soil cover is maintained, which helps to protect the environment. In some cases, an area of land is also used for traditional livestock rearing.

Traditionally, coffee was the main cash crop in these homegardens, with other crops grown largely to meet subsistence needs or for sale at local markets. In the 1970s, a combination of failing health of the ageing coffee plants, a decline in world coffee prices, and inherent structural weaknesses in the national coffee market, plunged local farmers into a downward spiral of poverty. This was aggravated by rapid population growth (about three percent per annum), which triggered large-scale changes in land-use practices, with devastating effects.

In the Kilimanjaro region, the SLM Project facilitated widespread uptake of practical technologies to improve average productivity of degraded land, reduce seasonal fluctuations in yields, underpin diversified production and improved income, and restore the capacity of agro-ecological systems to provide ecosystem goods and services. This includes measures to improve soil and water management (such as bench terracing, mulching, and improved efficiency of water furrows); improved coffee management (by replacing unproductive trees, training farmers in more sustainable and productive farming methods, and certification of production as organic and FairTrade to improve access to markets); and diversification of production (by including a variety of suitable fruits and vegetables, using improved varieties, and improved animal husbandry).

The project created opportunities for alternative income generating activities, such as micro-enterprises for bee-keeping, mushroom farming, and poultry-keeping (using improved breeds), that relieve pressure on limited land resources, and do not require consumptive use of forest and woodland resources. Demand for wood was further decreased by the introduction of fuel-efficient stoves for heating and cooking, combined with tree nursery and reforestation projects led by village committees and school groups.

Critical ingredients for success included the provision of practical training, strengthening existing community structures (such as Village Environmental Committees) to promote peer-to-peer learning and farmer-to-farmer extension services, strengthening skills for business and financial management, and providing improved access to micro-finance. The advances made through the GEF-financed intervention are now being sustained by the Kilimanjaro Regional Government.

Mr Josephat Samba, the SLM co-ordinator in the Rombo District Council says, "*These activities have helped a lot to conserve the environment and will help reduce poverty, especially amongst the women, who have demonstrated that they are strong agents of change.*"

Kazakhstan

Pushing back the shifting sands

The disappearing sea

There were once over 1,100 islands scattered across the extensive waters of the Aral Sea. "*I remember it very well,*" recalls Zhandos Moldagulov, who came to live in the Aral district with his family in 1967. "*Aral was formerly a harbour and fishing port on the banks of the Aral Sea, supplying fish to most of the neighbouring countries. My parents were proud to live in this place, with its abundant water, promising jobs, prosperous neighbourhoods, and fertile land*", he says.

During the 1960s, the main rivers that flowed into the Aral Sea were diverted for massive irrigation of vast cotton and wheat fields, and the Aral Sea started retreating – with devastating economic, social, and environmental consequences. The Aral district is now completely landlocked, suffering from high unemployment and declining socio-economic conditions. Over the last few decades, the population shrank by 85 percent, as people drifted away to seek a better life elsewhere. The remaining residents are facing serious health problems caused by airborne particles of toxic residues from fertilizers and pesticides, and highly saline sands that have been exposed to the winds by the retreating waters.

"*Back then, I could almost jump out of my house and straight into the greenest sea ever. Now, I can only dream about it. For 25 years now, it has been impossible to see the waters of the Aral Sea from the house where I grew up. Due to the shrinking Aral, we lost our homes, jobs, fertile land, and our neighbours,*" Zhandos observes, sadly.

> *"It is my life's dream to be a worthy son to my father, to keep the farm I inherited from him productive, the trees alive, and then to leave a healthy farm to my sons."*
>
> – ZHANDOS MOLDAGULOV

Zhandos Moldagulov

Shifting sands

With the fishing industry lost, and other livelihood opportunities being limited, agriculture remains the main source of income and employment for many in the Aral region. But, limited availability of water, high climate variability, and unsustainable land-use practices, were damaging the fragile soils. In addition, productive land was slowly being swallowed by the relentless onslaught of the shifting sands, pollution, and dust blowing in from the drying bed of the Aral Sea.

Zhandos Moldagulov's father had 142 hectares of land on which he grew fruit and vegetables. Zhandos remembers that his father grew big melons, water melons, and apricots that were sweet and delicious. "*Since the Sea began retreating, a lack of water for irrigation, and the moving sands, resulted in us losing our lands and our garden. Our trees have dried out.*" It was clear to Zhandos that a new way of working on the land was needed.

Many of the other local farmers were also keen to gain new knowledge of modern land-use practices suited to drylands and the harsh climate, and gladly took the opportunity to participate in Sustainable Land Management (SLM) training courses and demonstration activities offered by the 'Kyzylorda' Extension Centre. This training formed part of the GEF-financed, UNDP-supported Sustainable Land Management project being implemented in the Aral-Syrdarya district.

Zhandos attended thematic and 'hands-on' courses on how to run a farming business, manage seed banks, conserve soil and water, rehabilitate degraded or abandoned land, and grow suitable crops. "*By the end of the training, I knew which specific practices to apply to restore my father's lost garden.*" This was important to Zhandos. "*It is my life's dream to be a worthy son to my father, to keep the farm I inherited from him productive, the trees alive, and then to leave a healthy farm to my sons.*"

Revival

Over several seasons, through the application of agroforestry, improved soil and water management, and other sustainable land management practices, the farmers of the Aral region slowly began to transform their lands, enrich the soils, and improve their productivity and yields.

By applying what he had learnt, Zhandos has successfully rehabilitated 101 hectares of land. He started the process of reviving his land by introducing crop rotation and intercropping as measures to improve soil fertility. He increased the moisture content of the soil by covering it with plastic sheets, and on salinized soil, where the water table was raised, he improved soil drainage by planting salt-tolerant trees – here, he applies irrigation only sparingly to prevent any further rise in soil salinity. To protect the upper layers of soil from wind erosion and incursion by moving sand, Zhandos has planted a shelterbelt of White Poplar trees.

Gulnara Bayanayeva, another farmer from the area, is applying knowledge she gained on agroforestry, agro-investment, organic farming, and small-business management, to improve her agricultural yields and earnings. On 28 hectares of her rain-fed farm, Gulnara invested US$1,500 to plant potatoes, melons, and almond trees using an agroforestry approach. With the sale of the harvested products, she made a net profit of US$750. She also updated her seed bank for the next season's planting. During the second year of successfully applying these practices, she started breeding cattle, increasing her livestock from one to seven cows. She expects to be economically independent in the next two years, and is planning to set up a seven-hectare public picnic area to generate additional income. Gulnara believes that these new techniques and approaches will help her – and other women – gain greater financial autonomy.

Zhandos has also achieved higher yields since adopting sustainable land management practices. "*The techniques we learnt really work on these dry soils. It took about a year to increase my land's productivity by half, and to partially improve the productive capacity of the trees left from my father's garden.*" As his legume crop flourished, so his livelihood improved, and his herd of cattle grew from 17 to 35 head – which means that he now has enough animals to sell some at the market for cash. He has set up his own compost pit with a production capacity of 21 tons, and has started using this organic compost on his lands. With assistance from agronomists, Zhandos has diversified his crops, planting a variety of early-ripening fruit and nut trees – including apricot, apple, cherry, almond, and plum – to ensure an early harvest. And, together with his sons, he has dug a canal to bring irrigation water from the main canal, which had been rehabilitated as part of the SLM project.

For Zhandos, these changes have had far-reaching impacts. "*My sons are no longer going to the regional centre to work as taxi drivers or casual workers. Now, we all work together on our land, and both of my sons have launched new businesses – one as a cattle breeder and another as a beekeeper. All of the fresh fruit and vegetables we eat now come from our own plot, saving us about US$1,800 a year in food costs. Soon, my daughter will marry, and I will have enough fresh fruit, vegetables, meat, and money to organize a fine wedding and give her a nicer present.*"

Zhandos' business has grown, such that he now employs eight permanent and 27 seasonal workers, and neighbouring farmers employ a similar number of staff. This not only provides much-needed jobs, but also brings hope to this suffering region. "*It is hard to imagine that just because I increased my understanding of sustainable farming, my whole family's life has changed. We have become much more confident about the future. We have a number of new neighbours who have come back to their ancestors' land, and I am sure that in the future the Aral region will prosper,*" Zhandos proudly says.

Gulnara Bayanayeva

Background to the story

Kazakhstan's rugged, glaciated mountains are spectacularly beautiful; soaring to great heights in the north of the country, they form part of the great mountain ranges of Central Asia. The soils in these montane areas are fertile and well-suited to livestock and grain production. In the south, the landscapes of Kazakhstan are dominated by seemingly endless expanses of rolling steppes, scrubby drylands, and deserts. Here, rain is scarce, conditions are naturally harsh and arid, and the landscape is highly vulnerable to land degradation – a situation aggravated by years of unsustainable land use and protracted drought.

