Land for Life

CREATE WEALTH
TRANSFORM LIVES

As a mother is
Allowing us to cultivate her soil
Mother Earth gives her land
to us for our own bidding
We must, in turn,
Return the favor
Nurture Mother Earth,
as she nurtured us

Extract of poem, "Mother Earth,"
by Yen Li Yeap (13 years old)

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ISBN 978-92-95110-22-9 (hard copy)
ISBN 978-92-95110-21-2 (e-version)

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CREATE WEALTH, TRANSFORM LIVES

A Joint Publication of the World Bank/TerrAfrica and UNCCD Secretariat, with contributions from International Union for the Conservation of Nature, The Global Environment Facility, UNDP's Global Policy Centre on Resilient Ecosystems and Desertification and the UNCCD Land for Life Programme.

UNCCD
United Nations Convention to Combat Desertification

WORLD BANK GROUP

TERRAFRICA
REGIONAL SUSTAINABLE LAND MANAGEMENT

UN DDD 2010 - 2020
UNITED NATIONS DECADE FOR DESERTS AND THE FIGHT AGAINST DESERTIFICATION

Contents

Foreword

The Global Goals of the United Nations General Assembly mark a radical shift in the way the international community has solved land degradation issues in the past. For a start, there is a target on land. Goal 15, which focuses on the management of land resources, has a bold target: for every nation on Earth to become land degradation neutral by 2030. In simple terms, it means that in 15 years, we should put an end to the past pattern of degrading more land than we are restoring back to health every year. By 2011, when this idea was first proposed, at least 169 of the 192 United Nations member states had declared that they were affected by desertification, land degradation, and/or drought.

The adoption of this target can inspire positive change. But it would blow our minds if we could really see what 2030 would look like if we took that target seriously. We would create new jobs and pull nearly 2 billion poor people out of poverty. And we would live in beautifully restored environments that are not just resilient to climate change, but whose productivity would soar and its people thrive, in spite of climate change.

But we do not need to imagine what that world might look like. The stories and pictures within this book provide us with the picture of that tomorrow, today. Becoming land degradation neutral is not simply about restoring degraded lands. It is about self-interest—making sure the land can still provide food and fresh water for us, our children, and to the third and fourth generations. It is about giving every child, from Mongolia to Afghanistan and from Ethiopia to China, the fighting chance for a better life.

If this all sounds too good to be true, read this book. The pictures show the transformation and testimonies of families and communities rising from ruin and thriving, and of a restored man-made desert spawning a millionaire after rehabilitating the land. The achievements are phenomenal and the heroism of the people is refreshing. The target to stop land degradation is not wishful thinking. Whoever takes it seriously can expect to reap a meaningful reward!

Monique Barbut
Executive Secretary

Preface

The livelihoods of the poorest people in the world depend on land, water, forests, and other natural resources. Sustainable management of these crucial natural resources is at the heart of achieving the World Bank Group's twin goals to end extreme poverty and boost shared prosperity. Nowhere is it truer than Africa, a continent that has contributed the least to the profound changes underway in the Earth's climate but whose people will suffer its withering impact the most. Africa's climate and development agendas are inextricably linked.

Land is life. In Africa, drylands make up 43 percent of the continent's land area, account for 75 percent of agricultural land, and are home to 50 percent of the population. Frequent droughts accompanied by unplanned, unsustainable, and poorly managed use of land and water has contributed to the deterioration of the natural resources base in these areas. Investing in landscape restoration efforts and in improved natural resource management can help to strengthen the livelihoods of those communities who are dependent on these fragile natural assets.

The World Bank supports multiple regional initiatives, as well as a large number of projects, aimed at helping countries restore degraded lands, improve productivity, and become more resilient to the effects of climate change. These actions are similar to those described in Land for Life, a collection of stories on communities' and institutions' contributions to enhancing the resilience of both ecosystems and livelihoods, creating wealth and transforming lives. The stories prove that land degradation is not inevitable.

The initiatives described in this book have brought land degradation, climate adaptation, and resilient landscapes and ecosystems to the forefront of many policy and investment dialogues at national, regional, and global levels. But addressing these challenges will require heavy investments and effective partnerships to mobilize the resources needed. TerrAfrica, which is led by the African Union's NEPAD Agency, has supported governments by leveraging up to US$3 billion for sustainable land and water investments for the Great Green Wall, Sahel, and the Horn of Africa Initiatives, among others.

This year, 26 African countries and partners will launch the Resilient Landscapes Initiative to restore 100 million hectares of degraded and deforested land in Africa by 2030. The Resilient Landscapes Initiative will focus on improving soil fertility, food security, access to clean water, creating green jobs, bolstering economic growth and livelihood diversification, and increasing the capacity for climate change resilience and adaptation. The initiative is centered around people's social, economic and environmental welfare, and goes beyond single-sector interventions. Its success, however, will require the support and engagement of all land actors. As the stories in this report invite us to do, let's join forces to help support the sustainable use of land for better lives.

Makhtar Diop
Vice President for Africa Region
World Bank Group

Abbreviations

AD	Anno Domini (After Christ)
ASTOS	Tourism Association for the Southern Oases
BC	Before Christ
BIOTO	Tourism Information Office
CA	Conservation Agriculture
CARLA	Climate Adaptation for Rural Livelihoods and Agriculture
CBD	Convention on Biological Diversity
CBO	Community Based Organization
CCTV	Chinese Central Tele-Vision
CDP	Community Development Plan
CO^2	Carbon Dioxide
COAM	Conservation Organization of Afghan Mountain Areas
CORDAID	Catholic Aid for Relief and Development
COS SB	Cluster des Oasis du Sahara Social Business
DEG Die	Deutsche Investition-und Entwicklungsgesellschaft
DGCL	Directorate General for Local Collectives
EBDA	Egyptian Biodynamic Association
ESARO	East and Southern African Regional Office
GAN	Green Asia Network
GEF	Global Environment Facility
GHGs	Green House Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GLASOD	Global Assessment of Human-Induced Soil Degradation
HOA	Horn of Africa
IEM	Integrated Ecosystem Management
IFAD	International Fund for Agricultural Development
IUCN	International Union for Nature Conservation
MSP	Medium-Sized Project
NGO	Non-Governmental Organization
NRM	Natural Resource Management
PES	Payment for Ecosystem Services
POS	Programme Oasis Sud
RAP	Resource Advocacy Programme
RMB	Renminbi
ROWA	Regional Office for West Africa
RUA	Rangeland Users Association
SBR	Shouf Biosphere Reserve
SDF	SEKEM Development Foundation
SDGs	Sustainable Development Goals
SEKEM	Vitality or full of energy
SHGs	Self-Help Groups
SLM	Sustainable Land Management
SLWM	Sustainable Land and Water Management
UK-DFID	United Kingdom Department for International Development
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WFC	World Future Council
WPI	Water Poverty Index
WUA	Water Users Association

Introduction to This Book

The title of this publication, *Land for Life: Create Wealth, Transform Lives,* reflects the growing realization that land management underpins sustainable development. This realization is now embodied in the Sustainable Development Goals. Goal 15 focuses on "life on land" to: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation as well as biodiversity loss. *Land for Life: Create Wealth, Transform Lives* shares real-life examples of communities around the world that are already taking steps toward achieving Goal 15, and more specifically, this target: By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation–neutral world.

LAND DEGRADATION AS A CHALLENGE

Land is an important livelihood asset for millions of people across the globe. In the developing world, land-based ecosystem services are directly linked to human well-being. For example, about 1.6 million people depend on forest landscapes for their livelihoods. They get their food, fiber, fuel, and medicine directly from forests. Nearly 5 billion hectares of the planet's land area are under crop and livestock production, which utilizes natural capital — soil, water, and genetic resources — to produce food, fiber, and biomass. Managing this land efficiently and effectively is essential for maintaining the planet's life support system.

Unfortunately, sustainable land management remains one of mankind's greatest challenges. Each year, as many as 10 million hectares of land completely lose their productive capacity due to unsustainable practices. More than 2 billion people, including some of the world's poorest smallholders and pastoralists, are affected globally. This degradation is the result of land uses or a process, or combination of processes, including those arising from human activities and habitation patterns. The gradual loss of tree and vegetative cover, depletion of soil nutrients and organic matter, and decline in the quality and quantity of water resources are pervasive symptoms of land degradation in the developing world.

Land degradation reduces the capacity of the soil to produce goods and services, such as providing nutrients for crops and livestock, sequestering and storing carbon, safeguarding biodiversity, and supporting water and nutrient cycles. Severely degraded land ultimately becomes unproductive, and the economic cost of restoring such lands is often prohibitive. As a result, new areas are continuously opening up for agriculture and grazing to meet growing demands. Yet the planet's land-based assets are finite. We face a real risk of undermining future options if existing areas under production are not managed sustainably.

Sustainable land management is critical for ensuring the sustainable flow of ecosystem services to support current and future demands in crop and livestock production. Projections of global population growth suggest that the pressure to expand cultivated areas for food and feed production will increase, especially in developing countries. However, there are limited options for major new expansions. Sustaining the productivity of existing agricultural and grazing land is therefore essential to meet the current and

future needs of increased food production without compromising ecosystem goods and services.

THE PROMISE OF SUSTAINABLE LAND MANAGEMENT

Land for Life: Create Wealth, Transform Lives covers two main themes, as its title suggests, that reflect the relationship and interdependence between environmental well-being and human welfare—wealth creation and human security.

Creating wealth for human welfare through broadening livelihood opportunities and alternative incomes reduces pressure on land and related resources. The initiatives and projects demonstrate how institutions and local governance support wealth creation through sustainable land management. The initiative on pastoral communities in Kenya shows how the cooperation of state and customary institutions to manage land as a common property resource led to transformed lives. In India and Namibia, the projects include a careful consideration of gender as a core priority for successful implementation of sustainable land management. The institutionalization of gender needs, bridging gender disparities between men and women, showed a positive influence on the outcomes of projects.

With regard to human security, the publication highlights how land degradation and climate change are exacerbating extreme conditions in the drylands and leading to forced migration. A number of projects point to land degradation as an explanatory factor in human and animal migration, as well as a source of conflict among land users. As more land gets degraded and ecosystem services are lost, the impacts of climate change and climate variability are greatly pronounced. This reduces the size and value of the productive land that is the life support for millions of people, who can no longer produce crops or rear healthy animals. Their food security and food sovereignty are jeopardized. Consequently, such affected communities or individuals must relocate or migrate in search of more productive lands, often leading to the natural resource conflicts that we are witnessing in some dryland regions.

Land degradation is also a factor in rural–urban migration and, in some cases, in the loss of valuable agricultural skills that have been gained over millennia. With the depletion of productive land, farmers and pastoralists in many parts of the developing world can no longer afford to stay in agriculture. The forced migration and then return of the villagers in Mongolia, as well as the non-migration of communities in Afghanistan and in Egypt, in spite of living in some of the would-be most inhospitable environments, show the robustness of sustainable land management.

TOWARD A LAND DEGRADATION–NEUTRAL WORLD

This publication is the third in the Land for Life series for the United Nations Convention to Combat Desertification (UNCCD). The books are geared toward sharing stories of successful sustainable land management from around the world. *Land for Life: Create Wealth, Transform Lives* focuses on the links between socioeconomic and environmental challenges and the efforts to address them in a holistic manner. The initiatives and projects presented in this publication indicate that a land degradation–neutral world is possible. They also point to the fact that efforts to combat land degradation can be linked directly to human well-being, as reflected in the Sustainable Development Goals.

Land for Life: Create Wealth, Transform Lives is a useful compendium of initiatives and projects demonstrating the benefits of sustainable land management for livelihoods, in particularly harsh environments. Through

the selected projects, the book highlights practices and technologies being used to improve and sustain land productivity. The examples provide evidence that sustainable land management can arrest or reverse the degradation of biophysical elements of the land, while offering opportunities to improve the well-being of communities that depend directly on that land. It also shows that when the socioeconomic conditions are improved and livelihoods transformed, land resources are better managed.

Land for Life: Create Wealth, Transform Lives also offers a glimpse of how sustainable land management creates synergies among the three Rio Conventions: UN Convention to Combat Desertification, the UN Framework Convention on Climate Change (UNFCCC), and the Convention on Biological Diversity (CBD). Land degradation releases greenhouse gases above ground (through loss of vegetative cover and biomass) and below ground (through depletion of soil organic matter). Land degradation also leads to the loss of biodiversity through devegetation and defaunation. Hence, the initiatives and examples in this publication demonstrate bottom-up approaches that support synergies among the three Rio Conventions.

The lessons and experiences should be of broad interest to researchers, policy makers, and practitioners in the environment and development community. Progress toward a land degradation–neutral world will depend on the extent to which these stakeholders collectively engage. Understanding the diversity of approaches for sustainable land management will help to promote suitable policies for widespread implementation. It will also create investment opportunities to maximize impact potential. With this, there is reason to hope that a land degradation–neutral world is possible.

The text is not intended to read as one story with a central theme. Rather, it presents, in unusual detail, the often underestimated or under-acknowledged benefits of managing land sustainably that are particularly vital for behavior change. Some cases provide detailed information about how to mobilize communities, why communities resist change, how to engage patriarchal and powerful groups in society to empower women or how to use evaluations to learn and reinforce positive change. The cases also give the individuals who are directly affected by the projects a voice: from the 78-year old farmer Meresa Demts, from Merere in Ethiopia to Noura Nasser, a disabled girl in Egypt working at a school for children with special needs. Activists, practitioners and consultants interested in making land degradation neutrality a reality by 2030 will benefit, as will journalists looking for striking human interest stories that readers can relate to.

INNOVATIONS: INSTITUTIONS

INNOVATIONS: INSTITUTIONS

Sustainable land management (SLM) has the potential to provide multiple benefits both to the communities that directly depend on an ecosystem and others: neighboring rural communities, urban centers, and the global society. SLM encompasses approaches such as soil and water conservation, natural resources management and integrated ecosystem management. It also involves a holistic approach to achieving productive and healthy ecosystems by integrating the social, economic, physical and biological needs and values. But SLM also requires innovative solutions both to manage the risks associated with climate change effects and to address the unique environmental features associated with different ecosystems.

Such innovations are often diverse, widespread and at times even endemic to the cultural practices of communities. However, there is a risk of undermining these innovations through development and policy interventions or the assumption that rural communities are 'people who do not know what they are doing'.

This section focuses on behavior change: from unsustainable to the sustainable use of land in the drylands of Jordan and Kenya. The change is particularly interesting because it happens among communities that strongly resisted change initially. In the end, they not only change and police the resources themselves, but they also influence policy and regulatory change beyond their local regions. There are several important lessons, but two are particularly striking.

First, participation, through real and not cosmetic involvement of the communities in the dialogue, is indispensable. Resistance to behavior change is not due to the stupidity, illiteracy or even backwardness of communities, as is often assumed. Rather, it is a governance issue. It is a fight for their democratic principles. Traditional norms and rules

are the means by which communities live in peace. However illogical they appear to be, they have an inherent logical that is traceable to the history of the community, as is evident from the Dedha and Hima systems. To change these norms and rules, genuine consultation and dialogue with the communities is vital. Avoiding or overlooking that dialogue automatically compromises the sustainability of the desired change. It will erode with time. Dialogue is the process by which new norms are negotiated and agreed within the community.

Second, there is an economic logic to land degradation. Land is degraded because people have needs they must meet either directly or indirectly. Land restoration and rehabilitation efforts that fail to find the means to meet these livelihood needs will not succeed voluntarily. But as every story in this book demonstrates, SLM adoption rates rise exponentially when people see evidence of the positive results. As the restoration of the Shouf Region demonstrates, it is vital to find effective reward systems in order to get public support for the conservation of ecosystems that provide essential services but are not viable through private payments.

The other insights the chapter offers include the process of marrying local norms and rules with government regulation to produce robust means to avoid land degradation. They draw attention to the agents of change and how key opponents become the lead proponents of change, and to the use of "visioning" as a tool for social change. The chapter also underlines the importance of capacity-building at the local level for the long-term sustainability of the new rules and norms.

Natural Resources Governance as a Tool for Rural Poverty Reduction

Drylands make up 84 percent of Kenya's land surface and support over a third of the country's population of about 44.35 million people (Barrow and Mogaka 2007). Drylands also account for 80 percent of the country's eco-tourism and are home to up to 75 percent of its wildlife (GoK 2005b cited in Orindi et al. 2007). The potential value of drylands in development and poverty reduction is significant. But it is largely unrecognized, if the lack of investments and policy incentives targeting drylands is anything to go by. As a result, the communities living in the drylands of Kenya are among the poorest people in the country. They have less access to social services and infrastructure compared to those not living in drylands.

Traditionally, pastoral land in Kenya belonged to people of a clan linked by decent or cultural affiliation. Land in these communities is not usually regarded as private property. Rather, it is owned collectively by the entire community. Key pastoral resources such as water and pasture are often available to all. Here, traditional or customary laws that

protect the future productive capacity of the land are common. In many pastoral communities, they are used to govern resource access and use. These customary laws are used to negotiate and enforce dynamic and overlapping user rights, which enable herders to manage climatic uncertainty.

The community in GarbaTulla, composed mainly of the Borana pastoralists, use the Jarsa Dedha (the Dedha council of elders) to manage access and use of the pastoral resources. The Dedha council enforces laws, and they are governed by the Gada council (the supreme Boran governance structure). The way this traditional system was set up enabled pastoral vegetation to regenerate in a natural way and ensured conflicts over the use of these resources was limited. This is because the system ensured everyone accessed and used the resources at given times. The Dedha system was also highly respected by community members.

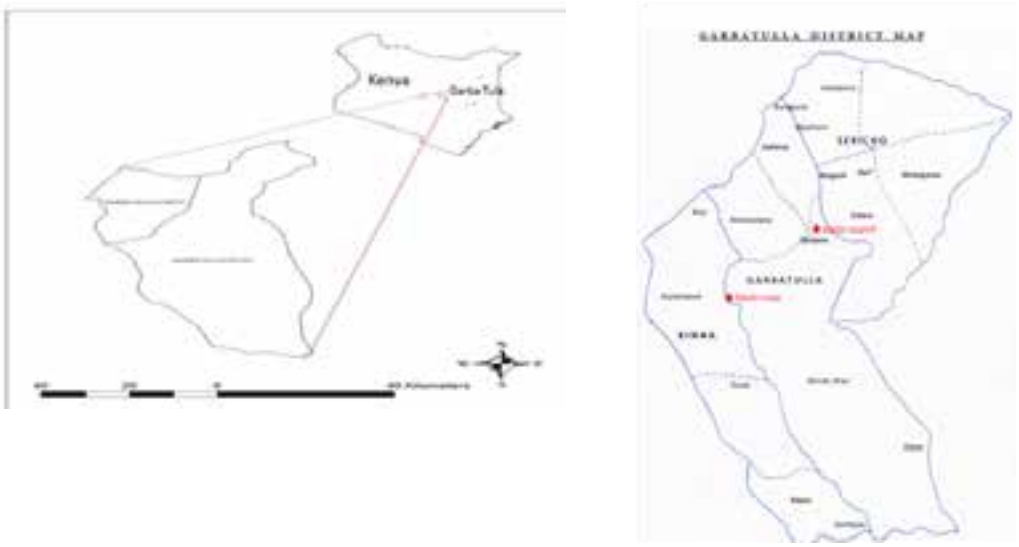
In general, livestock mobility allows pastoralists to use transient and scattered patches of pasture at their peak nutritional value. A skilled herder, for instance, will maximize the time that a herd is grazing on the best quality pasture. The herder relies on a deep knowledge of the local environment and manages herd mobility within the limits set out by the Dedha. The main objective of the Dedha is to ensure that standing forage is preserved for the dry season. Therefore, grazing near permanent sources of water is restricted when alternative grazing resources are available. Communal land tenure enables this mobility by providing the overarching institutional framework within which user rights are applied and renegotiated as environmental conditions change. However, pastoral land tenure today is still poorly understood and not respected. This has resulted in land policies that undermine the pastoral production system.

The International Union for Conservation of Nature (IUCN), in partnership with the Resource Advocacy Programme (RAP), a local community based organization, and with funding from the UK-DFID and CORDAID, implemented the "Improving Natural Resource Governance for Rural Poverty Reduction" project in GarbaTulla's District of Isiolo County. The four year project was implemented between 2009 and 2013. The goal was to "improve governance in order to support better livelihood security and ecosystem management in the drylands of Africa." The four main result areas for the project were: an increase in awareness and policy guidance among decision-makers and stakeholders, based on identified best practices for dryland management; more effective participatory decision making in natural resource use and management, based on strengthened institutional arrangements; local communities are better able to capture viable economic and biodiversity-related benefits from identified dryland ecosystem opportunities; and lessons and best practices are captured effectively and disseminated to promote learning and enable a scaling-up of the positive project impacts.

Strategies to Improve Natural Resource Governance

IUCN conducted a strategic planning process with RAP in order to determine the changes to natural resource governance that the project would support and the strategies for achieving them. The process involved a visioning process that brought out the prevailing governance challenges the communities in the district faced, and

Figure 1. IUCN: Kenya, Water for Livestock



created a vision for change. To the extent possible, the project built on existing governance mechanisms in the GarbaTulla area. In particular, the project built on the customary common property governance system of land and natural resource access, ownership and management, which has been in place for many years and is widely understood and recognized by a large proportion of the community. The project worked extensively with local communities, their representative institutions and with local government partners to support the development of stronger regulatory systems, more robust and effective institutions for natural resource management, and improved planning processes to strengthen the governance of natural resources within GarbaTulla district, and Isiolo County as a whole. The project approach involved several interlinked strands. Some of these included:

The idea of providing mechanisms through which local practices, cultures and innovations can be mainstreamed into official regulatory frameworks for natural resource management in GarbaTulla arose from the recognition that the compliance with laws and regulations is linked to the extent to which such systems reflect local customs, traditions and value systems of the people they are intended to govern. While many of the customs and traditions in this area remain resilient and applicable, the institutional structures through which they were previously enforced have been progressively eroded. The challenge, then, was to find the means by which the local customs, traditions and values could be institutionalized into formal natural resource management regulatory frameworks.

By strengthening traditional rules on natural resource management and formalizing those into laws that guarantee fair access and governance, the resource tenure could be better secured. More security over ones rights to a resource base can encourage more appropriate investment, enables effective decision making on use and management, and enhances the well-being of local people.

The process of developing the local by-laws was highly participatory. It enjoyed the buy–in of the local community and government in order to ensure the sustainability of outcomes and adherence to the law in the future. The by-law development process followed several systematic steps:

1. The collection and collation of information on customary rules for natural resource governance in consultation with key stakeholders, especially elders. The by-law formulation process started with the Ardha and Olla (which are the smallest units for resource management among the Boran community). At this level, elders generate customary rules/ regulations for certain resource management issues. The proposed by-laws were discussed extensively in Ardha meetings and then forwarded to the Dedha, the highest resource management unit, for further discussion and consideration. The Dedha elders are made up of representatives of the different Ardhas.

2. The distillation of customary rules and regulations into a language that will permit for their enactment as regulations within the framework of relevant laws including emerging County government by-laws, the Environmental Management and Coordination Act, 1999, the Water Act, 2002, the Forest Act, 2005, the National Land Policy, and the Constitution of Kenya, 2010.

3. A presentation of the draft by-laws to the community and the holders of customary law for validation and approval.

A customary institution bill for natural resource governance and management was proposed which articulates: a) the roles of elders, b) enforcement mechanisms and c) regulations on water resources, pasture, and woodlands. The guidelines for the other process that the community needed to put in place in order to have their regulations recognized by the statutory system were also developed. These included having the adoption by the County government and their registration with the central government. These guidelines also speak to the options for strengthening customary systems in natural resource governance and management within the emerging policy context in Kenya.

Although the by-law proposed is expected to solve a number of resource management issues, there are still outstanding challenges within this approach. These include: defining 'community' and delineating 'community land', scaling up the by-laws beyond GarbaTulla to the neighboring communities, and harmonizing the formal and traditional institutions of natural resource governance.

Rangeland Users Associations (RUAs) and Water Users Associations (WUAs) were identified as priority local institutions, which were supported in order to manage strategic grazing and water points. These institutions received capacity building training and support, and were assisted in operationalizing

some of the governance strategies agreed in the rangeland plan. In addition, the actors actively supported the capacity building of RAP, both technically and financially. The RAP was assigned the powers to convene meetings and to be the umbrella organization for rallying other traditional natural resource management (NRM) institutions on common issues. By working directly with NRM, institutions, new skills and knowledge was imparted, drawn from the experience gained from engaging with other stakeholders that are also addressing NRM in the district.

County level and national level dialogues were conducted to share lessons and discuss pertinent issues arising from the project. These dialogues helped to harmonize views and priorities across competing interest groups in the drylands, and to promote the adoption of common positions on governance matters in the drylands. These dialogues were also an opportunity to share knowledge about the IUCN approach to support natural resource governance in the drylands. The dialogues provided an opportunity to situate the lessons from the project in wider debates that were emerging within the country due to changes to the constitution and the evolving devolution processes.

Promoting Resilience in the Community Managed Rangelands of Kenya

The northern arid districts of Kenya are home to large pastoral communities. But the changing land use patterns, population growth and the erosion of traditional land management systems are weakening the resilience of the pastoral lifestyle. As drought cycles become more and more frequent, communities are losing large herds of livestock, as their livelihoods become more vulnerable to climatic events.

Moreover, the emergency water development undertaken often inadvertently worsens the situation. The inappropriate siting of water points encourages settlement, which is followed swiftly by a break down in the complex grazing patterns that have evolved over centuries. The end result is both water and land degradation. In addition, the tendency to focus on delivering hardware and technical support often comes at the expense of building the capacity and skills needed to effectively govern land and water resources. This project was driven by the demands by the local communities to eliminate some of the water points that relief organizations had set up. According to the community, these extra water points were distorting the functioning of their ecosystem and they needed to be shut down for the ecosystem to maintain its resilience.

Traditional dryland resource management is often built on synergies between land and water. Pastoralists use a flexible, adaptive system based on mobility, to sustain healthy ecosystems and reduce the land's vulnerability to drought. The Boran customary system sets out laws and regulations for the management of water and land resources, based on a complex web of user rights. While these are legitimate among local communities, they lack State recognition. Thus, the local system is often unable to control access and use of resources- particularly of water- by communities located outside the area.

In 2012, IUCN initiated a project called "Water for Livestock in Isiolo and Garissa Counties, Kenya — Enhancing water resource and rangeland management, community capacity through training and cash for work program". The objective was to improve livelihoods and resilience against drought among targeted communities by: (i) improving access to water for livestock in ways that promote sustainable management of rangeland resources and; (ii) strengthening the resilience of local communities in times of drought and climate variability.

The starting point was to create a strategic water development approach based on community needs and rangeland management plans. The rangeland management plans show the mobility patterns of pastoral communities during the wet and dry seasons. A specific concern for the project was to address the issue of water-rangeland balance in order to extend the grazing period in the wet season grazing area. With community needs at the centre of water development,

the focus lay in balancing water needs and pasture availability.

A key assumption was that during the wet season, communities are likely to move to the wet season grazing areas in search of pasture. However, despite the abundance of pasture, the decline in the water availability for their livestock would force them to move away from these areas. The intervention was meant to enable the community to stay in these areas long enough to utilize all the available pasture before moving on. Thus the idea evolved to develop sub surface dams to collect water to make it available for livestock, which in turn, would encourage communities to stay in the pasture areas for a longer period.

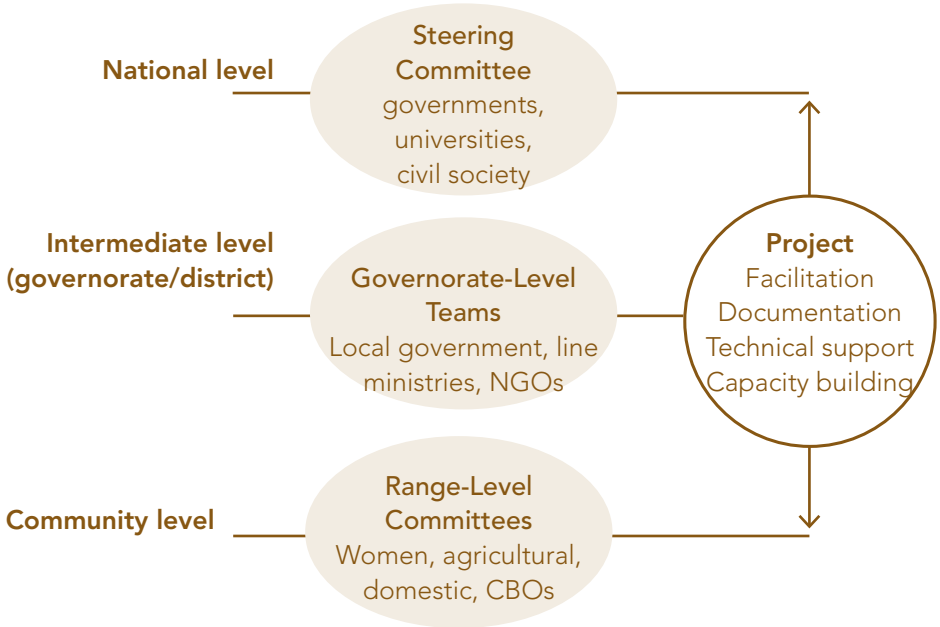
The process of developing the subsurface dams involved a social feasibility process. Adequate consultations are carried out with communities and other relevant stakeholders to agree on the location of these water points. Some of the key factors considered in the location of the water points are community movements, proximity to communities and the relevance of these water points to the community needs. There is however a risk that if the wrong infrastructure is put in place, the livestock will stay permanently and this will cause heavy degradation of a potentially fragile part of the ecosystem.

Thus, the focus also turned to strengthening the capacity of local institutions to sustainably govern and maintain water infrastructure in order to improve the lives of the community groups. Through sustainable and regulated water management, the project also expected to indirectly reduce the number of water-related conflicts.

IUCN envisioned three outputs by working with the community: (i) building up the traditional systems; (ii) understanding the key role that water plays in the management of an entire rangeland; and (iii) allowing for the flexible use of the rangeland's patchy, yet rich, resources.

After years of working with the community, the infrastructure for water that was set up improved access to water for livestock. Livestock could graze for two to five months more before moving to the dry grazing zones, which ensured the pasture was not exhausted. Simply put, it ended the problem of overgrazing which drives land degradation.

Figure 2. Consultation Processes Undertaken to Manage Kenya's Rangelands



The supply of domestic water now lasts between two to five months. And the water quality has improved. Community members reported a change in the color and taste of the water. In some areas, the incidence of waterborne diseases among children has fallen. The distances community members are travelling to find water have fallen, in some instances from 12 or 15 km down to 3 km.