Before Kazakhstan's independence, industrial-scale commercial agriculture was widespread in the south. This has taken a heavy toll, as evidenced by the compacted soil, extensive wind and water erosion, soils polluted with toxic residues, and the formation of '*solonchak*' (salinized) lands. To make matters worse for local communities, the Aral Sea, situated between Kazakhstan and Uzbekistan to the south, is rapidly drying out – what was once was the world's fourth largest lake, might soon become a desert. The shrinking of the Aral Sea and the ensuing desertification of the adjacent land, has impacted negatively on the health, well-being, and livelihoods of the surrounding communities, in what is widely acknowledged as one of the world's most significant environmental and human disasters.

UNDP is helping the Government of Kazakhstan through a GEF-funded project, '*Supporting sustainable land management in steppe and semi-arid zones through integrated territorial planning and agro-environmental incentives,*' to combat the effects of desertification, restore productivity to the land, and uplift the impoverished communities of southern Kazakhstan. Implementation began in 2015 and the project will run for five years, targeting six different regions, including Kyzylorda, and its Aral-Syrdarya district. The project is working to combat desertification and restore degraded lands through adoption of SLM, with contributions to poverty reduction, improved food security and access to water, better health and well-being, and greater resilience to climate-induced risks and disasters (see page 60).

Digging deeper

Promoting SLM through agricultural extension centres

Sustainable agriculture depends not only on a favourable natural resource base, but also on farmers having access to locally-relevant agricultural technologies, and information on how to maintain the productivity of their land without causing degradation. Around the world, agricultural extension centres provide this critical service, but, in many areas of Kazakhstan, these services have been sorely lacking.

As part of Kazakhstan's transition to a market economy, former large, state-owned '*kolkhozes*' (collective farms) and '*Sovkhozes*' (Soviet farms) were split and privatised. These, and other structural changes, led to a mass exodus of people, abandonment of croplands, and the loss of agricultural expertise. Farmers with no previous experience in modern farm management or technical agricultural knowledge, were suddenly faced with the difficult task of running a profitable farm business, under the toughest of circumstances. Many have failed.

To assist rural communities in overcoming these challenges, 'Kyzylorda', one of several extension centres and research institutions participating in the SLM project, provides much-needed training in SLM and business management for smallholder farmers. Through demonstration activities at pilot plots, farmers learnt how to: increase crop diversity using agroforestry; stabilize slopes, shifting sands and erosion gullies; rehabilitate topsoil and improve soil fertility; manage livestock and rangelands sustainably; and how to diversify their income through alternative income generating activities. Through this support, the extension centres are playing a vital role in empowering farmers to address land degradation and desertification through well-informed, sustainable land stewardship, that transforms vulnerable rural communities into more resilient and economically secure ones.

Eritrea

Land of dust and dreams

A passion for the land

Something remarkable is on the rise in the Horn of Africa. Despite a long history of political conflict and tough economic and climatic conditions, inspired Eritreans have been putting their shoulders to the wheel and working proactively to restore life to their damaged land. One such person is Gebremichael Gebremeskel, a farmer in his late sixties living in Adi Abzage village in the foothills of the Tsilima Mountains. Gebremichael has tended the land for over 30 years – he keeps a few dairy cows and grows a variety of crops, including barley, sorghum, wheat, and vegetables. He is a community activist with a passion for good environmental stewardship. Gebremichael says, "*It is my dream to turn this place into a paradise*."

To realize this dream, Gebremichael voluntarily introduced soil and water conservation measures on his government-allocated plot, as well as on marginal and abandoned communal land, and reclaimed it for agricultural production. He also championed a share-cropping arrangement, through which he restored productivity to previously-abandoned plots whose owners were unable to farm themselves – this boosted their food security and brought more land under sustainable management.

Gebremichael says that when he started this, his neighbours thought he had 'gone crazy', but, after years of applying a landscape approach to managing his land, he demonstrated how soil and water conservation measures nursed the land back to health and restored productivity to his fields. He is now recognized as a champion farmer who has won awards, and the admiration of his community.

It is this kind of determination, rooted in a deep connection with the land, that has provided fertile ground for sowing the seeds of Sustainable Land Management (SLM) in Eritrea – a process in which Gebremichael is a leading light.

Sowing the seeds of sustainability

On the outskirts of Asmara, the capital of Eritrea, is the Serejeka sub-*zoba* (sub-region) – a vast dryland ecosystem that was previously laid bare by overgrazing and deforestation. This area supports about 11,000 households in 28 villages. Ten years ago, rapid population growth had contributed to unsustainable practices such as cultivation of marginal lands on steep slopes with easily erodible soils. Livestock roamed the hills and plains in search of food, and people desperately searched for wood to use for cooking and heating. People were hungry – for food, and for new ways of meeting their needs.

With support from UNDP and GEF finance, the Government of Eritrea initiated a pilot project in 2009 to reclaim land productivity and protect fragile ecosystems in the Serejeka sub-*zoba,* by building capacity for the implementation of sustainable land management practices. Working through community committees, the project provided practical training in sustainable land management practices, with a focus on forest restoration and sustainable rangeland management. Important aspects of the work were the introduction of land-use zonation, integrated rangeland and water management, and the use of marginal lands to establish forest patches, from which farmers could earn additional income through the sale of timber.

The change in the Serejeka landscape has been remarkable. Hills that were bare have been re-forested. Grass that grows beneath the tree layer is used by communities to feed their livestock in the dry season, and bees – which had always provided a reliable source of food in the form of honey, but had disappeared – have returned to the reforested ecosystem. With the introduction of measures to improve soil fertility, prevent erosion, and use water efficiently – including irrigation from a newly-built micro-dam – farmers now grow vegetables such as tomatoes, spinach, kale, and potatoes, providing food for their families and a reliable source of income through sales at the market.

Building on the strength of this project, SLM is now being expanded into other regions, such as the Tsilima Highlands and Plains.

Re-filling Eritrea's food basket

The Tsilima Region – where Gebremichael lives – is part of the densely populated Central Highlands agro-ecological zone of Eritrea. This is the 'breadbasket' of the country, and is the focus of the government's current and future investments in food security. But the breadbasket had, over the years, been growing ever-emptier. Despite the relatively fertile soils, agricultural productivity had progressively declined as a result of increasing

population pressures, unsustainable land and water use, and the effects of climate change (less rain, falling in shorter and more intense rainy seasons and resulting in increased run-off). Farmers like Gebremichael understood well the importance of adopting more sustainable and integrated measures for managing soil and water resources at catchment level.

He points out, *"The mountain is a watershed, so protecting it has huge benefits on the farm land downstream. By strengthening the highlands against wind and water erosion, we protect our fields from erosion as well."* Voluntarily, he invested a significant amount of time, and some money, into filling in gullies and terracing the hillsides closest to his fields, to reduce excessive run-off, improve the ability of the soil to retain moisture, and combat landslides on the steep hillsides. He also planted trees upstream of his arable fields to act as a buffer against the wind and reduce the impacts of water run-off. Every few years, these trees can be harvested and sold, but while they stand, they provide important cover to prevent erosion and serve as windbreaks on the dusty plains. To raise awareness among the community in Adi Abzage and surrounding villages, Gebremichael donated 2,000 Nakfa (about US$130 – a significant sum in Eritrea) of his own money to organize a farmer field visit so that others could learn from his model.

To re-fill Eritrea's food basket, these measures need to be taken to scale across the landscape. As Gebremicheal notes, *"The community is ready to take up these practices, especially the women, they just need to be taught how to do it, and see the evidence for themselves … age and gender won't stop anyone!"*

This is being facilitated by a project to mainstream climate risk considerations into food security in the Tsilima plains and upper catchment areas. Building on the types of soil and water conservation measures pioneered by Gebremichael, the project is working with communities to improve watershed management, restore groundwater recharge, and adopt climate-smart crop and livestock management systems.

Bumper futures

Eritrea's investments in restoring the country's degraded landscapes are starting to pay off. Many of Gebremichael's neighbours and other farmers who have now taken up sustainable land management measures, are seeing the results of restoration activities on their farms. With unshakeable confidence, Gebremichael exclaims, *"We can feed ourselves here, if we all invest in the land. This year we only managed to harvest about 3,000 quintals* (300 tons), *but I can guarantee you that if every farmer here takes up these practices, we can produce over 12,000 quintals* (1,200 tons). *All farmers need is a little support with skills, tools, and minimal inputs, and they will transform the landscape."*

"It is my dream to turn this place into a paradise."

– GEBREMICHAEL GEBREMESKEL

Gebremichael Gebremeskel

Background to the story

Most people are unable to imagine Eritrea, its people and landscapes, and little is known about this enigmatic corner of Africa. Rich in history, culturally diverse, and scenically inspiring, the country is well-endowed with natural resources. But these have been in a state of steep decline as a result of both natural and human-induced disasters, including drought, deforestation, and a 30-year long war that ended in 1991. Socio-political turmoil has taken its toll, not only on the people and economy of this small country in the Horn of Africa, but also on its landscape, which is affected by severe soil erosion over much of the country's land surface. Like many parts of Africa, Eritrea is facing climate change-induced threats that are compounded by the impacts of land degradation, with serious consequences for agricultural productivity, food security, and quality of life. Land resources are a critical life-source for Eritreans, more than 80 percent of whom depend on agriculture for survival.

Food security is high on the agenda of the government, and a large portion of the country's budget is dedicated to land rehabilitation programmes that work to combat soil erosion and desertification, restore soil fertility and agricultural productivity. Eritrea has one of the largest reforestation and tree planting programs in the region, with over 300,000 hectares of community forest enclosures. The government is also working on a program to formalize the establishment of an extensive network of protected forests.

These landscape restoration efforts have been supported over several years by UNDP, through a series of three projects. These include the GEF-funded '*Sustainable Land Management Pilot' Project*, which was implemented in the Serejeka sub-*zoba*; a project currently financed through the GEF-Least Developed Countries Fund to mainstream climate risk considerations in the Tsilima Plains and upper catchment areas; and, a project financed through the Adaptation Fund in the Anseba *Zoba* to build capacity for climate change adaptation through integrated water management and sustainable agriculture practices.

Collectively, these investments serve to combat desertification, restore degraded land, enhance food security, and strengthen adaptive capacity of Eritrea's vulnerable rural communities to cope with climate-induced risks and disasters (see page 61).

Digging Deeper

Empowering people as effective land custodians

Eritrean pastoralists and farmers understand well that land must be carefully nurtured if it is to continue giving life, and they are well-practiced at making the best out of difficult situations. But, changes in socio-economic and environmental factors have meant that traditional approaches to land stewardship required adaptation to combat creeping desertification, growing food shortages, and poverty.

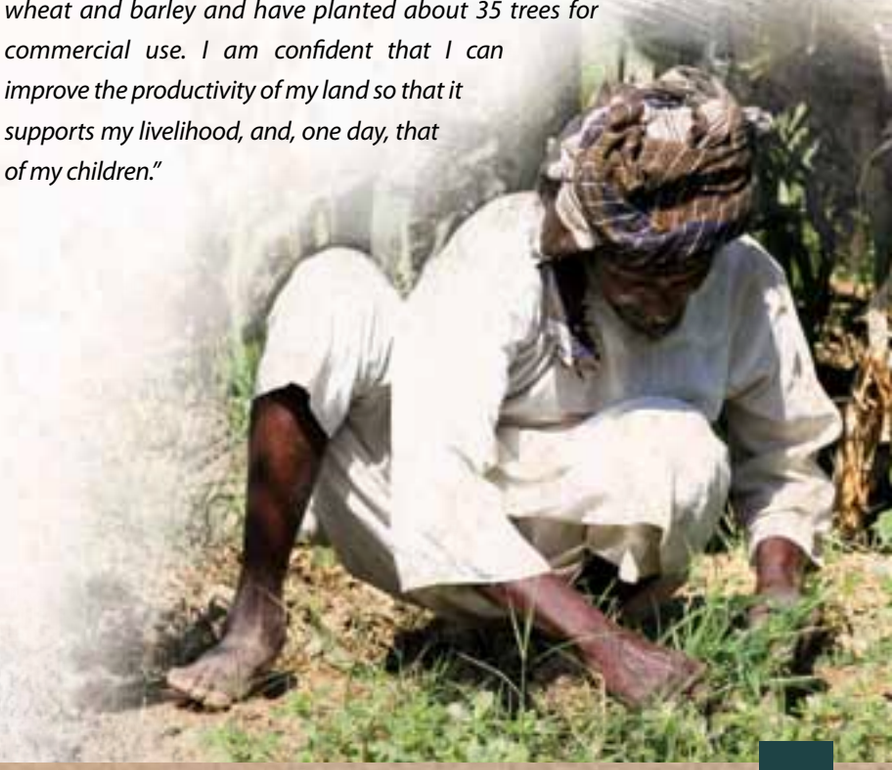
Eritrea's '*National Action Programme to Combat Desertification and Mitigate the Effects of Drought*' operates on the principle that achieving sustainability is a social task, requiring proactive and effective participation of the Eritrean people. This means that addressing land degradation requires both practical measures to re-direct land-management practices, and social interventions to empower people as more effective land custodians, over the long term.

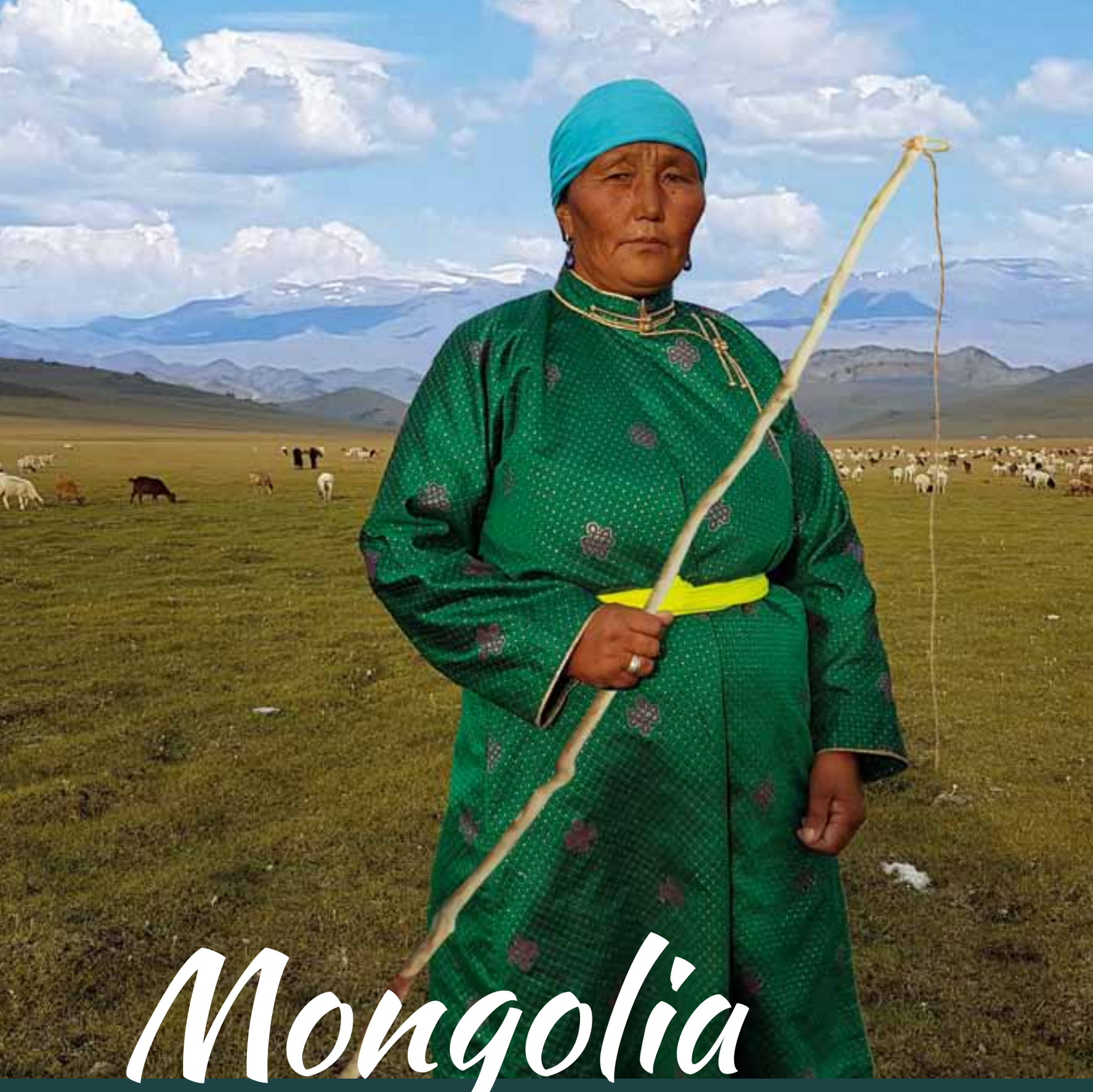
The SLM projects supported by UNDP in Eritrea uphold this principle in three ways. Firstly, they create a strong sense of ownership amongst communities by working through community champions – such as Gebremichael – and establishing community committees that drive project implementation at ground level. Secondly, they raise awareness of the importance of SLM, and build practical skills for the implementation of appropriate technologies at farm level, so that community members become the agents and beneficiaries of change. And, thirdly, they help facilitate the implementation of social interventions that incentivize more sustainable land stewardship, such as land-use zonation, and new land tenure policies.

All land in Eritrea is owned by the Government. Previously, short term land-use rights were assigned through village or kinship systems, with farmland redistributed every seven years. Whilst this system held some social benefits, it discouraged farmers from investing time or resources in sustainable land management over the longer term. In 1994, the government passed the *Land Reform Proclamation*, through which a new system of land tenure was introduced, under which long-term use (usufruct) rights to farmlands can be allocated to all adult Eritreans. This represented an important step forward in the fight against land degradation, as security of tenure encourages farmers to adopt more sustainable land management practices such as the construction of terraces and check dams, use of rotational cropping and fallow periods, and planting of trees.