Community members report that there are fewer conflicts over water resources because the water infrastructure has enabled everyone to get an adequate supply of water. However, this might not have been adequate to quell the conflicts. Capacity development trainings were carried out and well received by the different participants. The dialogues that took place in this process led to the creation of multi-stakeholder platforms that have helped to reduce the friction between groups and to sustain the integrated water management plans.

Community Participation Leads to Better Conservation

Various studies have shown that the western region of Jordan faces a multitude of threats to its biodiversity and natural ecosystems as a result of habitat loss and general land degradation processes associated with human expansion and economic growth. But by combining the traditional Hima and integrated Natural Resource Management (NRM) approaches, this region has recovered a lot of its degraded lands and has reversed biodiversity loss.

Naturally Disadvantaged

Jordan is well known for its droughts and water shortages. The northern mountains of Iraq, most of the Mount Lebanon and Anti Lebanon mountain ranges, as well as the southern regions between Jordan and Palestine are especially at risk of drought. In many rural communities, water is not the only problem. With little to no proper infrastructure, equitable shares of water merely exist and low environmental awareness and low incomes are the norm.

Jordan's demographics are potentially major factors affecting its development. Jordan's population exceeds seven million, most of whom live in urban centers. This fact poses a great threat in light of the many climatic changes and environmental challenges Jordan faces. As one of the driest countries in the world, Jordan shoulders large burdens in dealing with climate change impacts.

Despite great efforts by local governments to try to adapt to and manage climate change impacts in Jordan's rural areas, water

resources per capita are drastically falling as a result of mismanagement and population growth. Jordan's natural resources are under stress and are expected to be further aggravated in the future.

Overall, Jordan's Southern Highlands fall within the "moderate" land degradation severity class, which is characterized by greatly reduced agricultural productivity (GLASOD 1990). This result is based on the use of field observations, focus group discussions with land users and other stakeholders, and analyses of available documentation and information during project implementation. The qualitative assessment of the major land degradation types, as well as assessment of the major causes and incidences in the Southern Highlands has improved. Humans worsen the situation.

Rangeland degradation is driven by overgrazing. The impact of overgrazing on the vegetation is evident from the excessive uprooting of the green matter such as grass and bushes which leads to reduced seeding, reduced regeneration, and consequent reduction in plant production the following year. Also, there is a change in the composition of plants and a decline in their volume and frequency. In addition, during drought, there is a stronger decline in productivity compared to non-degraded rangelands.

Unsustainable land use and management, recurrent droughts, and climate change are the main causes of biodiversity loss in the Southern Highlands. Unsustainable land-use practices include improper plowing, inappropriate rotations, inadequate or nonexistent management of plant residues, overgrazing of natural vegetation, forest cutting, inappropriate land use, random urbanization, land fragmentation, and over-pumping of groundwater. The root cause is the unrelenting population growth, which exerts excessive pressure on the natural resources to meet increased food and income demand. Overall, the constraints facing deprived land users, such as poor access to technology, lack of capital, and insufficient organization, are the factors that lead to unsustainable practices.

Irrigation is marginal among the smallholders of the Southern Highlands. Some supplementary watering is provided to fruit tree plantations through spring water-fed conveyance systems, or through water-harvesting devices such as cisterns. However, due to water scarcity and insufficient investment capacity for adequate water-harvesting systems and proper maintenance of field distribution networks, this leads to water stress, low productivity, and even salinization.

The over-pumping of groundwater basins and land degradation have also resulted in negative effects on ecosystem diversity, animal and plant diversity, and agro-biodiversity. For instance, the average abstraction per year of groundwater from the renewable ground resources at Jafr basin currently stands at 180 percent of its combined safe yield. Here, groundwater is used for domestic, industrial, and agricultural purposes. Many of the springs are very small, and some have dried up in recent years due to drought and over-pumping of the aquifers. The springs are usually owned and operated by small, traditional farmers.

Moreover, the water scarcity associated with high poverty and population growth puts more pressure on the natural resources to meet increased food and income demands. In Ma'an, the governorate has a huge number of Jordanian families that are associated with tribal cultural customs. Its residents are commonly known as pastoralists. They live on agricultural land that is known for its mountainous soil and mild climate. Ma'an has high poverty and unemployment rates. Pastoralism is one of their major income-producing activities. Losing almost 50 percent of their livestock over the past ten years has made it harder to keep their profession alive.

Local community members have been unable to find alternatives or improve their management of natural resources mainly due to:

- lack of grazing areas, either caused by overgrazing or lack of access to land;
- poverty and high unemployment rates;
- lack of infrastructure and/or services;
- water shortages and drought; and
- lack of education and environmental awareness.

Generating Income Creates Sustainability

Planning is a key element of sustainable land-use management, particularly in areas that are experiencing high levels of competition for limited natural resources, such as water. Integrated NRM brings coordination and collaboration across the individual sectors. It also encourages stakeholder participation, transparency, and cost-effective local management. The Hima traditional grazing system implies a sense of accountability for the actions undertaken for resource management. It emphasizes accountability to and ownership by the local people for sustainable land use and management. With effective methods of participation and proper stakeholder engagement, natural systems have the ability to reverse degradation and restore biodiversity. When the integrated NRM approach was combined with the Hima approach, a powerful tool for both conservation and sustainable development was created.

A novel approach to mainstreaming biodiversity was conceived in Jordan under a component of a Global Environmental Facility (GEF) medium-sized project (MSP):

Mainstreaming Biodiversity in the Sylvo-Pastoral and Rangeland Landscapes in the Al Sharah Agricultural Development Region of Southern Jordan. It uses new approaches such as ecosystem management and more effective capacity development. The specific objectives of the project are to mainstream biodiversity conservation in sylvo-pastoral and rangeland management activities, produce local economic benefits, and alleviate poverty in a sustainable and replicable manner. One of the major foci for the IUCN Regional Office for West Asia (IUCN ROWA), working in cooperation with the Ministry of Agriculture in Jordan, the International Fund for Agricultural Development (IFAD) and the Hashemite Fund (for development of Jordan Badia), was to improve government and community understanding of the economic value of biodiversity by demonstrating the economic benefits to livelihoods resulting from rangeland biodiversity conservation.

Making Progress: One Step at a Time

The first step in this initiative was to apply a methodology that ensured the development of holistic planning. Here, the needs of end-users are brought to the attention of intermediate-level land managers from the local governorate and natural resources-related ministries. Including the consideration of gender and different wealth and power groups in the planning stage ensures that the poorest and most vulnerable people get an equitable share of and access to the resources. Managers also exercise control and ownership over land resources. The planning process identifies and develops location-specific long-term visions and strategies for land resource management to fight desertification. These are based on a careful reflection of environment-related problems and the development needs of the community. The process is supported by several participatory tools for collecting and analyzing relevant information, such as stakeholder analysis and participatory rural appraisal. Visioning exercises consist of mapping natural resources in their current state, including areas of degradation, followed by mapping of the desired future states of each of these areas. Local people then agree on a plan of action for getting from the current to the envisioned state. There is a strong emphasis on defining the roles and responsibilities of the local community.

Local communities can only excel if certain skills are gained through specific training techniques that the government delivers through targeted trainings. Each governorate has shown that different types of skills are needed to cope with the environmental degradation occurring daily. Governorates have also shown how to increase local community capacities toward sustainable land management.

From these exercises, it became evident that a key aspect required for all training courses is income generation. Integrating the local community into the decision-making process helps achieve both proper natural resource management and local community income needs.

Subsequently, the training was formulated around three thematic areas: agriculture, livestock, and water management. Agricultural management training needs revolved around specific knowledge and techniques in cultivation, pruning, and irrigation. Livestock management focused on arid land management techniques and income-generating projects targeting food production. Grazing techniques were not needed, but organized grazing was required. Water management was key—therefore, water management techniques and training needs were embedded in the other two themes, as well as addressing well construction, rainwater harvesting techniques, and maintaining spring water consumption.

A facilitation approach is used. Some of the most influential actors in rangeland management are challenged to come to a strategic consensus on how to work together to tackle

specific local issues of shared concern. The output from these local community exercises is used in meetings to highlight the need for innovation and policy revision.

The second step is to deliver relevant training. The objective is to help initiate proper rangeland management and to revive Hima to protect and conserve the land.

In the first year of the project, which started in 2014, 29 tailored training courses were provided to a group of local community members and government officials. This was made possible after a needs training assessment conducted in the governorate of Ma'an (areas of al Heesheh and Al Manshiyeh). Training courses and project implementation were conducted using a participatory approach built on increasing stakeholder dialogue and producing environmental action plans for the local community.

Figure 3. Successful Community Participation in Southern Jordan

After building capacity to manage knowledge of the Hima communal management system in the area, incomes increased from biodiversity-related livelihood opportunities. The number of local people who are aware of their biodiversity areas and who support biodiversity mainstreaming in rangeland ecosystems has more than doubled.

A series of success stories show that ecosystem services can provide a unifying language to produce economic, business, and environmental rewards. Beneficiaries are recognizing that they have a stake in conserving their environment and reviving their lands.

Lessons Learned and Going Forward

Increasing local capabilities offers future economic incentives, which are valuable for maintaining rangeland ecosystem services through small income-generating activities. In 2016, the partners foresee benefits arising from payment for ecosystem services (PES) from these projects. If the PES is fruitful, it would further prove that community participation and stakeholder engagement are key factors in conserving biodiversity and reducing poverty.

However, in this instance, PES is not designed to reduce poverty. Rather, PES is an economic incentive to foster a more efficient and sustainable use of ecosystem services. Biodiversity conservation becomes an implicit objective of this approach. Biodiversity is not only viewed as a natural or cultural element, but also makes a vital contribution to the productivity of the ecosystem. In addition, by maintaining and strengthening the capacity

of an ecosystem to cope with changes, biodiversity offers tremendous insurance value, especially for the groups' most vulnerable to environmental degradation and disasters.

However, there are ways to design PES that can help low-income families to earn money by restoring and conserving ecosystems. This is a critical selling point, because many rural people earn their living from natural resource–based activities, such as forestry and farming. In certain contexts, PES can present new incentives for sustainable management—in the form of regular PES. These regular payments could in turn promote long-term sustainable use and even conservation of the resource base by providing both a reliable source of supplementary income and additional employment in the community. Evidence from other sites in Jordan shows that a modest payment for drying herbs, for instance, can provide a meaningful increase in net incomes and also lead to the adoption of more sustainable land management.

A series of success stories in Jordan show that ecosystem services can bridge divergent economic, business, and environmental interests. The beneficiaries are recognizing that they have a stake in conserving their environment and reviving their lands.

Testimonies

Firas and Fares

Firas and Fares, twin brothers who have greatly benefited from capacity building, took advantage of their resources and have increased their income from biodiversity projects. After the training, the brothers started bee keeping and sustainably grazing their sheep and goats. Firas and Fares have become positive models in their community by showing how biodiversity projects increase incomes.

Um Enad

Um Enad has suffered the effects of land degradation her whole life. With overgrazed lands, she couldn't keep her family afloat. Living in Almanshiyeh, Um Enad took the initiative to strive and succeed. After taking a couple of training courses under the project, Um Enad has started producing homemade yogurt, butter, and jam. In less than three months, Um Enad made enough profit to send her three children to school.

Um Enad Al Jazy: Homemade products for happiness

Firas & Fares Al Habahbe: Bees for biodiversity and conservation

Salem Al Amareen: Cucumbers & tomatoes with a can do attitude

Salem

Every year, Salem lost his savings through unproductive agriculture. For years, he tried hard to break even, with little success. Living in the Al Heashe, in southern Jordan, Salem was one of the lucky people to benefit from the training courses offered by the project. In less than three months, Salem is the proud owner of four greenhouses and expects to earn a net profit this season from his farming. He grows cucumbers, tomatoes, and peppers with the knowledge he gained from the training courses in agriculture and irrigation.

Abdel and Tareq

Today, two brothers, Abdel Razak and Tareq, are using what was once an abandoned spring. They use the spring to sustainably irrigate their crops, applying drip irrigation systems inside their greenhouses.

Abdel Razak and Tareq Al Ghunaimeen: Making use of natural resources

Resources

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Value-Driven Land Rehabilitation in the Shouf Area of Lebanon

The value of protected areas in promoting sustainable land management is grossly underestimated, as demonstrated by the Shouf Biosphere Reserve (SBR) in Lebanon.

According to the Global Forestry Resource Assessment of 2011, forests cover 136,900 ha, or 13.3 percent of the total land area of Lebanon. These forests have played an important role throughout the Middle East because of their extremely wide range of forest species, habitat types, and landscapes. Long ago, Lebanese cedars (*Cedrus libani*) and other forest species were exploited for shipbuilding, the construction of temples and other major monuments. But more recently, the Ottoman Empire used the cedars to construct railways. This long history of timber extraction and human intervention, including animal grazing, led to the degradation of forest resources and the loss of most mountain forests. The civil war in the mid-1970s, uncontrolled urban expansion after the war, and frequent fires have resulted in the total forest area declining from about 20 percent of the country to only 13 percent. Today, the country is part of the Mediterranean basin, one of the most vulnerable regions in the world to climate change. Water constraints typical of the Mediterranean climate and the location of the region between two markedly different zones, the humid/cold temperate zone and the hot desert zone, may result in dramatic changes if there is even a slight shift in the climate band—even just a few degrees of latitude north or south.

It is in this context that the Shouf Biosphere Reserve (SBR) was established in 1996 to conserve and protect the standing forest—620 ha of *Cedrus libani* forest, the largest expanse of this species in Lebanon and 25 percent of the remaining cedar forests in the country. The SBR also had three other goals:

- restore the ecological integrity of the ecosystem through high-profile, science-based research and fieldwork;
- support rural entrepreneurs and the weakest sectors of villages (women, youth, and the unemployed) by boosting sustainable business practices and facilities linked to tourism, agriculture, and traditional products; and
- boost the image of the SBR at the national and global level and position it as a leading destination for tourism, a showcase for sustainable land management, and an example of ecosystem-based adaptation to climate change in the region.

The SBR is considered important nationally and internationally because it covers an area of 50,000 ha, equivalent to about five percent of the overall area of Lebanon. It is one of the largest protected mountain areas in the Middle East. It is home to over 70,000 people, who live around the core and buffer zones of the reserve. It encompasses 24 different municipalities that stretch over three *muhafazat* (districts). Government legislation, Law No. 532 of July 24, 1996, declared the

"communal lands of Niha, Jba'a, Mrousti, Khraibe, Maasser, Barouk, Bmohreh, Ain Dara, Ain Zhalta villages, in addition to the government-owned lands on the eastern side of Barouk Mountain" a nature reserve. The SBR is under the authority of the Lebanese Ministry of Environment. In July 2005, the United Nations Educational, Scientific and Cultural Organization (UNESCO) declared the Shouf Cedar Nature Reserve a "biosphere reserve" and named it the Shouf Biosphere Reserve. The SBR includes:

- the Shouf Cedar Nature Reserve (established in 1996), located in the Shouf mountains of central Lebanon;
- the Ammiq Wetland, east of the Shouf in the Beqaa Valley—Ammiq is a Ramsar site and one of the last remaining wetlands in the Middle East; and
- twenty-four villages surrounding the biosphere from the eastern and western sides of the Barouk and Niha mountains.

The SBR lies between longitude 35° 28'– 35° 47' east and latitude 33° 32'– 35° 48' north at an altitude ranging from 1,200 m to 1,980 m. It is located along a mountain range known as the Barouk Mountains, which is a southern extension of the Mount Lebanon Range. The range runs parallel to the Mediterranean coast. The Beirut–Damascus highway and the town of Jezzine define the northern and southern borders of the reserve. The western slopes of the range face the Shouf region. The eastern slopes face Mount Hermon and form the western escarpment of the Beqaa Valley.