Although some land users were initially skeptical about these changes, a total of 10,839 hectares of cropland in 28 villages (accounting for more than 50 percent of all land in Serejeka sub-*zoba*) has since been put under long-term usufruct rights, with farmers adopting sustainable land management practices they learnt through the project. Under the new tenure arrangements, both men and women are now recognized as legal co-owners and managers of their cropland.

Abrehet Ghirmay, a 43-year old mother of five, describes the impact that this has had in her life, "*For the first time ever, I have a piece of land that I can use for my whole life, and pass on to my children one day. I am looking forward to a bountiful harvest of wheat and barley and have planted about 35 trees for commercial use. I am confident that I can improve the productivity of my land so that it supports my livelihood, and, one day, that of my children.*"





Mongolia

A balancing act

Tuvshee Orgodol

A herder's life

Western Mongolia is the most remote, ethnically diverse, and mountainous region of Mongolia. Its vast mountain steppes provide habitat for many species, corridors for seasonal migrations (of wildlife as well as herds of livestock), and critical ecosystem services. In Uvs '*Aimag*' (province), some 38,000 nomadic and semi-nomadic herding families occupy these landscapes. Herders are adapted to the rigours of living in these mountainlands, and have a deep and intimate relationship with their land and the critical resources it provides – water and grazing – to support the animals that are their primary source of food and cash income.

> *"We had a peaceful and abundant life."*
>
> – TUVSHINJARGAL ORGODOL

Tuvshinjargal Orgodol (who is known as 'Tuvshee') is a 57-year old herder who lives in Gurvan Jigertei ('Three Jigertei') in the Bukhmurun 'Soum' (district), close to the Mongolian-Russian border. She, like her ancestors before her, is a sheep herder with a deep love of her homeland, "*My ancestors lived here for a very long time as herders, and I have lived this life since I was born – I have never been to school or university. I have raised eight children here. Four of them are herders, but the others have gone away to live in Ulaanbaatar (*the capital city*). When I was young, the landscape of Gurvan Jigertei was really beautiful. In summer the area was covered with dark green grass and throughout the seasons the steppes provided abundant grass and water. Many herds of cattle from surrounding areas used to come here, and our livestock grazed alongside black-tailed gazelles. We had a peaceful and abundant life.*"

Changing times

Over the past decade, this picture has been changing, with rapidly intensifying land degradation and desertification placing the future of traditional herders – and the integrity of the mountain and desert steppe ecosystems that support them – at risk. Below the surface of the steppes lies a vast repository of mineral deposits – coal, copper, and gold – and mining exploration and exploitation is increasing rapidly, restricting the amount of land available for herders and affecting water supplies. Tuvshee describes the situation, as she sees it, "*Gurvan Jigertei has been degraded by coal mining operations and poor land management in recent times. Our pastureland is being damaged and is disappearing and even small springs, ponds, and hand-wells are drying up. The vegetation was so scarce between 2012 and 2014 that our animals could not lay on enough fat to survive the harsh winter, and we lost many livestock. This brings such misery to nomadic herders like us whose livelihoods depend directly on nature's resources and the weather.*"

With increasing competition for land between different land users, herders and wildlife can no longer move unfettered across the landscape, leading to overcrowding and overgrazing. Increased herd sizes, changed grazing regimes, and land tenure arrangements, have resulted in declining availability and health of pastures, reduced herd fitness, soil erosion, degradation of water sources, and loss of biodiversity – with all of these impacts worsened by the effects of an increasingly unpredictable climate.

The herders show great awareness of the problem, but did not know how to solve it. Tuvshee explains, "*We are heavily dependent on pasture condition. Many herders are trying to live close to the border region where grazing is still available, and some of them have even settled there. We are aware that this small area cannot provide enough pasture and water for all of our livestock – and the animals of nearby herders – as there is not enough rain and there are no more springs. But we have no other choice.*"

Setting off on a new path

This is where the GEF-funded 'Land Degradation Offset' Project has come into play. In a collaborative effort involving government, the mining sector, and local communities, a range of measures is being put in place to address land degradation issues arising from competing land uses (such as those described by Tuvshee), and to invest in Sustainable Land Management (SLM) to rehabilitate degraded lands and avoid future degradation. One of the critical interventions has been to address the issue of water supply and quality, and to restore productivity to over-burdened rangelands. Tuvshee describes how the project is helping in her area, bringing benefit to about 18 herder families, "*Last spring, we discussed this problem with the regional ('Soum') government and the land degradation project team. As a result, a small pond (check-dam) has been established nearby to help us store water, and about 250 hectares of pastureland are being restored.*"

In addition, alternative income generating activities are being introduced that allow communities to retain their deep connection to their land and rural lifestyles, while using natural resources in ways that maintain ecosystem integrity. Living near the check-dam described by Tuvshee, is the 'Tsakhir' community conservation group. They are pursuing livelihoods based on wildlife management and sustainable use of wildlife resources. The land they occupy has been reserved for conservation and sustainable use as part of the government's commitment to set aside ecologically sensitive areas, protecting them from damaging extractive land uses such as mining, and using them instead as natural assets to support sustainable livelihoods. In Tuvshee's view, these efforts are showing signs of success, "*The Tsakhir community are no longer managing their livestock as other nomads do, but are earning their income by managing the wildlife. This environmental group has now become one of the most successful communities in this area when it comes to income generation.*"

Background to the story

With a land area of some 1, 500 million km^2, and a population of a little over three million people, Mongolia is the world's most sparsely populated country. The rugged beauty and sheer vastness of its landscapes – which include everything from the high, snow-capped Altai mountains, to vast steppes, lush forests, and parched deserts – is awe-inspiring. The country stands at the interface of the world's southernmost tundra and northernmost desert, and its diverse habitats harbour globally significant biodiversity – this includes numerous rare, endangered, and unique species, such as the secretive snow leopard, giant argali sheep and Przewalski horses. Climatically, Mongolia is characterized by an extreme continental climate – long cold winters, short hot summers, a high incidence of wind, and unpredictable rainfall; with an average of 257 cloudless days a year, this is undoubtedly the 'country of blue sky'.

About 40 percent of Mongolia's population is rural, made up of traditional herders who still follow nomadic and semi-nomadic lifestyles, with customs dating back to the times of Genghis Khan. The rest of the population is urban, and mostly young, with people following modern careers and lifestyles and aspiring to a higher standard of living.

Despite the low population pressure, more than 70 percent of the land surface of Mongolia is affected by land degradation. This has been caused by a combination of natural factors (extreme weather, skeletal soils, and climate change), and human-induced impacts such as overgrazing and, increasingly, mining.

UNDP is helping the government of Mongolia to implement the GEF-financed 'Land Degradation Offset' Project, to reduce and offset negative impacts of mining on rangelands in the western mountain steppe region, and to test new approaches to overcome the conflicts that have arisen between mining and traditional land uses, such as livestock herding. It brings together government role-players, mining companies, NGOs, pasture user groups, and other community organisations to implement landscape-level land-use plans and sustainable land management practices that reduce, avoid, and offset the impacts of land degradation. The project also seeks to promote sustainable consumption and production, protect the livelihoods of local communities, and ensure equitable access to adequate water and land resources for all land users (see page 62).

Digging Deeper

Piloting land degradation offsets in Mongolia

Mongolia's economy has shown rapid economic growth in recent times, driven largely by exploitation of the country's vast mineral resources, but this has carried high costs: erosion of cultural values and traditional lifestyles, and increasing land degradation. The result has been decreased land productivity, with serious implications for vulnerable rural communities, national productivity, and the quest for equitable and sustainable development. Three years ago, some 2,768 mining exploration and exploitation licenses had been granted, covering about 11 million hectares (representing about 7.5 percent of the total land area). Exploitation of mineral resources is essential for sustaining the type of economic growth needed to meet the aspirations of an increasingly urban population and a rapidly-growing market economy. But, a balance needs to be struck between this and other land uses – especially livestock husbandry, which is the second largest economic sector in the country and the mainstay of rural communities – and managing Mongolia's unique ecosystems sustainably.

It is for this reason that the Government has embraced the concept of a green development programme which includes measures to rehabilitate degraded land and water resources, reduce and avoid future degradation, and offset the negative impacts of mining operations where they do occur.