When the Al-Shouf Cedar Reserve (SBR) was established in 1996, a number of adverse practices had been largely uncontrolled: wood cutting, overgrazing, and barbeque fires at the base of ancient cedars were all rampant, as were the accumulation of trash and the carving of names and initials on the trunks. These activities led to the death of many ancient cedars. But the establishment of the SBR in 1996 put a halt to all tree cutting and burning, charcoal production activities, and the uncontrolled grazing of goats.

These changes in land use within and around the protected area produced a dramatic change in the vegetation cover of the area. The natural regeneration on the periphery of the cedar forests and the rejuvenation of the oaks and pines throughout the area has since been well documented. In addition,

the grassy meadows last longer in spring and summer, giving young seedlings of larger trees a better chance to establish.

Today, the Shouf Reserve is a model for promoting sustainable land development in the region. It is promoting nature conservation, the preservation of water catchment areas, the protection of scenic areas, controlled development, tourist facilities, and clean roads. The SBR and the municipalities in this region are at the forefront of the movement to improve income-generating capacity without causing irreversible harm to natural resources. Moreover, the reserve is reviving the economy of the local people and is improving their livelihoods. Due to these activities, many jobs were created and, as a result, out-migration is minimal. Many people are coming back and living within the reserve's territory due to its natural wealth. It is managed and organized so as not to cause harm to the protected areas and the whole environment.

Rehabilitation and Restoration

Restoration of the degraded forest lands within the SBR has provided evidence on the connectivity of these activities. Restoration is helping reduce the threat that high fragmentation and isolation pose to the ecological and socioeconomic resilience of the Lebanese forests. It has also been effective in prompting the restoration of a mosaic landscape structure, which has a strong resilience to environmental constraints and disturbances.

Terrace restoration, along with the planting and cultivation of wild fruit trees and aromatic or medicinal plants, is important for soil stabilization and for biodiversity within forest landscapes. The management of natural forests, through practices such as thinning and reduction of the dry biomass, sustainable grazing, temporary fencing and post-fire management can represent an important component in passive forest restoration. The reforestation program also supports the testing and implementation of forest restoration techniques that are highly adapted to the impact of climate change.

So far, the forestation/restoration work has been implemented in seven sites along the corridor, using a mix of techniques consisting of direct sowing, planting of seedlings and fenced planting, covering approximately 47

ha. Regeneration of the relic cedar forest, diversification of natural habitats, and the preservation of threatened species are top priorities.

The initiative designed adaptive forest restoration and management plans that were applied in a number of pilot sites over the three years of project implementation. For example, sustainable forest thinning and pruning operations were applied in 18.5 ha of *Quercus calliprinos* and *Pinus brutia* forestland, and ecological restoration techniques were tested and demonstrated in 59.11 ha. Seeds and seedlings of about 35 plant species were used, with the objective of restoring the forest habitats and ecological processes by which the species populations can self-organize into functional and resilient communities well adapted to changing climate conditions while delivering vital ecosystem services.

Reaping Benefits

In 2014, IUCN, in close coordination with the SBR team, conducted an economic valuation study to assess the direct and indirect values of the ecosystem services from the reserve. The results show that the economic benefits generated every year ranged between US$16.7 and US$21.3 million. Most of these benefits derived from water services, including grid water quality and bottled water. The value of carbon sequestration services and production of biomass (that is, briquettes) is also significant. Every year, tourism adds an additional US$700,000 to the region, which supports the local employment equivalent of about 100 jobs. Whereas some of the previous ecosystem services are intangible, the economic value of tourism activities in the SBR is tangible, and growing.

The experience yielded several lessons. The forestation actions revealed new opportunities to inform forestation plans in the country and to regulate forest biomass harvesting and its combined use with agricultural waste to control the risk of forest fires, generate economic benefit, and contribute to local livelihoods. The results demonstrate the environmental and socioeconomic benefits of combining the use of forest thinning and pruning products with agriculture waste such as olive pomace and wood waste from fruit tree pruning. This reduces carbon dioxide emissions from fossil energy consumption and the burning of forests while also decreasing agricultural waste. Other benefits include: increasing the capacity of forest ecosystems to adapt to climate change, reduced competition for the scarce water resources in the thinned forest stands, and healthier forest stands that can store higher quantities of carbon.

The SBR meets three goals. Socially, SBR promotes entrepreneurship in rural areas to create direct and indirect jobs, thereby reducing the migration of rural people to cities. Environmentally, the use of wood waste from forests and fruit tree orchards for bioenergy reduces the risk of fire, pests, and forest diseases. Lastly, it has significant potential to mitigate greenhouse gases (GHGs) if resources are sustainably developed and efficient technologies applied.

Unlike fossil fuels, carbon dioxide from the combustion of biomass is equal to the carbon dioxide absorbed throughout the plant's life during photosynthetic activity. A net zero carbon balance is achieved. In addition, the use of agricultural and industrial by-products generates a number of environmental benefits by reducing waste pollution. Economically, the main savings will be for customers who switch to biomass.

The SBR has contributed to rural development through handicraft production and women's employment. Handicrafts and other projects built in the SBR have enabled women to realize their potential and have helped them enter the labor market, which has improved their living conditions. Through the program, a group of women with the potential for craft work was

identified to start a craft sector that reflects the authenticity and traditions of the Shouf area. This group also promotes the importance of the reserve and biodiversity conservation, and its economic benefits to the area.

Through the cedar loan program, more than 70 applicants have received loans; 60 of the successful applicants were women. These loans have helped many women acquire the material and equipment they need to produce and sell rural food.

Testimonies

Nizar Hani, SBR Manager, Biomass and Forest Fires

"The total forest surface in Lebanon is highly vulnerable to fire risk. In 2007, forest fires burned more than 2,000 ha in just a few days. The proper use and management of forests can play a major role in the reduction of forest fires. We are removing agricultural waste and thinning forest trees for biomass production. This combustible biomass would otherwise ignite fires and burn the entire forest. By thinning and pruning forests, the fire rate will decline. At the same time, we will be using renewable and sustainable energy."

Kamal Abou Assi, SBR Team, CO_2 Emissions and Biomass

"The carbon footprint of biomass is generally between three and 10 percent compared to


Nizar Hani


Kamal Abou Assi

fossil fuels such as diesel. And using wood for heat produces lower emissions of sulphur and nitrogen oxides than diesel. And unlike wind, solar and hydroelectric energies, which respond to natural processes that can be interrupted; the supply of biomass is continuous."

Monzer Bou Wadi, SBR Field Coordinator

"The development of biomass can create up to 15 times more jobs than fossil fuels. On average, it creates 135 jobs per 10,000 consumers compared to nine jobs per 10,000 consumers for fossil fuels. So biomass generates 15 times more jobs than fossil fuels, and those jobs, which are in the briquette business, are located here in the rural areas.

Briquettes have a lower heating value compared to other energy sources. One kilogram of briquette provides 4.65 kwh/kg which is equal to the heat produced by 1.255 kg of oak wood or 1.5 kg of olive wood."


Monzer Bou Wadi

Lilian Njeim, SBR Coordinator for Handicrafts Program

"The crafts program has assisted more than 25 women living within the SBR region. Today, these women are working in green jobs to produce cultural and traditional crafts."

Lilian Njeim

Resources

Shouf-Cedar SBR Channel: http://www.youtube.com/user/shoufcedarreserve

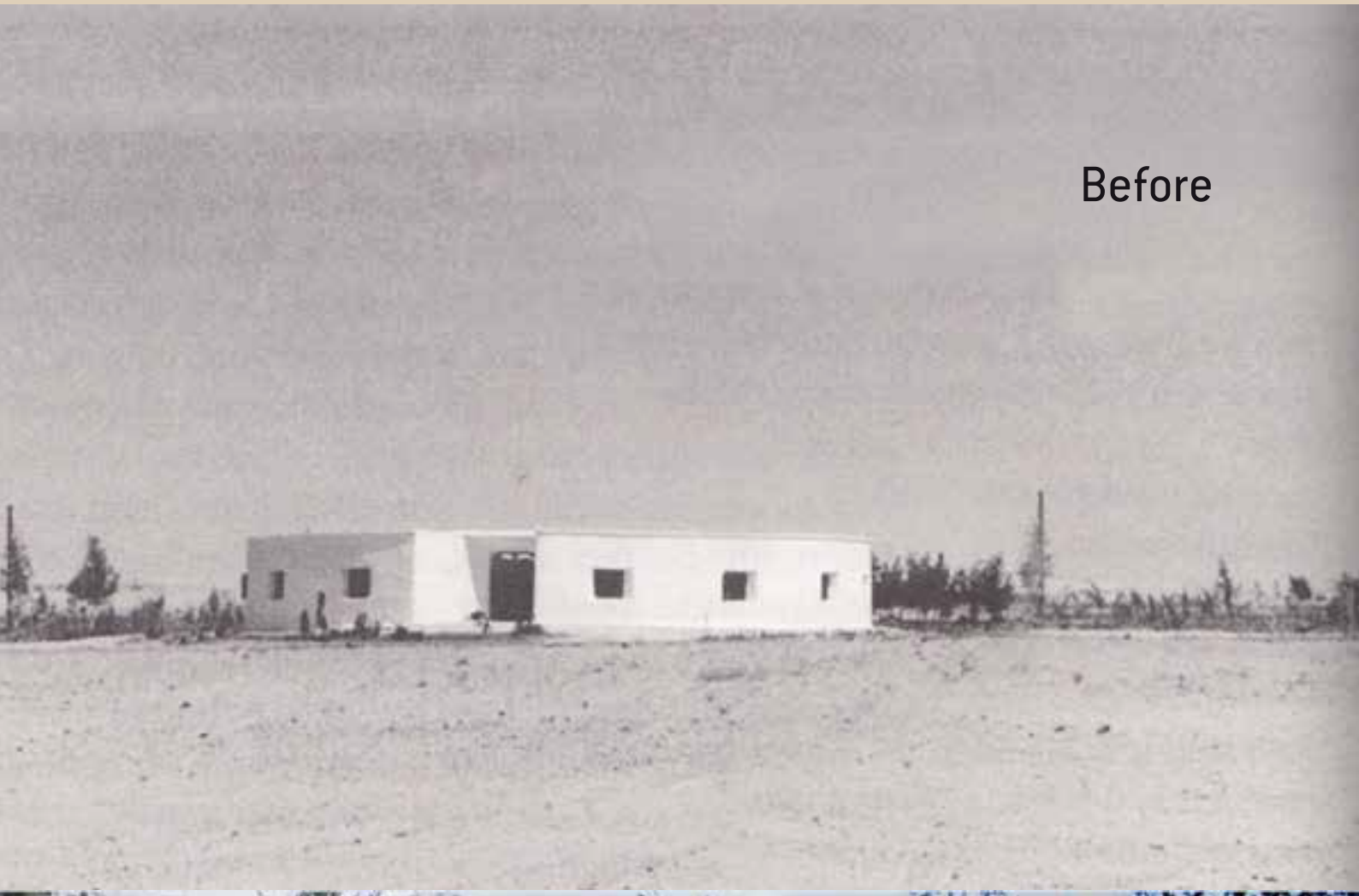
Al-Shouf Cedar Reserve—Ecosystem Restoration: http://www.youtube.com/watch?v=xEp5HhwxThA

Byblos Bank/Shouf Reserve Bio-Corridor Reforestation Initiative: http://www.youtube.com/watch?v=3lcdO30MlPM

Shouf Biosphere Reserve Documentary: http://www.youtube.com/watch?v=liHdAcdAY1A

SBR general pictures and Dropbox link: https://www.dropbox.com/sh/7qcpibsq4xdn6p4/AADaG0L0NqHR0RkQ2wchAXMKa?dl=0


WEALTH CREATION


Before


After

WEALTH CREATION

The 17 Sustainable Development Goals adopted in 2015 provide a 15-year window of opportunity to eradicate poverty, protect the planet and ensure prosperity for all. Goal 15 on Life on land, has a target aimed at ensuring the productive land available globally remains stable or increases by 2030 and beyond. But this responsibility is for all actors, from governments, to the private sector right down to the small scale land users in the world's drylands where the land is most vulnerable. Is it realistic to expect this level of change to happen in some of the poorest countries or communities? This chapter provides evidence that the change is possible.

It is possible to create wealth among the poorest people on Earth. Governments can do it. The private sector can do it and still make money. Given the chance, poor communities can transform their own lives through voluntary non-profit initiatives. In this and the following sections, the case studies present different models and approaches to change.

SEKEM in Egypt introduces a non-state actor model. It is built on one man's powerful values and his vision of turning a barren empty desert into a productive ecosystem with fertile soils and teeming with plant and animal life. The resources are mobilized through voluntary support from local, national and global partners. With growth, the approach integrates market mechanisms that create employment in land-related activities and its supply chain, and by developing the intellectual and productive skills of the people to expand growth. SEKEM also borrows from the public sector model the use of incentives to pay the contract farmers above market rates in order to induce the desired change. In this model, the risks for failure are assumed mostly by the visionary leader who is only able to do so by mobilizing international support.

Elion Resources Group in China demonstrates a private sector model for sustainable land management, which is driven by the company's self-interest. By restoring degraded areas, the company reduces its operating costs, creates new market ventures to generate new income from the investments made into the environment, and by contracting the local people to produce for the industry and to become consumers of the additional services created. A key to this success is the willingness of the beneficiaries and government to take responsibility for some of the risk of failure that a company would not undertake otherwise.

Programme Oasis Sud in Morocco showcases the third model – a public-private partnership. The model approaches sustainable land management as a massive public works initiative that is similar to any large infrastructure project. The cross-sectoral scope of the project, the breadth of its reach from the household to the regional level and the rapid road to results are striking. The programme caters to the needs of youth, women and other groups, it creates a new service industry and it restores land. Individual households, women's groups, small start-ups and development projects are all wrapped into the programme.

Two of the models provide valuable information on how behavior change is introduced peacefully in some of the most conservative rural communities. The Moroccan case provides a step-by-step discussion of how to integrate SLM with income generating activities and ensure sustainability. It also offers important insights on how to successfully target and work with women in societies with deep-rooted traditions.

More Than Sustainable Land Management

In the beginning, I thought that these are some crazy ideas from Europe. There was almost nothing around my hometown but desert and drylands. Today, we have green fields, roads, and villages with schools and medical care, exclaimed Aied Abdel Hamed, who has worked on the SEKEM farm for almost 30 years. But dry lands and desertification are still visible elsewhere in Egypt. In fact, 90 percent of the country is degraded, with the only natural fertile soil located along the Nile River, and only six percent of that land can be used for agriculture.

This scenario is expected to further deteriorate in the face of climate change. The Nile Delta is at risk of salinization from sea-level rise. But Egypt also suffers from water scarcity, and water availability per person per year is much lower than the global average (that is, a water poverty index [WPI] of 600m3/year per capita, which is below the standard [WPI] 1,000 m3/year per capita). Agriculture alone consumes 85 percent of the freshwater available in Egypt. Rainfall is rare in Egypt, which makes artificial irrigation essential.

Pressure from Rapid Population Growth, Climate Change and Degraded Land

Adding to these challenges is the rapid population growth. The population in Egypt in 1960 was approximately 30 million. Today, it is more than 90 million. Population growth is increasing just as the land needed to grow food is degrading. And the Nile, which is polluted by waste and agrochemicals, lacks enough clean water to irrigate the food crops. As a result, Egypt relies heavily on food imports.

The combination of rising world food prices, limited water resources and agricultural land, rapid population growth, climate change, and desertification is making it increasingly more challenging for Egypt to feed its people, now and in the future.

All of these conditions might not be as overwhelming if the population could afford to buy food. But the Egyptian unemployment rate exceeded 13 percent at the end of 2013. Two of every three young Egyptians age 20 to 34 are unemployed. The World Bank in 2011 determined that 25 percent of Egyptians were living below the national poverty line. Poverty and income disparities are also putting pressure on the current economic and political situations.

The rise in global food prices only exacerbates the situation and makes the country especially vulnerable to external price shocks. The occurrence of food riots and social disruptions related to food security should come as no surprise, and the uprising against Egyptian President Mubarak's regime in 2013 signals the depth of this pressure on the livelihoods of Egyptians. So, how does a nation turn around such a dire situation?


Before


After

An Idea Once Thought Impossible

SEKEM, the winner of the 2015 Land for Life Award, is fighting these odds and changing Egyptians' livelihoods one household at a time. It is combating desertification through a holistic business model that integrates human development, fair opportunity and income, and ecological and cultural development in its daily operations. Leaders of SEKEM also believe this approach offers a long-term competitive advantage.

After returning to his home country of Egypt in 1975, Dr. Ibrahim Abouleish introduced the idea of integrating societal, economic, and cultural life into the everyday business operations in 1977. He started by using biodynamic agricultural principles to rehabilitate 70 ha of untouched land in the Egyptian desert. Abouleish used biodynamic methods to grow local medical herbs and spices. Shortly thereafter, he founded LOTUS, the first company of SEKEM, to process and market the products locally and internationally. Later, he established the ISIS Organic Company to process and distribute organic crops among the other activities he introduced to support agriculture.

Today, SEKEM Agriculture manages all the activities linked to agriculture, such as grafting plants through El-Mizan, cattle management, and composting. SEKEM owns 500 ha of biodynamic farms and has recently started three land reclamation projects that encompass more than 2,000 ha of degraded land in other parts of Egypt.

TESTIMONIES

Aied Abdel Hamed

Aied Abdel Hamed is a 53-year-old father of four children. He is a farmer and has worked for SEKEM for 30 years.

"SEKEM feels like my home—even more—like my second soul. I was born to be a farmer, and I think it's a gift from God that I got the chance to work for SEKEM. It was hard to find work during that time. SEKEM gave me a chance. I didn't have any idea about biodynamic agriculture. I attended lots of training sessions with Dr. Ibrahim Abouleish, who was very good in explaining the biodynamic farming methods.

When I look 30 years back, it is really unbelievable how everything changed around SEKEM. Back then there was almost nothing around my hometown except desert and dryland. Today, we have fields, roads, and villages with schools and medical care.

After 29 years with SEKEM, I also realized that something changed in the way I live my life. I started paying more attention to the beauty of my hometown. I collect any rubbish that I see lying around wherever I find it. I understand litter is a huge problem in Egypt.

But most of all, the biggest benefit from SEKEM is the awareness I have gained about the importance of a good education for my children. They have the opportunity to go to SEKEM school. One of my sons is studying now. He is the first member in my family to do so. That makes me really proud!"

More Jobs, Secure Incomes

In addition to applying the biodynamic principles throughout SEKEM farms, SEKEM

Aied Abdel Hamed

promotes this form of sustainable land management across the country, and it was one of the founders of the Egyptian Biodynamic Association (EBDA). The association has helped more than 400 farms covering more than 325 ha of land to adopt organic farming practices.

EBDA was also a global pioneer in growing and producing biodynamic cotton. Today, after adopting sustainable agriculture practices, Egypt uses 90 percent less chemicals in its textile industry. EBDA also trains farmers, helping to raise their awareness of sustainable agriculture practices. In addition, EBDA helps land users obtain certification for their organic products, opening new market channels for the producers.

Through EBDA, SEKEM has contracted more than 400 farmers and producers, offering them a fair income or a fixed contract with fixed prices for their produce. SEKEM pays the farmers 20 percent above the prevailing market price. This has contributed directly to better incomes and more job opportunities in farming.

SEKEM's group of companies has created over 1,500 jobs that benefit the local communities directly. Only 25 percent of the produce from SEKEM is exported. The organization has kept its commitment to produce and sell about 75 percent of its produce locally to reduce Egypt's heavy reliance on imported food products. The local residents thus also benefit by consuming its high-quality produce.

TESTIMONIES

Hesham Mahmoud

Hesham Mahmoud is a beneficiary of the socioeconomic integration system that SEKEM initiated. He started working as a SEKEM-contracted farmer in 1994. With the help of EBDA, he was able to own a 20 feddan (8.4 ha) organic farm in Kafr El-Sheikh in the Nile Delta, in northern Egypt. He cultivates vegetables and herbs on his Demeter-certified farm and then sells the produce to SEKEM.

"Since I have contracted with SEKEM, my family and I feel more secure. We have a reliable and also increasing income that enables us to make plans for the future. Now, I can buy new land to grow more crops because I am sure about the price that SEKEM will pay for my harvest. I also feel much better because I am working in a healthy environment without using agrochemicals.

Also, my family is happy that we have a contract with SEKEM. Two of my kids are studying at university, which they are only able to do because I have a secure monthly income.

I like the regular events, such as the trainings and workshops that are organized by SEKEM, because they are really useful for exchanging experiences and maintaining a relationship with colleagues and managers."

Giving Back to the Community

SEKEM's work goes beyond sustainable land management. Today, it also covers social and human development. SEKEM has established a nursery, a kindergarten, schools, and a vocational training center to enable those who have little opportunity to get an education. In 2012, the Heliopolis University for Sustainable Development was established to provide more opportunities for national and international students to deepen their knowledge in sustainable development technologies that integrate societal and cultural value.

SEKEM also has a medical center to provide health care to its employees and their families as well as to residents at SEKEM project sites. These facilities were established through the SEKEM Development Foundation (SDF).


Mohammed Berry

TESTIMONIES

Mohammed Berry

Mohammed Berry, a beneficiary of the SEKEM societal initiative, describes his experience and life with SEKEM. As a young man, Berry was often teased by friends who called him, "Made in SEKEM." However, he took this as a compliment and often replied that SEKEM is his destiny and fits in the puzzle of his life.

Berry attended the SEKEM kindergarten and later graduated from the SEKEM school. He returned to work for SEKEM's Environmental Science Centre after completing his tertiary studies in mathematics and physics. At the centre, he organizes projects for its pupils and young people from other schools to explain and relate theories with practice. Berry also works with the Sustainability Team at the SEKEM farm in Wahat Al Bahareyya, where he is coordinating new solar energy projects and water irrigation systems.

Berry is not only proactive in his country, but also in Uganda. He is supporting a friend who is starting a charity to help establish a school, a medical center, and an orphanage. "I am convinced that organic farming is the biggest opportunity to handle a lot of the global and local challenges that we are facing today. I call it the 'glocal' solution," said Berry.

Noura Nasser

Noura Nasser comes across as a petite and inconspicuous woman. She uses crutches to get around and is not much taller than the children she cares for at the SEKEM School for Children with Special Needs. But appearances can be deceptive. Nasser has an impressive personality. Physically handicapped since birth, Nasser has faced many setbacks in her young life. When given the opportunity through a friend of her father to attend SEKEM School for Children with Special Needs, she was overjoyed.

Nasser turns 25 this year. When she finished studying at SEKEM school, Nasser continued her tertiary education. Every day she traveled two hours by public transportation to her university. She graduated from university with a degree in psychology, and is now in charge of a group of disabled children at the SEKEM School for Special Education. In addition, Nasser is continuing to study while supporting her six siblings. She boasts about having an exceptionally strong will.

"In the past I had no crutches, and I tried getting around using wooden sticks. The teachers and my classmates helped me a lot. If we had a place to visit, they carried me or put me on a bike so that I could accompany them wherever they went.

I was often approached and asked why I was on the road traveling and not at home. In Egypt, it is still a common practice for young


Noura Nasser

girls to stay at home and not normal for physically disabled people to participate in societal life as equals.

The work is quite demanding, but I love the kids very much, and they give me lots of joy and gratitude. One day, I hope to lead an institution that offers psychological therapy. I would like to help people better understand themselves and assist them in healing their emotional wounds."

Afdal Farid

Afdal Farid was born in Galfina, a small village on SEKEM farm. This former SEKEM pupil studied business and economics at the Heliopolis University for Sustainable Development. She was awarded a scholarship from the SEKEM Friends Association in Germany to continue studying at Heliopolis University with a focus on Sustainable Development. She is grateful to SEKEM for giving her a chance to receive an education.

Farid is very active at the university. With her classmates, she established the Heliopolis University Balance Club to empower women by promoting awareness about gender and gender equality in the local communities, with the goal of creating a balanced society. The 20-year-old student organizes exchange visits between female farm employees and university students as a way to raise awareness about different working and living conditions on the farm and to learn from each other.

Afdal Farid

"Without SEKEM, it is unlikely that I would have had a chance to study. I was lucky that SEKEM also offers children, whose families can't pay school fees, the opportunity to receive a holistic education. I especially enjoy the artistic subjects and learning instruments.

Most of my classmates at university are not used to the core program's activities, such as movement, painting, theatre, or languages. But I see how they start to like it and how it helps us to develop skills beyond the subject of our study.

I love studying at Heliopolis University because it offers us a lot of practical experience. We have the chance to meet a lot of interesting people from all over the world and participate regularly in conferences. Soon I will travel to Germany for an internship. This is something my family and I would have never dreamt that I would be doing."

Dr. Ayman Abouhadid

Dr. Ayman Abouhadid, the former Minister of Agriculture of Egypt, was impressed and proud of SEKEM's work: "SEKEM is well known in Egypt for pioneering the organic movement. After visiting the mother farm near Belbeis, I was deeply impressed. I can see that SEKEM also stands for a whole new development paradigm for Egypt and the world. With all its institutions from different spheres of life, it represents a healthy

Dr. Ayman Abouhadid

community that is able to integrate business practice, research and innovation, human capacity building and education, and sustainable land reclamation in a unique way—like a symphony. I wish Egypt had many more such initiatives."

Chérifa H. Rachad

"SEKEM is part of our supply chain and we have learned a lot from our friend Helmy Abouleish. SEKEM, for us, is not just a way of doing business—it is a life philosophy," Rachad said of SEKEM.

Rachad and her husband, Hussein A. Fakhry, own A. Fakhry & Co., a company that crafts aromatic raw materials from Egypt. The company has produced and exported organic products for over ten years, and is recognized worldwide for its organic essential oils. It also owns two organic farms of 60 ha. Both farms integrate botanical and husbandry farming.

"We believe that in order to have a truly balanced ecosystem, one must adopt a holistic approach that integrates all aspects of farm life. Besides owning farms, we also contract organic farms, which account for an additional 200 ha. When we got to know Mr. Abouleish, we learned a lot about the way sustainability can be integrated into the core of our business. Since then, our production has used more organic raw material, and we also aim to produce high-quality, Demeter-certified biodynamic products. We would like to credit SEKEM, whose initiative started more than three decades ago, with

Chérifa H. Rachad and her husband Hussein A. Fakhry

Dr. Ibrahim Abouleish

pioneering the whole organic movement in Egypt."

Dr. Ibrahim Abouleish

"About 40 years ago, when I returned from Europe, where I had lived for over 20 years, I carried a vision deep within myself: In the midst of sand and desert, I saw myself standing at a well drawing water. Carefully, I planted trees, herbs, and flowers and wet their roots with precious drops of water. The cool well water attracted people and animals to refresh themselves. Trees gave shade; the land turned green; fragrant flowers bloomed; and insects, birds, and butterflies showed their devotion to our creator, as if they were reciting the first Sura of the Qu'ran. Humans, perceiving the hidden praise of God, care for and see all that is created, as a reflection of paradise on earth. For me, the idea of an oasis in the middle of a hostile environment is like an image of dawn, after a long night's journey through the desert. I saw it in front of me like a model before the actual work even started.

And yet I still desired even more. I wanted the whole world to develop. Thus, the SEKEM vision has developed: Sustainable development toward a future where every human being can reach his or her individual potential, where mankind lives together in human dignity, and where all economic activity is conducted in accordance with ecological and ethical principles.

While studying in Europe, I noticed changes taking place within me. I became thoroughly involved with European culture, getting to know its music and studying its poetry and philosophy. But even though almost everything inside me developed a new, I did not leave the Egyptian culture and Islam entirely behind. I was living in two worlds, both of which were essentially different: the oriental, spiritual stream I was born into, and the European world, my chosen course.

When I returned to Egypt in the 1970s, I found that Egypt was in a very bad way. The societal, cultural, ecological, and economic systems appeared as dry as the desert itself. With the vision of sustainable development in mind, I decided to buy desert land and cultivate it using biodynamic agricultural methods. Almost everyone called me crazy. There was no support by the government, and even my own friends were not convinced that my vision had promise. After struggling against much opposition, and undertaking protracted negotiations with public entities and the indigenous people, I finally saw a small miracle taking place. We built a community in the desert, striving for sustainable development in Egypt, and benefiting the whole world as well.

Soon, SEKEM became surrounded by an international network of partners, friends, supporters, and like-minded people. These people carried the SEKEM idea and started to build bridges connecting people, countries, and continents. Projects were developed together with international and national partners, SEKEM Friends Associations were founded, and our partners joined SEKEM. We cofounded the International Association of Partnerships (IAP); a group of entrepreneurs promoting biodynamic agriculture and fair trade, as well as the World Future Council (WFC), and participated worldwide in events on sustainability and organic farming. Without all of these friends, SEKEM would not be what it is today. It would not have had the chance to employ about 2,000 people, nor would it have been able to offer holistic education in the SEKEM schools or the Vocational Training Center. Without our partners such as GIZ, DEG, GLS University, Triodos, OikoCredit, and many more, SEKEM would not have been able to prove that land reclamation using biodynamic farming methods is not only possible, but is quite effective, efficient, and improves health. I am grateful that I was given the opportunity to build SEKEM together with the community and that it has become a role model, contributing to a better, cleaner, healthier, and more sustainable world for all of us."

Resources

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Kubuqi Ecological Restoration—Reviving the Old Charm of Kubuqi's "First City of Grassland"

The Green Plateau That Once Was

The Kubuqi Desert is the seventh largest desert in China. It lies to the north of Ordos Plateau in Inner Mongolia, covering 18,600 km^2. Kubuqi dates back to the Qin (221 BC–207 BC) and Han (202 BC–220 AD) eras and was once a fertile land covered by dense forests and thriving grasslands. However, during the Qing Dynasty (1636–1911), population growth, years of war, and the unrestrained conversion of forests into farmland led to the desertification of a vast area of land, which was buried under vast sands.

In the 1980s, over 100,000 herdsmen and farmers suffered from the Kubuqi's harsh weather and sandstorms. Kubuqi Desert was one of the three major sources of sandstorms that would engulf the Beijing, Tianjin, and Hebei areas. A strong wind in Kubuqi would blow the sandstorms to Tian'anmen Square overnight. Sandstorms often made the roads impassable, exacerbating the poverty in Kubuqi. Many communities lacked access to basic public services, such as schools, hospitals, electricity, and roads. Kubuqi Desert was locally known as the Dune of Death.