The concept of offsets is new in Mongolia, with the first ever biodiversity offset programme introduced as recently as 2012. For this reason, training and capacity building has been an important aspect of the 'Land Degradation Offset' Project. Amankeldi Mektihani, who works as a mine engineer at the Khotgor coal mines in Uvs Province, describes the benefit of the training provided through the project, "*The main outcome of the training was not only increased awareness of and capacity for implementing land degradation offsets, but also improved cooperation between local government organisations, private mining companies, and civil society groups. We have recently concluded the development of an offsets plan and our company has increased its budget for implementation of environmental management actions by 74 percent.*"

At ground level, mining companies are working alongside pasture users groups to rehabilitate degraded land and support alternative income generating activities, such as sustainable wildlife management and use, and harvesting, sale, and marketing of natural products such as sea-buckthorn (a wild berry used as food for people and animals in the dry, eastern parts of Mongolia). Work has only recently begun, but, already, local communities, government and mining companies are seeing progress as Mongolia embarks on its green development pathway.

'Gaaya' Galsandondog, who is the Governor of Khovd Province, sums up their ambitions, "*We have set forward four objectives to reduce, offset, and prevent land degradation. These include taking more land under state protection, rehabilitating degraded pastures and introducing sustainable livestock management plans, adopting best practices in the mining industry and implementing an offsets policy, and placing more land under afforestation. We are committed to achieving green development through multi-stakeholder collaboration and effective public-private partnerships. I have no doubt that if we meet these objectives, we will make great strides to achieving our goals for sustainable development.*"

Burkina Faso

Social networks for sustainability

Drought and scarcity

Every year, as the month of May approaches, farmers in the Dalo commune of Central-West Burkina Faso watch the sky and hold their breath, wondering if the rains will come. This should be the onset of the short 'wet' season, bringing the life-giving rain without which crops will fail and grazing will disappear, causing food shortages and hardship for the people who live here. The climate in this part of the country is harsh and hot, with temperatures reaching 45 degrees Celsius, and increasingly frequent droughts during which rivers dry up completely. Under these conditions, it is not uncommon for farmers to go from having a good harvest in one year, to nothing at all the next, and, during the 'hungry years,' families have to sell off what few possessions they have to buy food.

For women, the immediate worry is about how to feed their families, but, their lives are also badly affected by land degradation and increasing scarcity of many other things that they rely on from nature to meet their daily needs. "*We need wood for making our cook-fires, and this is becoming more and more scarce, and we have to go further to find it than before," says* Selemou Seni, the President of the Yiida Cooperative Society, a women's group in Dalo. *"Certain leaves, flowers and roots that we eat or use for traditional medicines are also getting harder to find or have even disappeared from the forest. This is a real problem because the people here are poor, and we rely on traditional medicine to treat the sick."*

The changes observed by Selemou arise from a combination of protracted drought, widespread deforestation (caused by large-scale clearing for agribusiness, and local over-harvesting), stripping of riverbanks for cultivation (due to land and water scarcity), a lack of suitable restoration measures, and increasing land-use conflicts (including between humans and wildlife) – all of which contribute to creeping desertification, poverty and food insecurity.

Cultivating women's power

Agriculture is the mainstay of the subsistence and commercial economy in the Central-West Region. Traditionally, women do not own land, but participate in farm activities on land owned by their husbands or male relatives, according to ethnically- and culturally-defined rules. If women want to cultivate land independently, they have to borrow or rent it from those who own it, and their land-use tenure arrangements can change at any time. As individuals, women also find it difficult to access adequate finance and agricultural resources, which limits their land-management options, productivity, and earning potential, and leaves them vulnerable and disempowered.

Although women generally do not participate in village-level governance, they occupy a prominent place in the community in their role as mothers and home-keepers, and influence decision-making in subtle ways. Social networks have for a long time played an important role in Burkina Faso, to optimize use of limited land, share equipment and labour, manage access to rangelands, and facilitate access to cash. Although women's 'natal' groups (based on ties with their paternal family) have brought some land-use benefits, these have been limited.

With the advent of the Country Partnership Programme on Sustainable Land Management (SLM) in Burkina Faso, this picture is changing. Women's associations are benefitting from support provided through this UNDP-supported, GEF-financed initiative to introduce SLM, with benefits for livelihood and food security, and the condition of farmland and natural habitats on which these depend. In the commune of Dalo, the project is helping the 30-strong Yiida Cooperative Society, to improve their socio-economic conditions through the application of sustainable land- and water-management practices, and diversified income-generation strategies.

Small steps, big strides

One of the most important impacts this has had, is to increase the earning power of women, and their ability to provide enough food to meet daily needs. *"We were helped to develop an irrigated field to produce rice at a site that was previously degraded and unsuitable for any sort of production. We were also trained in dry-season production techniques using other crops, and were supplied with inputs such as seeds, and organic and mineral fertilizers of good quality," says* Zenabou Kanyili, a member of the Yiida Cooperative Society. *"As a result, we have produced over 600 kilograms of bulbous onion, and, in the dry season, I harvested a significant quantity of onion, sorrel and bean leaves and okra, which we use in the preparation of sauces that accompany our different local dishes. This has meant that I am spending less money on buying food, and, with the sale of surplus produce, I can save a little money for use in the dry season."*

The support of the project has also helped the Yiida Cooperative Society to achieve legal status, which has far-reaching impacts.

"Being a part of this co-operative society gives me great pride," says Suzanne Zio, the Treasurer of the society, *"Because of the support we have received, our living conditions are improving. We have set up working capital of more than 150,000 CFA (US$300), which we can use to fund future activities."* The new legal status also gives the women access to supplementary credit if needed. Suzanne adds, "*We have built up knowledge and experience and have been supplied with practical things like an ox-plough and subsidized fertilizer, and this means that we can apply good farm management practices.*"

Many farmers are now applying SLM technologies on their farms, such as sowing crops in planting pits (called '*zaï*'), and building stone contour bunds, to capture runoff and prevent slippage of soil. Women have also been trained to build and use energy-efficient cook-stoves, which reduces demand for firewood, and frees up some of the women's time (which was previously spent collecting wood) to spend on other income-generation activities, such as the production of '*soumbala*', a condiment made from '*néré*' *(Parkia biglobosa).*

Empowered through knowledge and skills, and improved status in their community, the Yiida Cooperative Society, and other women's associations like it, is better able to provide for the food, health and educational needs of their families, and they have become better stewards of the land that supports them.

"Today we participate in community life through our presence and membership in professional and community-based organizations," explains Zenabou. *"For us, these are mechanisms through which we meet other community members, exchange experiences and participate in programmes that improve our knowledge and social and economic conditions. Before, we were women of a 'village group'; but, now we're a cooperative society for development, for ourselves and for our community. Our status has improved and many more opportunities are now opening up for us."*

> *"We were women of a 'village group'; but, now we're a cooperative society for development – for ourselves and for our community."*
>
> – ZENABOU KANYILI

Background to the Story

Burkina Faso falls within the Sudano-Sahelian climatic zone, where climate patterns are influenced by the aridity of the Sahara Desert. The severe droughts of the 1970s and 1980s, which affected most of the Sahel region, had significant and long-lasting impacts on the climate of Burkina Faso, with dry years becoming more frequent and rain increasingly unreliable. For a country that is heavily-dependent on rain-fed agriculture for food production and livelihoods, this has far-reaching impacts on people's lives, and negative consequences for the environment. The Central-West region of Burkina Faso has for centuries experienced seasonal movement of people in search of fertile land, pasture and opportunities for trade, but, overlaid with drought, poverty and increasing pressure from conflicting land-uses, these displacements have led to environmental degradation, famine and further mass-scale migrations.

Building on existing local-level innovations and efforts, the government of Burkina Faso, with support from UNDP, has developed a GEF-financed Country Partnership Programme for Sustainable Land Management, made up of three sub-programmes, each centred in a different part of the country. The overall aim of the Programme is to improve the productivity of rural resources in Burkina Faso by adopting a sustainable, integrated and holistic approach for combatting desertification and alleviating poverty (See page 63).

The work featured in this story was supported by the Centre-West sub-programme, which will be implemented in three phases, over an extended period.

Digging Deeper

Empowering social networks to address land degradation

The challenges of desertification and food insecurity have shaped the people of Burkina Faso's relationship with their land, and with each other, and social networks have emerged as powerful mechanisms for fighting land degradation. In recent years, farmer-led innovations in sustainable forest management, and traditional soil and water conservation, have contributed significantly to maintaining and improving the productivity of agriculture. This has provided a receptive environment for introduction of sustainable land management technologies that are adapted to the local conditions and offer new approaches for reclaiming degraded land and protecting critical resources, such as water.

Working through partnerships, with a particular focus on empowerment of women's associations, the Country Partnership Programme on SLM has demonstrated how the implementation of sustainable soil and water-management practices can increase agricultural productivity and improve food security among farming households.

One method that has proved effective for improving soil fertility – and is popular among farmers because of its relative simplicity – is the use of 'zaï' pits. These are shallow depressions (about 20 x 15 centimeters) that are filled with organic manure, in which seeds are sown when it rains. The pit traps the water, and provides a fertile environment in which germination can take place. Using this type of method, farmers are managing to reclaim desertified land.

Rain-fed rice production has nearly doubled through the use of stone-wall bunds and raised earthen banks, which trap rainwater runoff, and enable it to spread out across the rice fields. During the dry season, instead of abandoning these fields for others, women now shift to producing high-value crops such as tomatoes and onions to sell at the market. Since the adoption of these sustainable land management measures, overall productivity has improved and cash flow is more evenly distributed across the year, which makes it easier for women to care for their families and improve their living conditions.

Lebanon

Protect, restore, reduce – working towards land degradation neutrality

The critical Qaraoun

The Bekaa Valley, in the east of Lebanon, is a wide sweep of fertile land running between the Mount Lebanon and Anti-Lebanon mountain ranges. These mountains are important 'water towers', and much of the country's remaining forest is found on their slopes. The Bekaa is also Lebanon's agricultural heartland, hosting large-scale commercial farms (producing table grapes and wine, wheat, corn, vegetables, and stone fruits), and subsistence agricultural activities. In the north – which is drier – traditional nomadic, small-stock farming is the main livelihood of the rural poor.

The Bekaa Valley contains the Qaraoun catchment, which feeds Lebanon's biggest and longest river, the Litani. This catchment is a critical source of water for food production and urban use, and provides habitats – including important forests and wetlands – that harbour threatened biodiversity. The ability of the catchment to provide critical ecosystem services is being undermined by accelerating land degradation, resulting from historic deforestation, excessive firewood collection, overgrazing, inappropriately-placed infrastructure, unplanned expansion of urban and informal settlements, and loss of agricultural fields to competing land uses.

In recent years, nearly 400,000 displaced people have settled in the Bekaa Valley – many of them in the Qaraoun catchment – placing increasing pressure on already-stretched land resources, and leading to conflicts between land users. Where conflict and poverty prevail, people have turned to coping strategies that meet their short-term needs for food and safety, without consideration for the long-term sustainability of their land-use practices.

To address both the drivers and effects of land degradation in the Qaraoun catchment, the Government of Lebanon has partnered with UNDP to implement a GEF-financed Sustainable Land Management (SLM) project (referred to here as the 'Qaraoun SLM Project', for short). This initiative is an integral part of the national stabilization and development agenda, and supports efforts to strengthen the resilience of Lebanon to socio-economic and climatic shocks and disturbances.

Taking a landscape view

One of the root causes of land degradation in the Qaraoun catchment, and elsewhere in Lebanon, has been the lack of an integrated approach to land-use planning and management. Although policies and plans that include land-use zonation plans are in place, these have a narrow sectoral focus, and do not specifically take land degradation into account. Weak co-ordination and overlapping mandates across the four spheres of government have also meant that application and enforcement of national plans and policies relating to land use is problematic. The Qaraoun SLM Project provides a strategic and integrated landscape approach to address these challenges.

Adel Yacoub, who is the Head of the Natural Resources Protection Department at the Ministry of Environment, and the national focal point for the Qaraoun SLM Project, explains, "*This project is one of the first – if not the only – initiative in Lebanon that takes an integrated approach to managing land use in forests, rangelands, and agricultural ecosystems. At the one end of the scale it tackles existing land degradation by rehabilitating degraded ecosystems, and, at the other end, it works to reduce or prevent further degradation. It will achieve this through the development of integrated land-use plans that take land degradation into account at the landscape and local scale, and that are in line with sustainable use of natural resources. It will also provide practical, sustainable land management solutions for role-players across all sectors, based on sound diagnosis of the problem.*"

Adel Yacoub

Master planning

Over the years, the Government has issued numerous laws and decrees aimed at safeguarding natural resources in the country. Until now, these have lacked an overarching planning and policy framework to connect them. The Qaraoun SLM project will help to address this by strengthening the 'master planning' approach that is already in effect in the country, by integrating sustainable land management principles into land-use planning, determining land productivity values, and identifying how they can best be protected.

Protection of sensitive ecosystems and valuable natural assets is a key component of the landscape approach to avoiding land degradation. Adel Yacoub explains, "*The Ministry of Environment is using several measures to preserve important natural areas, including the establishment of protected areas, declaration of RAMSAR sites and Important Bird Areas, and so on. Also, we have engaged closely with the quarrying sector to regulate and manage licensing, extraction, and rehabilitation activities. But we know that our planning needs to be strengthened and we are working towards the development of a 'Master Plan for the Protection of Mountains, Natural Areas, Beaches, Green Areas and Agricultural Areas'. We also recognize the importance of building environmental protection into national planning at multiple levels.*"

Chadi Mohanna

Sami Feghali, who is the Head of Land-Use Planning at the Council for Development and Reconstruction, explains how the country is using 'master planning' to reduce and avoid the negative impacts of land degradation on socio-economic conditions, '*The National Physical Master Plan for the Lebanese Territory (2009)' recognizes the impacts that land degradation has on people, and the importance of land-use planning to minimize these negative effects. It seeks to identify risk-prone areas such as those susceptible to floods and landslides, and ecologically sensitive areas, to ensure that these are accounted for in our physical planning, and that development is in line with available resources.*"

At the district level, sustainable land management principles will be integrated into development plans that identify ecologically sensitive areas to be placed under improved management, and degraded areas that should be rehabilitated. The project will also help set up a multi-sector planning platform to promote co-ordination between all relevant role-players, and align environmental, social, and economic objectives.

Local-level land-use plans will identify forests, rangelands, and arable lands that are currently degraded, and in which SLM must be implemented to restore the flow of vital ecosystem services, and avert local-level conflict between land users. The project will also test new land management approaches in different production sectors to reduce environmental stressors and sustain the livelihoods of local and downstream communities.

Choosing the right tools

For land-use plans to be effective, land-use managers must be able to monitor changes in the landscape, and they need to know which tools to apply, where, and when, to restore degraded land and reduce future degradation.

Dr Chadi Mohanna, Director of Rural Development and Natural Resources at the Ministry of Agriculture explains the dilemma, "*We can see the direct impacts of land degradation on the landscape, but indicators that can be used to trigger appropriate remedial action are scarce, and very difficult to quantify. Applying corrective measures can be laborious and financially demanding, especially when the degradation is extensive or has been in effect for a long time, and rehabilitation in some cases can take years.*"

Integrated land-use planning represents a significant advance over earlier approaches to landscape restoration, in which site-selection was unsystematic and driven by diverging objectives. "*We are looking to address these challenges by integrating the 'landscape' concept into our Forest and Landscape Restoration Mechanism. Before, reforestation and land reclamation were seen as stand-alone activities at particular sites, but now they are tools we use specifically to address landscape restoration*," Dr Mohanna explains.

In support of this process, the Qaraoun SLM Project will help put in place a robust decision-support system, including a Strategic Environmental Assessment, and an effective monitoring system for tracking trends in the condition of the land, so that corrective action can be taken before degradation becomes irreversible. The monitoring framework will inform ongoing planning and will guide development investments and enforcement.

Keeping track

The drivers of land degradation operate at multiple scales and in many different places across Lebanon, and particularly in the Qaraoun catchment, where the large-scale movement of displaced peoples adds an extra layer of complexity to land-use patterns. Under these circumstances, it is difficult to monitor resource use and enforce compliance with existing land-use regulations.

Dr Mohanna provides some examples of the particular challenges with which his department has to grapple, *"With the influx of refugees into the catchment, hectares of cherry orchards in Arsal were lost and these will take many years to rehabilitate to a productive state. Along the Lebanese-Syrian border, small ruminants wander without control, often feeding in areas where grazing is restricted, causing depletion of rangelands and damage to forests. At another scale, people are harvesting medicinal plants and selling them to passers-by to make a little money, but, this practice is unsustainable and difficult to control – despite the existence of clear regulations for the sector."* Add to this mix the excessive use of harmful pesticides on commercial farms, increasing pollution of water-bodies, unwise and unplanned urban settlement, and the increased incidence of drought and damaging wildfires, and the need for an integrated approach to land-use regulation becomes obvious.

The Qaraoun SLM project will work to strengthen capacity for enforcement, and will engage land users in participatory planning processes – if people have been involved directly in the development of land-use plans, they are more likely to comply with their provisions. The aim is to shift land stewardship mindsets from 'deplete-abandon-migrate', to 'restore-sustain-protect' in order to reduce pressures on forests, rangelands, and water resources, whilst ensuring that the livelihood and security needs of the community are met in an equitable and sustainable way.

Sami Feghali

Background to the story

Lebanon is among the smaller countries of the world, with an area that occupies only 0.07 percent of the Earth's land surface. But, this country grapples with a disproportionate share of complex challenges resulting from its war-torn past, and, more recently, the pressures brought to bear by the influx of over one million displaced Syrian people. A long history of unsustainable and weakly-regulated land use, compounded by the ravages of war, has left the natural landscapes of Lebanon deeply scarred. Accelerating land degradation poses a significant barrier to the country's efforts to reconstruct its infrastructure and economy, restore its social fabric, protect people's livelihoods and well-being, and restore peace.