However, 20 years later, the desert has been transformed into a scene of vigorous, vast greenery, home to approximately 100 species of plants and wild animals, including swans, hares, and the Euphrates poplar tree. Far from being a degraded Dune of Death, Kubuqi now attracts 200,000 visitors annually.

Miraculous Transformation

This spectacular change was driven by the vision and innovation of Wang Wenbiao, a Kubuqi native. As a salt factory manager in Kubuqi, Wang faced challenges in transporting salt to other parts of Inner Mongolia due to the sandstorms. He knew he had to overcome Kubuqi's dunes before his salt business would become profitable. In 1988, he established Elion Resources Group and began his journey of land restoration. "In the beginning, [land restoration] wasn't my goal. But we were forced to control the sand," Wang told the Global Times. "Salt had to be sold, and we had to build roads. Over the last two decades, it went from one road to a network of roads in the desert. With the support of the government, Elion has not only

connected with the outside market, but also controlled the sands along the way."

Elion's initial investment in road construction to transport the salt production was then extended to tree plantings in over 10,000 km^2 in Kubuqi and the establishment of licorice and other Chinese medical herbs for the pharmaceutical industry in Kubuqi, a green energy production park, and many more initiatives. Today, Elion's investment is estimated to value over RMB 100 billion (US$15 billion). The restoration project has benefited over 100,000 farmers and herdsmen, with annual local incomes increasing from RMB 500 (US$74) in 1988 to RMB 30,000 (US$4,500) today. Public infrastructure, such as roads and schools, were also built. The desert's nickname has changed from the Dune of Death to the Golden Dune.

Innovations Hold the Key

A number of technological innovations by Elion have been critical to the desert restoration process. For example, with the integration of local knowledge, Elion introduced over 1,000 germplasm resources that are cold-drought resistant and saline-alkaline tolerant that have helped restore the desert's ecosystem. Another breakthrough was the development of water-jetting for watering freshly planted trees, which boosts the trees' survival rate from 20 percent to 85 percent. Elion also implemented a sand barrier technology, adopting a grid pattern of bundled salix (willow) stems, which has helped to stabilize sand dunes.

Licorice is a local, drought–resistant, medicinal plant in Kubuqi, which Elion has extensively planted in efforts to turn the barren Kubuqi land into a thriving medicinal production center. Today, over 200 km^2 of medicinal plants and herbs are grown in Kubuqi. In addition, an ecological-based industrial chain has been introduced by planting forage and

feed crops to expand the livestock industry. Manure from the livestock is collected as organic fertilizer to use in tree and herb planting as well as for biogas power generation. Elion also takes advantage of Kubuqi's ample sunshine and space and has invested in solar and renewable wind energy, supplying electricity to the local population as well as the factories.

Elion's "ecology + business" model has yielded a positive cycle of mutual benefits, demonstrating the profitability of land restoration.

The Chinese administrations at all levels have prioritized ecological restoration, especially in desert lands such as Kubuqi. The government has given incentives and support for this restoration project. For example, the financing framework support provided by the central and local governments underwrote Elion's financial loans from state and commercial banks. Awards and recognition of private enterprises and individuals were a dominant driving force for private-sector engagement in desert restoration.

One of the project's driving successes has been its active engagement with locals, as well as its creation of additional local jobs, spurring the economic growth in Kubuqi. Through its strong community partnership, Elion successfully mobilizes thousands of people for its annual seasonal tree and grass planting. International partnerships with such agencies as the United Nations Environmental Programme (UNEP) and the United Nations Convention to Combat Desertification (UNCCD) have raised awareness about the importance of local participation in restoration. Elion's close collaborations with scientific research institutions have helped drive innovation in improved techniques to control desertification.

Testimonies

Gao Maohu, Herdsman and Farmer

"Planting trees helps accumulate virtue," said Gao Maohu, a local herdsman who has planted trees for years. The years of hardship in the Kubuqi Desert are reflected in the deep lines on this 54-year-old man's face. Before becoming a tree contractor for Elion, Gao was a village head and farmer. Every year, he worked for two farms and for Elion's salt fields in the summer and winter. In the past, Gao had only 13,333 m^2 land, and the harvest was not enough to feed his family.

"In the early 1990s, Elion started the afforestation project and many elders said that the trees will die. After much consideration, I decided to take up the tree planting project as I still could tend to my farm," Gao said. "Elion then contracted out tree planting and those who took the contract were responsible for the trees' survival. I became the main contractor a year later, and I have hired 100 to 200 workers each year to plant trees over millions of square meters. It was a risk at first, but I learnt new tree planting techniques, and the trees survived. In the beginning, my annual income was RMB 20,000 (US$3,000). Then it went to RMB 50,000(US$7,500), then RMB 120,000 (US$18,000), and I earned RMB 200,000 (US$30,000) in 2011. I never thought planting trees would make me rich."

This year, Elion plans to open over 2.3 km^2 of experimental forest, graft plants to increase their resistance, and develop a new desert

Gao Maohu

green economy industrial chain. This new approach has been a great success in the Ala Shan Desert.

Gao himself is planning to plant 1,000 km^2 of dunes and to graft desert plants. When someone asked him whether he was afraid of big losses, Gao replied, "Over the years, we have made money from Elion. Do you want to be the one who only joins when you earn money and then who turns back because of fear of the risk?" In his view, Elion's investment of planting trees in Kubuqi for over 27 years is not only a project, but a way of accumulating virtue, by providing for the locals and future Kubuqi generations.

Mengkedalai Meng, Herdsman

Mengkedalai, who comes from a nomad family in the Kubuqi Desert, herds sheep, cattle, and camels to sustain his family. His family also operates a farmhouse restaurant. In addition, he took on contract projects from Elion, such as off-road visitor tours, irrigating trees, and working at a tree conservation project. Today, his family's annual income has increased from RMB 100,000 (US$15,000) to RMB 300,000 (US$45,000), and he has been able to support his 15-year-old son's secondary school studies.

Zhang Xiwang, Herdsman

"We are like the salix tree, which will not die due to thirst or hunger, and we live well with a bit of sunshine!" said Zhang Xiwang proudly. Zhang grew up as a herdsman and is considered a local celebrity in Kubuqi. His salix planting was filmed on CCTV. Back then, Zhang had no idea about tree planting methods, but his courage and determination led him to success. In the beginning, many who contracted for salix planting quit, but Zhang took the leftover land and planted about 5.3 km^2. No well could be drilled, and the land was dry. Even providing water for the workers was tough.

Zhang was well known for his efficiency in tree planting. For instance, he completed the planting of salix across 4 km^2 within 17 days.

Soon he was given responsibilities over the Populas conservation project and the two grasslands at Seven Star Lake.

From zero knowledge of tree planting, within three years, Zhang had planted many different species of trees over 13.3 km^2. "This year, I will plant one square kilometer of a new tree species beside the road in the Seven Star Lakes Resort. I would like to try my new planting method," Zhang said eagerly.

Zhang Xiwang

"Twenty years ago, in Kubuqi Desert, there was no road, sand flew everywhere. When the wind blew, you couldn't even open your eyes, sand blew straight into your face. Compared to today, the difference is like winter and spring, such big changes. Green is everywhere. Where there is green, there is hope." Last year, Zhang's son went to college and his daughter went to technical school.

Aotegenghua Huang, Herdswoman

Aotegenghua, known by the locals as Sister Hua, is a Mongolian ethnic tribe nomad who lives in Daotuliushe. Hua spent her childhood as a nomad, moving from place to place. Her livelihood depends on herding cattle and sheep. Her biggest dream was to turn her hometown into an oasis, giving her community in Gacha a stable life that no longer bears the harshness of the desert. Her dream came true. Now, Sister Hua's annual family income has increased from a few thousand yuan to several hundred thousand.

Twelve years ago, after learning of Elion's tree and grass planting project, Sister Hua joined the team as a united worker. In 2009, with her accumulated planting experience, Sister Hua organized the Gacha herders to establish their own united worker team and mobilized them to take on a tree planting project.


Aotegenghua Huang

Sister Hua also led her team to participate in a pilot project on cultivating water-saving herbal plants. Walking into the field of licorice planted by her team, Sister Hua smiles and says, "My team members and I love this land; we love our home. We are very happy to support these greening activities. All these years we haven't just been planting licorice, herbs, grasses, and trees, we've been planting love and hope for our hometown. To make the sands green, the herders rich, and our home beautiful are our biggest dreams at Gacha."

Dalengqiqige Qian, Herdswoman

Dalengqiqige, known as a desert greening "self-taught expert," won Elion's recognition in 2014 for her 100 percent survival rate of trees. She was once poor and went through hardship like many other herdsmen and women in Kubuqi. She comes from Duguitala, a town located in the middle of the Kubuqi Desert. Back then, Dalengqiqige did not have any professional background of desert greening, but she knew deeply that "all roads lead to Rome, and everything is about technology." To compensate for her lack of expertise, she cooperated and learned from engineers and technical supervisors, studied books about desert greening technologies and management methods, consulted experts, and experimented on the field. Her eagerness to learn new things and her affection for the desert restoration project have yielded rewards.

Dalengqiqige recounted, "At first, we made mesh sand barriers with salix on both sides of the road, fixing the dunes. We then planted trees and grass on a large scale. In the desert, learning advanced technological methods like water-jetting is important for ensuring a high survival rate for the trees. Creativity is crucial. For example, the mesh sand barrier prevented quicksand from invading the highway. The trees guarded the dunes and gradually turned the desert green."

Nie Haiwang, Herdsman

"In the past, there was only a barren desert here. There was no pasture at all and nothing could be raised. But you see, through the transformation work, we now have a high-quality pasture. I can raise geese and sheep and make some money," said Nie Haiwang, a herdsman living in Sharizhaogacha. He now boasts an annual income of RMB 150,000 (US$22,500), compared to his past income of only RMB 10,000 (US$1,500).

Nie raises geese and other livestock in the ecological zone that shares its space with a


Dalengqiqige Qian


Nie Haiwang

110 megawatt photovoltaic project, which produces 650,000 watts of clean energy per day. Besides the energy production, alfalfa and other high-quality pasture produce are grown in this area. Nie and other herdsmen can also opt to clean and maintain the 5,000 photovoltaic panels in the green energy zone to earn additional income. Such private community partnerships have motivated more local people to engage in desertification control activities.

Han Meifei

"Over the past 20 years, about 10,000 people have been directly involved in tree planting activities every year, of which approximately 40 percent are female and about 60 percent


Han Meifei

are young people. Over 400 local farmers have also been trained in using new technology for tree and grass planting." Han added that the local farmers and herdsmen have also benefited from the restoration projects by earning dividends from land pooling, labor income from afforestation, and income from the tourism industry.

Fu Xiaomin, Reception Manager, Elion Desert Ecology Group

Fu Xiaomin has noticed a big reduction in the number of Kubuqi sand storms compared to 27 years ago. More rainfall has also been recorded. Many different animals and plants are reappearing and residents are more aware of the value of ecological restoration. She also sees that through Elion's investment in building schools, kindergartens, and vocational training centers, increasingly more young people in Kubuqi have the opportunity to get a proper education.

Gao Ke, Project Director, Elion's Desert Ecology and Health Company's Work Safety Department

"There are many youths who are unwilling to leave the desert, and after leaving, they have a great longing to return to their land. After graduating from university, my friends and I contacted Elion to get a contract for tree planting. We failed in our first tree-planting attempt because we were inexperienced and lacked knowledge about desert geology. But we have not given up. We want to start over, and so we have joined Elion to learn from its successes. We believe that after accumulating experience and learning from Elion, we can start our own company in desertification control activities."

Wu Manping, Employee, Elion Green Land Technology Company

Wu Manping, a local woman who works for Elion Green Land Technology Company, undertakes project feasibility surveys and

legal risk prevention and control. Wu said that Elion has helped assure her family's quality of life. "I feel I'm contributing to creating a green world. I'm valuable, and I'm happy. We, the women of the '80s generation, assume the important responsibility of caring for the elderly and raising children, and at the same time we can realize our dreams. Thanks to the Kubuqi Desert control project, we do not need to do what many females in other remote areas do—leave their homes to make money and sustain their families. Instead, we can work here and sustain our families. My female colleagues have all benefited in this way."

Resources

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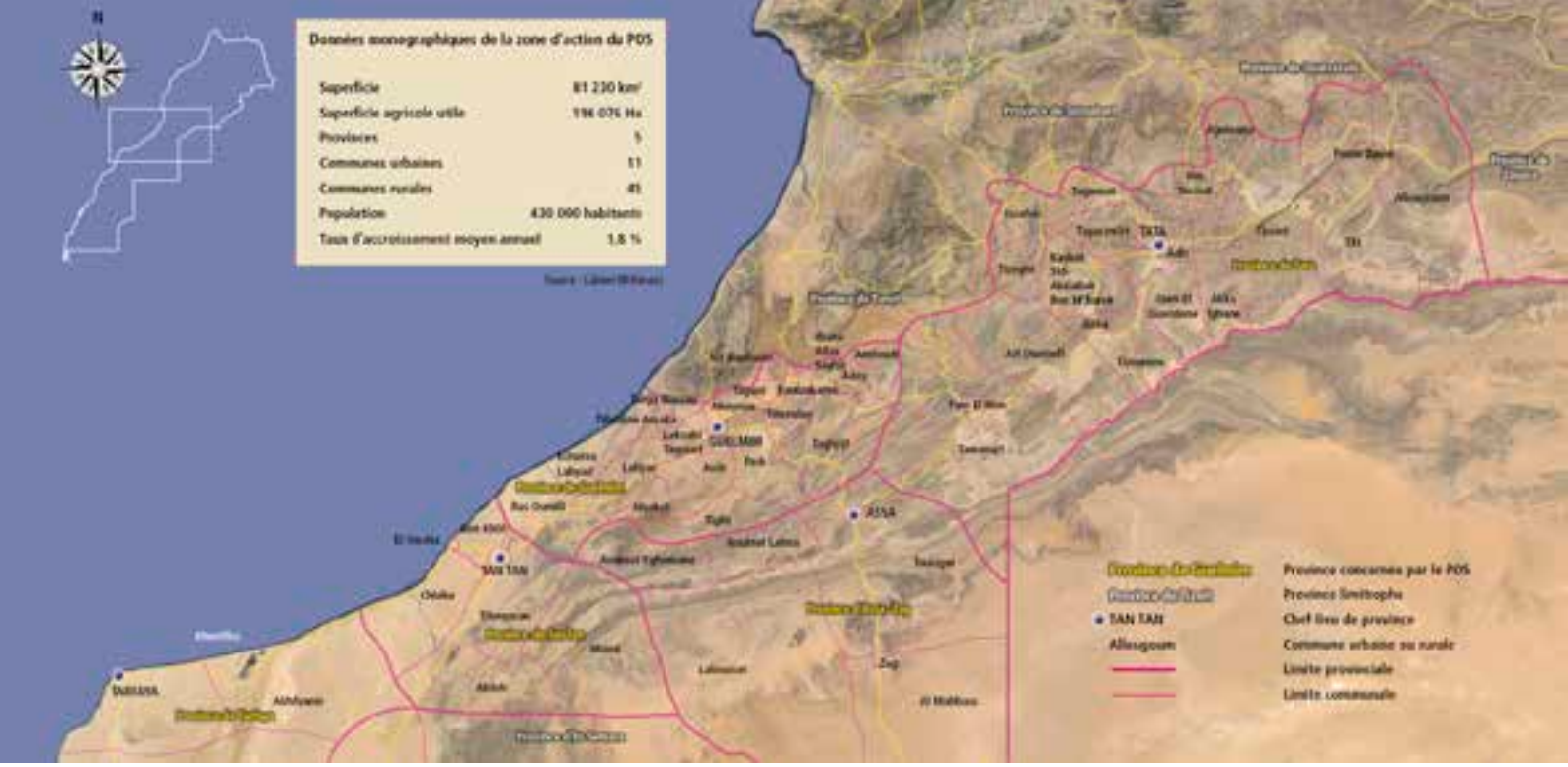
Living Oasis: The Fight against Desertification in Morocco

Morocco is bordered by the sea on the north and the ocean on the west. The rain coming from these two maritime coasts is either stopped or very strongly diminished by four mountain ranges, particularly the Atlas Ranges arc. To the east and south, the drylands of the country unfold.