Lebanon falls into the Mediterranean ecoregion – one of the most endangered in the world, and one of 25 globally recognized biodiversity hotspots. Much of the country is dominated by mountainous landscapes, which are important watersheds. Historically, these landscapes were largely cloaked in forests and woodlands, but mounting human-induced pressures over the span of many years has led to widespread changes in land cover, including a reduction in forest cover from 74 to 13 percent. This undermines the provision of ecosystem services, especially the supply of water – the life-blood of this drought-prone land.

Over the past decade, the Lebanese government has adopted a suite of policies to address the pressing problems of land degradation and desertification through active reforestation, enhanced protection of important biodiversity, integrated management of water resources, and improved land-use planning. To assist the government in these efforts, UNDP is supporting the GEF-funded project in the Qaraoun catchment, to promote the adoption of sustainable land management practices to minimize land degradation, rehabilitate degraded and abandoned lands, and support sustainable livelihoods. This project builds on the achievements of earlier work to preserve aquifers through large-scale reforestation, and other methods to improve forest cover, and contributes to new efforts to set targets for achieving land degradation neutrality (See page 64).

Digging Deeper

Land degradation neutrality

The Qaraoun SLM Project promotes a landscape approach to the management of natural resources. This involves managing a mosaic of land uses including, protection, restoration, production and sustainable use, across landscapes to deliver ecological, economic, and social benefits. This is consistent with the concept of land degradation neutrality, the objective of which is to maintain or even improve stocks of healthy and productive land resources over time.

SLM is the key mechanism for achieving land degradation neutrality through practices that help to avoid degradation, improve the productivity of land, and enhance the resilience of land resources and the communities that depend on them. This means that people at grassroots level, whose everyday decisions and actions affect the condition of land and water resources, must be involved from the outset in developing integrated land-use plans, and in designing and implementing measures to halt and reverse land degradation.

In the Qaraoun SLM Project, this need will be addressed through participatory land-use planning involving all land-user communities, without gender or livelihood bias, but, with special effort made to involve vulnerable and marginalized groups, such as herders. In the Qaraoun catchment, a large proportion of the rural community depends on livestock for their sole source of income. Livestock-rearing practices have, however, been inefficient, unplanned, and poorly managed, and the influx of herders and additional livestock from across the border has complicated the situation. With an established tradition of non-compliance with regulations, shepherds are often considered as outcasts – especially in areas where livestock grazing in outlawed – and they are amongst the most marginalized in the catchment. Work with these land users will focus on building capacity for implementation of sustainable rangeland management practices, and promoting the adoption of alternative income generation activities to strengthen livelihood security, which is essential for realizing the goal of land degradation neutrality.

Advancing the Sustainable Development Goals

Namibia

"The Country Pilot Partnership (CPP) Programme for Integrated Sustainable Land Management"

Programme duration: 2007-2012
GEF grant: $9,000,000
Co-financing (cash and in-kind): $36,467,112

"Sustainable Management of Namibia's Forested Lands (NAFOLA)"

Project duration: 2014 - 2019
GEF grant: $4,446,000
Co-financing (cash and in-kind): $22,500,000

15.2 Sustainable management and restoration of dry forests promoted through the declaration of Community Forests and strengthening of Community Conservancies to implement improved land stewardship over at least 500,000 ha.

15.3 Rehabilitation of degraded rangelands promoted through de-bushing, regulation of grazing, and other restoration measures, in 13 land degradation hotspots, to combat desertification and strive for land degradation neutrality,

15.6 Fair and equitable sharing of the benefits of sustainable use of natural resources to be advanced through the development of nature-based, alternative income generating activities (such as integrated ecotourism based on conservation of African Wild Dogs, and sustainable harvesting of Devil's Claw).

1.3 Access of rural communities to natural and economic resources, and secure tenure and control over land, ensured through support for the declaration of a Community Forest and strengthening of a Community Conservancy, affecting 5,000 people in 112 settlements and villages (to be replicated in 10 other Community Conservancies).

1.3
1.4 Community livelihoods and resilience enhanced through restoration of degraded rangelands for improved livestock production, and productive use of invasive species for income generation and creation of local employment in the catchment of the African Wild Dog Community Forest.

13.1 Adaptive capacity to climate-related hazards and natural disasters, such as drought and damaging fires, strengthened through holistic management of dry forest ecosystems, sustainable livestock and rangeland management to reduce of overgrazing, improved fire management, and de-bushing of encroached areas to reduce fuel loads, and diversification of livelihood activities to strengthen resilience.

Cuba

"The GEF Country Pilot Partnership (GEF-CPP) on SLM"

Programme duration: 2008-2023
GEF grant: $10,000,000
Co-financing (cash and in-kind): $79,437,499

15.3 SLM practices implemented over 15,000 ha at demonstration sites to combat desertification, halt deforestation, and restore degraded soil, with replication taking place in 153 municipalities, to achieve land degradation neutrality.

15.8 Measures taken to reduce the impact of invasive alien species over 12,100 ha of terrestrial and aquatic ecosystems, by removal of invasive species and use of bio-control agents.

15.9 Ecosystem values incorporated into national and local-level planning, with SLM principles built into the regulatory and policy framework of the agriculture, forestry, and economic planning sectors. This includes the development of a Manual of Procedures for Sustainable Land Management; and incorporation of SLM into 100 technical norms and standards in the agricultural sector.

2.3 Agricultural productivity restored to previously-degraded land and incomes of food producers at least doubled (at demonstration sites) through adoption of SLM, and through secure access to land.

2.4 Sustainable food production systems and resilient agricultural practices introduced such as use of organic worm compost, bioenergy, biopesticides, mulching, intercropping with leguminous plants, and use of check-dams to maintain ecosystem services, strengthen capacity to adapt to climate change, and improve soil and water quality.

6.4 Water-use efficiency improved by up to 70% at some sites, through community in engagement integrated water resource management.

8.3 SLM integrated into the 'Procedure for assessing economic, environmental, social and technological impact of SLM practices' to inform investment policies that support productive activities, job creation, and innovation.

17.7 Development, transfer, and dissemination of environmentally sound technologies achieved through training (over 4,070 farmers, experts and school teachers), awareness-raising and incorporation of SLM into the school and university curricula.

17.13 Policy coherence promoted through incorporation of SLM into regulatory and policy frameworks in agriculture and national development planning, including the Decree Law on Idle Land, the National Land Management Scheme, and Cuban Standards for Soil and Water Quality.

Tanzania

"Reducing Land Degradation in the Highlands of Kilimanjaro Region" (known as the Kilimanjaro SLM Project)

Project duration: 2010 -2015
GEF grant: $2,630,000
Co-financing (cash and in-kind): $18,800,000

15.2 Demand for forest products reduced and restoration of degraded forests promoted through the creation of alternative sustainable livelihoods that are not based on consumptive use of forest resources (such as apiculture, mushroom, and poultry farming), the establishment of tree nurseries (55,000 tree saplings) and implementation of tree planting projects covering 18, 425 ha.

15.3 More than 59, 000 farmers and 265 district officials trained to implement SLM practices, over 100,000 ha of land affected by soil erosion rehabilitated, and tree cover increased by 60% at pilot sites, as a contribution towards combatting desertification, restoring degraded land and striving to achieve land degradation neutrality.

15.4 Capacity of the Kilimanjaro mountain ecosystem to provide services essential for sustainable development enhanced through the adoption of SLM measures, with 74,532 ha directly under SLM practices and another 26,978 ha impacted through upscaling.

15.11 Capacity of local communities to pursue alternative livelihoods strengthened through introduction of apiculture, mushroom growing, improved animal husbandry, and poultry-keeping. With the establishment of these micro-enterprises, household incomes across participating communities increased by between 7% and 300%.

2.3 Average annual agricultural productivity increased (by 58% for bananas, 126% for maize, and 120% for shade coffee), reducing the number of food-insecure days of participating households by 27%, and generating a 95% average increase in incomes.

7.3
7.4

Improved energy efficiency achieved through the introduction of 901 fuel efficient stoves that burn 67% less wood and emit 50% less carbon dioxide than old cook stoves.

13.1 Resilience and adaptive capacity of local communities to increased drought and unpredictable rainfall strengthened through measures to improve water-use efficiency through rehabilitation of water furrows, installation of rainwater tanks and drip irrigation, and through the use of weather data from 14 mini-weather stations to plan the farming cycle.

Kazakhstan

"Supporting Sustainable Land Management in Steppe and Semi-Arid Zones through Integrated Territorial Planning and Agro-Environmental Incentives"

Project duration: 2015-2020
GEF grant: $1,900,000
Co-financing (cash and in-kind): $9,499,459

[1]

15.1 Conservation, restoration, and sustainable use of dryland ecosystems enhanced over 85,503 ha.

15.3 Desertification addressed through agroforestry, soil and water conservation, and afforestation measures introduced over 68,697 ha (including afforestation of the dried Aral Sea bed) to restore degraded land and soil.

1.2 Incomes of 729 farmers (460 men and 269 women) increased by between 30 and 79% as a result of improved land productivity due to use of efficient irrigation systems, cultivation of high value crops, improved livestock breeding, and other SLM measures.

1.3 Access to economic resources facilitated for the poor and vulnerable (especially previously displaced people and women) through job creation (93 permanent jobs and 221 jobs for seasonal workers from adjacent regions created on 19 new, sustainably-managed farms covering 154,200 ha of restored land), and through recruitment of 131 local residents (mostly women) to work in forest nurseries and land restoration projects.

3.9 Well-being and health of more than 74, 000 people living in the Aralsk district improved due to reduction of hazardous contaminants in the air, soil, and water achieved through improved land cover and a shift to organic farming that does not use chemical pesticides and fertilizers.

6.4 Water scarcity addressed, access to water and water-efficiency improved through reconstruction of the Basykara Canal and Sholakaryk Channel, a 100% improvement in the per-hectare efficiency of irrigation system, installation of water filters, and improved participation of local communities in integrated water management.

13.1 Exposure and vulnerability to climate hazards and natural disasters reduced through the establishment of green zones to protect villages from moving sands exposure and vulnerability to climate hazards and natural disasters.

1. Results achieved in the Kyzylorda region, since 2015 to date.

Eritrea

"Mainstreaming Climate Risk Considerations in Food Security and Integrated Water Resources Management in Tsilima Plains"

Project duration: 2017-2021
GEF(LDCF) grant: $9,050,000
Co-financing (cash and in-kind): $27,500,000

"Capacity Building for Sustainable Land Management in Eritrea"

Project duration: 2009-2016
GEF grant: $1,820,000
Co-financing (cash and in-kind): $8,542,000

15.3 Degraded forest and woodland restored over 9,000 ha in the Tsilima highlands and plains, through the introduction of soil and water conservation measures, including terracing of hillsides, construction of check-dams, and planting of 2,300,000 tree seedlings.

2.3 Agricultural productivity and incomes of small-scale producers, including women, increased in 11,000 households and 28 villages in Serejeka sub-*zoba*, through implementation of the 1994 Land Proclamation to secure long-term access to land; and, 17,000 households in the Tsilima region benefitting from climate-smart agriculture measures.

2.4 Sustainable food production strengthened by introduction of resilient agricultural practices, including use of drought-resistant and early-maturing sorghum and millet varieties (with production increasing from 0.5–0.6 to 1.0–1.2 tons/ha) using the new varieties; diversified production of grains, fruits, vegetables, and fodder plants enabled by improved water conservation measures (such as check-dams) and use of improved small-scale solar-powered irrigation systems by 400 to 500 households over 120 ha of previously-abandoned land.

5a Women's access to land promoted through implementation of long-term land-use (usufruct) rights, and their capacity for management of natural resources built through involvement of the National Union of Eritrean Women as an active member of the SLM sub-*zoba* committee, participating fully in SLM awareness-raising and capacity building programmes.

6.4 The number of people suffering from water scarcity reduced through construction of 4 micro-dams (with a capacity of 120,00m^3–340,000m^3) in Bashari, Wazentet, and Gebsie villages, enabling year-round water supply to 1,200 households in Hemalmalo and Habero sub-*zobas*.

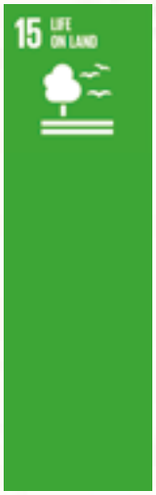
6.5 Integrated water resources management implemented through support for the financing and roll-out of the Eritrea Integrated Water Resources Action Plan.

13.2 Climate risk and resilience mainstreamed into the National Food Security Strategy and the Integrated Water Resources Management Action Plan.

Mongolia[2]

"Land Degradation Offset and Mitigation in Western Mongolia"

Project duration: 2016-2019
GEF grant: $1,289,863
Co-financing (cash and in-kind): $5,280,000



15.3 Land degradation neutrality to be achieved through the introduction of land degradation offsets in the mining sector, and the inclusion of SLM into land-use planning and mining licensing approval processes.

15.4 The capacity of mountain and steppe ecosystems to provide benefits that are essential for sustainable development to be enhanced through introduction of SLM over 41.5 million ha of pastoral production systems and natural habitats.

15.5 Degradation of natural habitats and production landscapes to be reduced through the introduction of integrated landscape management and land degradation offsets over 100 hectares (at pilot sites).

15.11 Conservation, restoration, and sustainable use of terrestrial and freshwater ecosystems in Western Mongolia to be strengthened through a 10% increase in the extent of the protected area network.

2.4 Productivity of rangelands to be restored through introduction of sustainable rangeland management systems that avoid and reduce land degradation and build resilience of vulnerable herder communities to environmental and economic shocks and disturbances.

6.3 Water quality and availability to be improved through protection and restoration of water-related ecosystems, reduction of pollution from mining, and introduction of integrated water resource management involving communities and mining operators.

12.2 Implementation of the 10-year Framework of Programmes on Sustainable Consumption and Production to be supported through incorporation of SLM principles and the land degradation offsets model into the Green Development Programmes of provincial governments in Mongolia.

12.6 Sustainable Consumption and Production to be promoted by encouraging mining companies to increase their budgets by at least 50% for implementation of land degradation offsets and sustainable mining practices, and to integrate sustainability information into their reporting cycle.

17 Institutional capacity for implementation of land degradation mitigation and offsetting framework to be increased by 25%, through effective public-private partnerships involving government, mining companies, and pasture-user-groups to address land degradation and build sustainable livelihoods.

2. Results achieved at pilot sites since 2016, or anticipated in future.

Burkina Faso

"Country Partnership Programme for Coordination and Institutional Development of Sustainable Land Management"

Programme duration: 2009 – 2014
GEF grant: $1,000,000
Co-financing (cash and in-kind): $8,616,088

"Country Partnership Programme for Sustainable Land Management CPP-SLM: Sub-Programme for the Centre-West Region"

Programme duration: 2012 – 2017
GEF grant: $2,219,594
Co-financing (cash and in-kind): $8,141,633

15.2 Pressures on forests reduced through adoption of energy-efficient cook-stoves, and improved integration of agro-forestry into farming systems.

15.3 Soil condition improved and land-cover restored over 776 ha in 9 communes, through increased investments in SLM, and uptake of SLM technologies to reduce soil erosion and restore fertility to previously degraded land.

2.4 Sustainability of food production systems enhanced through the introduction of water-conservation measures (bunds and dams), and drought-resilient practices that increase productivity (yields of rice increased from 2.4 to 4 tons/ha).

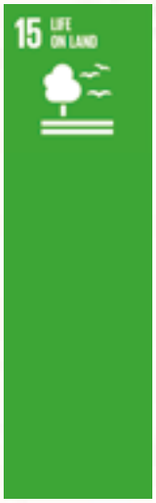
5a Participation of women in agricultural production enhanced through empowerment of women's co-operative societies, in the case of the Yiida group bringing benefits to 30 women and their families. Benefits include: improved access to land and economic resources and reduced competition with men for access to land (through the participation of women in land tenure committees, and support of male champions); improved control over natural resources; increased and diversified incomes; and better access to financial services.

8.3 Entrepreneurship and innovation encouraged through inclusion of women in agricultural production, and valorization and sustainable harvesting of non-timber forest products, such as African Locust Bean or *néré* (*Parkia biglobosa*).

Lebanon[3]

"Sustainable Land Management in the Qaraoun Catchment"

Project duration: 2015-2019
GEF grant: $3,187,671
Co-financing (cash and in-kind): $18,050,000



15.1 Ensure the conservation, restoration, and sustainable use of terrestrial and freshwater ecosystems, including all types of forest, and ensure that measures to restore and rehabilitate degraded forests are identified, demonstrated, and integrated into existing Forestry Management Plans.

15.2

15.3 Contribute to achievement of land degradation neutrality (LDN) through: (a) co-ordination of and participation in LDN target-setting workshops; (b) facilitation of the legal assessment to underpin LDN targets; and (c) restoration of 10,000 ha of rangelands and 300 ha of forests.

15.9 Ecosystem and biodiversity values incorporated into national Master Plans, Integrated Land Use Plans in West Bekaa and Rachaya, a Land Use Monitoring System, and decision-support framework to ensure that SLM considerations guide development and investment planning and that changes in land use remain within acceptable limits.

2.3 Productivity of rangelands and farms enhanced and the incomes of small-scale farmers and pastoralists increased through uptake of SLM techniques by 50% of land users at pilot sites in the project implementation area (in West Bekaa and Zahle).

8.3 Productive activities, entrepreneurship, and the growth of small enterprises promoted through development of an econometric model to develop production best practices and support alternative income generating activities, in line with available resources.

16.7 Establishment of a peaceful and inclusive society in the Qaraoun catchment supported through inclusion of all stakeholders, without prejudice, in responsive, participatory land-use planning to earmark parcels of land for different land uses, and design appropriate sustainable land management measures.

3. This project has only recently started and information reflected here represents targets, not results achieved.

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