A string of more than 180 oases lines up in the south of the country in the provinces of Guelmim, Assa-Zag and Tata, which together cover over 100,000 ha. These agro-ecosystems at the desert's door have had ecological, social, and economic significance for centuries. But the cumulative effects of recurring droughts and climate change have turned these oases into a theater for various desertification and land degradation processes, exacerbated by deep socioeconomic and institutional changes.

The Oasis, Miracle of Toil And Water

Oases are havens of greenery, and quiet witnesses to human solidarity and labor. They were built patiently over millennia by humans. They represent real victories over an austere environment. Through their excellent knowledge of the territory, their exceptional management of scarce water resources and their agricultural know-how, the oasis people invented this green archipelago at the edge of the desert. They knew how to take advantage of the shade, sun, earth, and water to extract fabulous treasures of life from any



plot of land. They were able to plant crops such as alfalfa, tubers, vegetables, henna and cereals at ground level, and they even created shady living areas with fruit and palm trees.

But oases are threatened by desertification today. They suffer from continuing and increasing degradation, mainly due to the irrational exploitation of their natural resources. The situation has led to accelerated desertification, loss and abandonment. Because of their role as natural plant and microclimatic barriers to the advancing desert and their strategic economic, social, and ecological roles, saving the oases is crucial to win the fight against desertification in southern Morocco.

Launched in 2004, the National Planning and Development Strategy for the Oases emphasizes that "the oasis is a matter of national interest; a priority that affects the essential nature of the national identity." Based on this strategy, Programme Oasis Sud (POS) was designed as an environmental intervention, placing the fight against desertification at the center of its objectives.

Programme Oasis Sud (POS)

The Agency for the Promotion of Economic and Social Development of the Southern Provinces (referred to as Agence du Sud in this chapter) is the pioneer and leader of the POS, which was launched in 2006 in partnership with the United Nations Development Programme (UNDP).

Since then, POS has been actively addressing the challenges posed by climate change, drought, and desertification in Southern Morocco and it has made tangible improvements to affected ecosystems and the lives of their inhabitants. POS presents a beautiful Moroccan experience of sustainable and equitable development in the fragile territories of southern Morocco. The knowledge and practical know-how developed by POS can be adopted and adapted to other oases at the national level and across the entire Sahel.

POS was initially designed as a modest program in a marginalized area. In 2011, it evolved into a comprehensive program for sustainable territorial development. Its budget exceeded US$34 million. By 2014, it had created an estimated 5,500 jobs. POS is active across an area of 81,230 km^2, covering five provinces—namely, Guelmim, Tan Tan, Tarfaya, Assa-Zag, and Tata—that comprise 11 urban and 45 rural communities.

Elements of Success

POS's success can be attributed to both the development process facilitated (the means)

and the results (the ends). Six main elements contributing to POS success are:

1. Strategic planning and the participatory path taken to develop it.

2. Combating desertification and enhancing adaptation to climate change.

3. Sustainable and equitable water resource management.

4. Promotion and development of sustainable tourism.

5. Creation of efficient and effective value-adding and marketing structures.

Strategic Planning, an Exemplary Participatory Process

The elaboration of municipal development plans for 46 communities is probably the most spectacular result of POS's capacity to promote inclusive growth at the local level.

In line with the country's guidelines for strategic planning, POS adopted community development plans (CDPs) as the main tool for the participatory planning and implementation of development interventions. POS followed bottom-up, collaborative approaches and mobilized a wide variety of development actors from the local to national levels. Top-down logic alone is sterile and counterproductive for the POS. Past experience has shown that top-down interventions are particularly unsustainable and do not benefit the ecosystem nor its communities.

In the first phase, during the design of CDPs, a comprehensive territorial diagnosis is conducted with the collaboration and strong involvement of local communities. Various formats for discussions and information gathering are used—including, interviews and questionnaires, open and semi-open

interviews, workshops, meetings, field visits, and tours. The objective of the approach is to use all practical means to best capture the perceptions of the local communities regarding their own development needs, constraints, opportunities, and potential. A comprehensive territorial diagnosis is then completed that reflects the reality on the ground.

CDPs are designed with the active involvement of young, unemployed graduates. The CDP has two major objectives; to mobilize local potential to drive the local development process; and to create a skilled development nucleus through an appropriate training program that would then assist in CDP implementation.

Based on the territorial diagnosis, a framework for local development is outlined with various lines of action. Thematic, issue-based workshops bring together representatives of decentralized departments of relevant institutions, municipality and local authorities, NGOs, key local people, animation experts, and thematic specialists. The CDP is then approved by the Commune Council and becomes the framework document driving the local development process. During CDP implementation, extensive consultations are organized with affected communities to ensure harmony and collaboration and to promote efficiency in the use of labor and resources. Inter-communality or collaboration between communes for CDP implementation is facilitated to promote synergy and efficiency. Consultative, collaborative meetings that include up to 20 municipalities are organized at the provincial level.

Fighting Desertification and Enhancing Adaptation to Climate Change

Fighting desertification and sustainable management of natural resources became priorities after the first reframing of POS in late 2007. Since then, these issues have been addressed comprehensively and in an integrated manner across the entire territory to promote sustainable development.

From the lessons learned through the various pilot actions aimed at territorial cohesion and the studies performed by POS, a new approach was adopted to design and implement the development interventions. As a result, biodiversity conservation and sustainable management of natural resources have become essential elements of every CDP aiming to promote inclusive sustainable development. Thus, a territorial planning approach became a key component in the second phase of POS. The upside is a new generation of CDPs that reconcile conservation and development imperatives. The intercommoned projects and initiatives for sustainable national resource management have been developed and implemented on the basis of these CDPs.

Sustainable and Equitable Water Resource Management

Sustainable management of scarce water resources is a crucial development issue for the oases in southern Morocco. POS was able to implement comprehensive approaches to water management that consider the catchment as a whole and revive traditional knowledge and water management practices. Water management cannot be conceived at the plot or palm grove scale only. Upstream of the well is the catchment area, which must be included in water resource management for interventions to be effective. Management has to account for the scope of the catchment area and its characteristics (soil type, slope and vegetation, and so forth). Demand for water is highest downstream in the dry zones. POS interventions in the water sector were comprehensive, integrated, and took account of the entire watershed. They involved water supply as well as demand management; they

complemented other interventions implemented by the Agence du Sud in the water sector, which involved diversion and protection of water canals and construction of dams and of hillside storage reservoirs.

POS reinforced the customary ancestral practice of allocating water. In the process, water towers and channels were rehabilitated and traditional usage rights revitalized. The khettaras—a traditional underground system that channels water from the piedmont to the palm grove—were cleaned, maintained, and renovated. Other actions included the refurbishment of springs and irrigation canals, digging of wells, and construction of water-harvesting basins. Another beneficial intervention is the progressive conversion of the classical gravity-based irrigation system into a drop-by-drop system. This system is more respectful of the water resource. Following the territorial logic, in the areas located outside the oases, wells were dug along the transhumance axes and equipped with solar pumps to supply drinking water to pastoral families and their livestock. Together, these actions promoted sustainable, equitable water resource management in the oases.

Promotion and Development of Sustainable Tourism

The promotion of sustainable tourism in the Southern Oases was a major development intervention of the POS that continued to evolve over the lifetime of the program. The first phase of the POS included a strategy for the promotion of sustainable tourism in the oases; however, its implementation on the ground was limited to pilot activities and *ad hoc* experiences, such as the development of the bed and breakfast concept in Tighmert, thematic training in Asrir, and the production of some marketing material.

During the second year of implementation, POS expanded its operations to include new oasis communities. The tourism component started developing new products such as tours and a tourist signaling system across the whole of the Southern Oases. Tourist accommodations, including 30 bed and breakfast facilities, inns and camps, became scattered across the three provinces of Guelmim, Assa-Zag, and Tata. Thematic training sessions for community members and stakeholders were also multiplied and generalized.

These efforts aimed to increase accommodation facilities in the whole territory and to put in place several ecotourism thematic circuits. POS then invested in the rehabilitation and development of several heritage sites. For example, the restoration of the Ksar in Assa made room for tourist accommodations, as well as religious and community spaces.

In the third phase, POS set out to harmonize the touristic products offered with the intrinsic wealth of the territory. Through this creative approach, for example, artistic events were linked to the discovery of a variety of local products to provide an added value of authenticity, thus building on the power of attraction for these destinations. The cultural/folkloric activities, the diversity of local products—mainly food, cosmetics and crafts, astonishing desert honeys, smooth olive and argan oils, delicious date jams and pastes, refreshing prickly pear juice, diverse dairy and meat products, and rich multi-cereal couscous—made these ancient caravan stops a wonderful destination within a perfumed atmosphere of bkhour in the shade of a Saharan khayma.

This wealth of local potential and heritage was brought together under one unifying concept, Oasis du Sahara, or the Oases of the Sahara. Eight oasis clusters were defined based on territorial reach and resource diversity. The Tourism Association for the Southern Oases (ASTOS) was created and put in charge of managing the Tourism Information Office (BIOTO), also supported by the POS. ASTOS brought together all tourism stakeholders, including bed and breakfast owners, local guides, handicraft and food-processing cooperatives, music and folkloric troops, hike organizers, as well as travel agencies.

Efficient and Effective Value-Adding and Marketing Structures

POS was active in the promoting, value-adding, and marketing of local products. It identified dozens of marketable local products. The main challenge was how to keep their originality while improving their taste. Some of these products were also new to local populations. Public access to these discoveries demands distribution and marketing logistics in tune with their production. This has led to the establishment of the Cluster des Oasis du Sahara (COS), a platform bringing together up to 100 cooperatives and associations from the entire region, adding value to their products, enhancing their production standards and quality control procedures, and supporting the marketing of their produce through the creation of a unified brand "Nadweyya." Two Nadweyya marketing outlets were opened in Guelmim in 2011 and in Rabat in 2014. These outlets are witnesses to the success of COS. The plan for the future is to widen the range of products offered with the addition of new products such as meat and dairy from camel, royal jelly, propolis, essential oils, and aromatic and medicinal plants. A further step will be to expand the Nadweyya brand to include cosmetic products produced by POS member cooperatives.

Handicraft makers were also organized into dedicated clusters. Designer artists were hired to support new, creative, and functional designs. The development of the souk or market in Tata met the hosting needs of hundreds of ambulant craft merchants. These clusters coordinate closely with ASTOS, the network of tourism professionals in the region, to promote the establishment of a nested branding for the oases of southern Morocco, or Destination Oasis Sud.

The success of these initiatives encouraged the development of larger-scale production structures including the Ouaaroune Cactopole in Asrir. The Cactopole derives its name from the cactus, a unique natural resource that is present in large quantities in southern Morocco. The Cactopole was conceived as an industrial area of excellence to add value to cactus production, locally referred to as the "green gold." It is strategically located along the main national road, supports applied

experimental research, and includes an activity zone covering over 25 ha.

Empowering Women: The Mother, The Wife, The Daughter

POS was initially conceived as a program to address environmental problems. In a closed society, where women were never involved in community decision-making processes, it was challenging to talk about gender equity and women's empowerment. However, with the development of the first CDP in Asrir, gender equity became a priority objective for POS. Starting in 2009, the income-generating activities and micro-entrepreneurial initiatives primarily targeted women and women's associations. In 2009, POS launched a project for "enhancing women's roles in local governance," with a budget of US$460,000 for two years.

Following the launch of an awareness campaign, there was increased interest in involving women in local development processes. The results were instantly tangible: Parity and Equality of Chances Commissions became operational on a pilot basis in three communities (Asrir, Oum El Guerdane, and Tata). In 2009, 12 women representatives won in community elections.

POS created about 2,000 jobs for women and girls between 2006 and 2014. The scope of its gender-based interventions is extensive. They include, among others, capacity building and training in agro-food production and tent-weaving techniques; facilitation of experience exchange including inter-cooperative exchange visits; participation of local women cooperatives in national and international exhibitions; support to the creation of new associations, economic interest groups, and federation units that bring together various women cooperatives for their mutual benefit; provision of daycare; and establishment and equipment of multimedia classrooms welcoming women and youth.

These actions transformed the lives of hundreds of local women. As women's

conditions improve, so do the conditions for their families, communities, and the ecosystems in which they live. Increasingly, women are debating about the future and are involved in local development processes. The Network of Elected Women Officials was established to bring together locally elected women to build their capacity and strengthen their role in local governance and decision-making processes. Membership in the network is open to any woman with an elective function within a local authority.

POS catalyzed huge strides toward gender equity and women's social, economic, and political empowerment. It made a continuous evaluation of the local dynamics to meet the evolving expectations of women and men and to reconcile the urgent livelihoods needs with those of sustainability and resilience building. The combination of a comprehensive approach and adaptive management capacity enabled POS to respond efficiently to development demands in an ecologically and economically vulnerable zone.

Testimonies from Elected Officials and Local Authorities

Abdellah Addouz, President of Fask

"I have been president of the rural community of Fask since 2003. I was reelected for a second term in 2009. That year, we held an agreement forum under the tent forum for two weeks to discuss local development with the community, but the forum had limited results. Then, we established an emergency program with a budget of three million dirhams (US$308,500) with the Agence du Sud and entrusted its implementation to the association For a Green Morocco; the startup was difficult.

A territorial diagnosis was then conducted, for which POS succeeded in mobilizing community interest and participation. Despite difficulties during the planning phase, the training meetings with POS experts were successful and consultation meetings succeeded in capturing everyone's views. The resulting CDP was then approved by the members of the Municipal Council. Today, we are mobilizing funds to implement it. I believe that progress in Fask will come by developing the resources for tourism—hot springs, sand dunes, camel hiking trips—and through intercommunal networking with the neighboring communities in Tiglit or Asrir."

Moulay Mehdi HABIBI, President, Municipal Council of Tata

"In 2011, with the support of the DGCL (General Directorate for Local Collectivities), the Agence du Sud, and the AfDB (African Development Bank), we initiated the local development planning and governance process in the urban municipality of Tata.

The Municipal Council, with the support of its partners and some experts, was able to involve all the local actors and civil society. At the start of this process, we agreed with our technical partners to make the Tata CDP a model in terms of building resilience and adaptation to climate change. Thus, during the early stages of defining the local context and the participatory territorial diagnosis, vulnerability of the community and natural resources to the effects of climate change was taken into account.

The Municipal Council is proud to have a comprehensive CDP that is responsive to local needs and promotes economic development, while considering climate change mitigation and adaptation aspects, as well as the management of risks and natural disasters.

Mohamed El Kholty, President of Oum El Guerdane

"The adoption of the gender-sensitive approach was a real revolution for our community policy and planning process. Initially, we underestimated both the number of women and of young people in our actual demographics and hence marginalized their role.

The partnership with the POS opened up exceptional paths in programming, participatory planning and project implementation, based mainly on women's empowerment and gender sensitivity. I'm myself surprised by the results. I'm from this territory and I can assure you that women's strong involvement in preparing our CDP was unexpected.

If I have any advice to give to the presidents of the rural communities of Tata, I would tell them not to hesitate in this regard. The gender-sensitive approach is not only beneficial in terms of enhancing local democracy and governance, it also helps in mobilizing additional funds to finance local development and reduces the poverty pockets in communities affected by desertification and drought."

M'barek Nafaoui, President of Asrir

"We started the planning exercise by defining the local context and conditions with an in-depth diagnosis in early 2008. Then, we organized and hosted, with the POS, a series of forums and action-oriented workshops throughout 2008. The result of this policy dialogue and consultations was a first draft CDP that was submitted and validated by the local community during a Validation Forum in May 2009.

Following participatory, inclusive planning, the most important step remains implementation of the CDP. In this regard, the fundamental contribution of inter-communality should

be acknowledged. It facilitates experience exchange and promotes synergy and the pooling of resources in support of CDP implementation and to advance economic, social, and cultural development. Inter-communality falls within the promising logic of territorial solidarity and territorial development and can initiate a sustainable dynamic of economic growth that can, in turn, reduce poverty and social misery and enhance the sustainable management of natural resources."

Mohamed Oudor, President, Municipal Council of Fam El Hisn

"Since 2006, Fam El Hisn has been one of the first municipalities to subcontract a modernization program with the POS. Within the framework of this program, POS rehabilitated infrastructure, such as highways, and initiated several modernization projects that facilitated a local development dynamic.

But the real change in the scale of development came after the development and implementation of the CDP, which comprehensively addresses all aspects of local development including environmental conservation and women's empowerment. Large-scale projects are still being designed and scheduled. The promotion of a social and solidarity economy in Fam El Hisn revolves around the development of ecotourism and the creation of an Agropole as a postharvest, packaging, value-adding, and marketing platform for agricultural produce in the region. Some of the CDP projects are ambitious and are pioneers at the regional and even national levels. Innovative ideas are proposed for the monetization of local assets and potential, including revealing and restoring the architectural heritage, installing a Saharan animal park, and establishing a value-adding unit for dates. A starter budget has already been agreed with the POS, and additional funds will be mobilized from various departments, institutions, and national or international donors."

Testimonies from Entrepreneurs and Beneficiaries

Sadik Idrissi, President, PCM Company

"The inventory of local products from the provinces of Guelmim, Tata, Assa-Zag, Tan Tan, and Tarfaya has revealed a rich and diverse range that is fragmented and opaque to the national market. We have identified ten sectors, seven of which have development potential, as well as 36 local products and a dozen aromatic and medicinal plants. The approach adopted was based on quality, linking the product to its origin, and integrating and pooling a number of products and services. This was followed by upgrading the production units, supporting the development of quality and origin labels, and developing the "Nadweyya" brand name.

Networking between small producers was facilitated with the creation of Social Business (COS SB). It is a consortium that is responsible for adding value and promoting local products. Its objective is to optimize returns for local producers while ensuring an equitable distribution of benefits along the entire supply chain."

Karim Anegay and Abderrachid Boutouba, Coordinators, POS Cactus Subprogram

"From 2008 to 2011, the cactus development and valorization subprogram involved eight communities in Guelmim that had large prickly pear plantations. Several actions were implemented to assist them. A cooperative was created and equipped to add value to cactus production and its derivatives including cactus nectar, jam, cosmetic seed oil, nopal, and edible young cactus leaves. Recently, POS established the Cactopole, an industrial district dedicated to value adding and the marketing of cactus and its various products. It is located in Ouaaroune, in the community of Asrir, and as such creates an economic link between the oases communities and the cactus-producing communities."

Hamza Louali, President, Cactus Commodities (Ouaaroune)

"The Cactus Commodities Company was created in May 2012. We were the first company to set up shop in the Cactopole. In the first 15 months of our operation, we have exported 320 liters of prickly pear seed oil, mainly to the United States, Japan, and Asia. Our turnover is much higher than our initial forecasts."

Fatima Rachoy, Director, 3S Travel Agency

"Before, I was an employee at a hotel in Guelmim. But I have always cherished the idea of creating a travel agency. The 3S Travel Agency became a reality thanks to the POS, which gave me a start-up credit of 200,000 dirhams in 2009. This helped me to pay the deposit required to obtain the travel agency license for Guelmim, issued by the Ministry of Tourism.

My communication and promotion work thereafter helped me to earn the trust of almost all the administrations of the Guelmim–Es Semara region. After five years of working in the tourism field, 3S Travel opened a branch in Marrakech. Now we want to tackle another part of the tourism industry, tourist transport. Today, we have four permanent jobs. To find out more about the tours that we offer, please visit our Web site, www.3s-travel.com."

Ahmed Fiddi, President, Tazerzite Association (Fam El Hisn)

"My surname is "Fiddi," which literally means silversmith in Arabic. It's not for nothing; my family has worked in the silver sector here in Fam El Hisn for generations and has created the reputation of the oasis and the village. Together, with four other recognized craftsmen, we created the Tazerzite Association, and the Rural Commune with the support of POS has built and equipped a dedicated building, the "House of the Artisan" commonly referred to as the House of Metal. We are much more efficient working at the house because of the space and the facilities, including the adapted furnace for melting the metal. All steps of the production process are now done onsite; before, we were obliged to go to Tiznit to complete some stages of the process. Today, we receive orders from Tiznit!

There is also a showroom that you can visit. And thanks to POS, we are working with designers from Rabat and Casablanca to create new jewelry models. The jewelry we make generates income for several men and women from the village, who resell it across the region."

Hicham Aoud, Head Chef, The Workshops of the Chef

"The local products from Saharan Morocco have allowed me, these past years, to assert my expertise as an Executive Chef. They have fueled my imagination to develop original recipes such as "the Argan Oil and Chocolate Macaroon," or even "Couscous Khoummasi with a creamy camel's milk cheese and candied vegetables." The development of these products has been a great source of inspiration, a constructive challenge, and a source of great pride. I would like to thank POS for its confidence."

Mohammed Oummane, Owner and Manager of the Ecological Hammam (Taghjijt)

"My sister Fatima and I came up with the idea of building a traditional hammam (steam room) on our parents' land located in the center of the village of Taghjijt. We were helped by the Assadaqua Association for Development and Cooperation that provided us with access to a *Mouqawalati* loan, and has mobilized additional funds from the municipality, the DGCL, and POS. The association and POS convinced us to equip the hammam with an improved thermal boiler. Equipped with solar panels, this boiler saves 60 percent of the firewood otherwise needed; this is why it is an ecological hammam. We contribute to the community health and well-being, we save energy and reduce the pressure on the limited wood resources in the area and provide a good practice on how young women can fit into the economic and social fabric of the village. Forced migration is not inevitable. Today, the hammam is frequented by 50 to 100 people a day. It's a business that is working."

Bouchra Janah, President, Al Mountada Nissoui Cooperative (Assa)

"We are 10 women in the cooperative that was created in 2009 with the help of POS and the Japanese Cooperation. As in many places in Morocco, we used to only make goat cheese. Southern Morocco is, however, the country of the camel. POS brought in experts who showed us how to make cheese from camel's milk. The process is difficult because camel milk is fatty, and thus quite difficult to curdle. The other problem is that the milk comes from migratory herds that are not always nearby, whereas the cheese must be sold fresh; it cannot last for more than five days. Still, we succeeded in making a soft dough cheese that is much appreciated and sold immediately in Assa and in Guelmim, despite its high price."

Brahim El Joumani, President of COS SB

"Initially, the mission of the COS SB was to bring together the small producers to share resources and work together in a network. For instance, I have provided my experience and my address book. This is how the COS SB system works.

Given the encouraging results achieved by the COS SB, I am confident that we can move to the next step which is international marketing. But to do so, we need to develop the members' skills and professionalize the production network further. In this regard, we would like the government support to continue in order for us to succeed in overcoming future challenges."

Maalem Blal, Potter at Jhalak Douar (Tata Province); President of Tighmert Association

"At the Tighmert douar in Tata, we are proud of our expertise in pottery. It is a common heritage for several families of artisans. Before, the artisans shared a traditional wood oven. This meant a lot of wood collecting chores for women. It also created air pollution. And the efficiency was not very good. By replacing it with a modern gas oven, POS provided two solutions: First, it increased the volume of the oven, allowing for faster and larger production as well as less damage during the baking process. Second, women were liberated from the drudgery of collecting wood; the environment is rid of smoke pollution. As a result, some young people have returned to this traditional craft and people now buy quality traditional products much cheaper despite the competition from plastic and aluminum.

The products from the Tighmert oven are no longer just simple pots for the traditional kitchen. Some of the products are used for decoration. All the mud-bricks used in the rehabilitation of ancient mosques, old attics, and many vestiges of the Saadian splendor are baked here."

Testimonies from Women

Mbarka Aouissa, President, Casamar Cooperative (Tarfaya)

"Tarfaya has six cooperatives and associations that make couscous, with nearly 40 women involved. At our place, we only make moukhamiss or khammasi, which is the couscous of the beydanes, a mixture of five cereal flours. It is five times better than the couscous made in the north! We are always at someone's home to roll the grains together. POS gave us aprons and all the production equipment."

Hafida Ouknou, President, Tifaouine Cooperative (Kasbah Sidi Abdallah Ben M'Barek)

"At the Tifaouine Cooperative, there are 20 women from Kasbah Sidi Abdallah Ben M'Barek. We had always made couscous at home, with very simple utensils, by precooking it on a wood fire. With POS, we organized ourselves in a women's cooperative because by producing together, we had a larger supply and started attracting customers beyond family members. POS built us a facility, gave us equipment, trained us, and even installed an electric dryer. Today, together with cooperatives from other douars, we are part of an Economic Interest Group, and all of Morocco eats our couscous!"

Mahjouba Bidar, Sounboula Cooperative (Assa)

"When our cooperative of ten women joined the Economic Interest Group (GIE), we viewed the other cooperatives as competitors. Today, they are our partners, because together we agreed on the quality standards to follow. We went all the way to Laâyoune to discuss the ingredients of the khammasi couscous. Now we all produce it the same way, and then the COS SB sells it for all of us. There is a standard recipe and we keep it secret because now it has a Protected Geographical Indication over all the southern provinces!"

Salka Momo, President, Lamta Women's Cooperative for the Production of Marni, Asrir

"I would have never thought that you can make money from megli (roasted barley) until POS created a cooperative to produce and package it. Today, we sell megli to cooperatives that make khoumassi couscous; it is one of its ingredients. The COS SB even sells it in an individual package so that people can buy it to make their own lemriss (a drink made from a mixture of megli, sugar, and water) or beloghmane (a megli paste made with hot water and goat fat). Encouraged by POS, I transformed the basic megli flour into delicious pastries with the addition of honey, dates, olive oil, almonds, and spices. We call these cakes halawiat salka. We just offered them at a fair in Rabat and sold everything—60 dirhams (US$6) per kilo and the people are asking for more. There is demand from faraway places such as the Canary Islands and Mauritania. We are seven women in our association; some were in difficult economic situations, but now, thanks to God and to POS, we are able to make a living."

Lalla Fatma El Merini, President, Network of Elected Women Officials

"I always wanted to help my fellow citizens living in rural areas, especially women. When it was announced that a quota for women would be introduced for the 2009 elections, I did not hesitate. Before, there were no

women on the Municipal Council of Asrir, now there are two.

But becoming a member of the council is not enough. Fortunately, the POS funded and coached us to create the Network of Elected Women Officials, of which I am the president. Today, we are five from Guelmim, four from Tata, two from Tan Tan, and two from Assa at the office. The network promotes experience exchange and learning with the organization of several thematic training workshops. We just got back from the one held at Tan Tan last week. Some women elected officials from another province told me that when they used to arrive at their Community Council, they [would] find their chairs moved away from those of the male members and [they] were starting to get used to being marginalized and not heard. We encouraged them and told them that it is their right to express themselves and to give their opinion; that they should not be intimidated. If they are unable to express themselves in a good classic Arabic, they can use the dialect. The important thing is to make their voices heard. Now, they feel confident to sit at the table with men, eat, speak, and listen."

HUMAN SECURITY, CLIMATE CHANGE, AND FORCED MIGRATION

HUMAN SECURITY AND CLIMATE CHANGE

Environmental degradation impacts human welfare and affects the basic conditions for peace and stability. Because of its strong linkages with food security, economic development and human rights, the state of the land is at the core of the most fundamental positive feedback loops of our times. Mankind could use these feedback loops to multiply the quality of life or neglect them with uncertain and potentially devastating results.

The ecosystem is challenging human organization with its ever swifter modifications. The fundamental question is whether humans will stay united in order to restore the balance of the key ecosystems in a rational way, or they will turn to irrationally competitive behavior that may continue feeding the ecosystem's disruption.

The commonly feared and condemned scenario is the "business as usual", with a continued neglect of the natural balance. The fact is, a worse turn may be looming and could be more catastrophic. If the impairment of ecosystem services is pushed beyond a given threshold, it may exacerbate competition over scarce resources and trigger some systemic insecurity, societal and institutional fragility, instability and conflict. In turn, these changes could paralyze the international community's willingness to unite and manage the ecosystem rationally. This negative feedback loop is far worse than the 'business as usual' scenario. Defusing this loop is imperative and is contingent on granting sufficient and fair access to thes ecosystem services essential for an orderly economy and social cohesion. Most of these services are rooted in healthy soils, for a majority of the global population.

The up side of this fundamental link between humanity and land is that it also works in the opposite direction. Protecting land productivity could trigger peace, stability and ecosystem recovery cycles. The benefits would extend far beyond the use of the natural resources. Inspiring examples exist, as shown in the following pages.

Sustainable land management, thus, is a crucial, yet underestimated solution for many of the world's most pressing challenges, including forced migration and climate change adaptation. A first implication is the need to improve direct land use. But the stakes are now so high for food security and human well-being that preserving the healthy lands left is not only necessary, but the most cost-effective way to address the growing vulnerability of people living in resource scarce areas. It is also vital, if we are to prevent land degradation becoming a threat in other areas.

The current trend is one of a constantly expanding human population and production. From this perspective, the responsibility to protect the health of productive land is a priority strategy. We must take action on the causes of environmental degradation – foster renewable energy, prevent and repress poaching, monitor timber markets and so on. But we must also be aware that we may reach or are reaching the point at which the heavy consequences of ecosystems failure might be unavoidable.

Individuals and communities both need to resist and adapt to the changing circumstances by taking responsibility for natural resources. Cooperative approaches towards

conservation, the sustainable management of common goods and land rehabilitation are key resilience strategies. The stories from Bayannuur (Mongolia) and those of the Green Revolution (Ethiopia) show that creating jobs and revenue opportunities around ecosystem restoration are decisive factors in offering people the chance either to tackle the drivers of forced migration or to find somewhere else to survive.

In the stories that follow, land emerges as the first and foremost asset of value for livelihoods for a great portion of humanity. Land needs to be nurtured, if we are to avoid being embroiled in local and regional conflicts, or even global instability. The good news is that, by restoring ecosystems and degraded lands to solve the consequences of environmental imbalance, we will also solve the knotty issue of poverty.

From Yellow to Green: Building a Sustainable Regional Development Model

Between 1999 and 2002 in Mongolia, severe winters known as *dzud* killed 11 million livestock and turned more than 12,000 households into environmental migrants. But this was not just a sudden development. It was a disaster waiting to happen.

Mongolia, due to both its innermost location and its extreme continental climate, is especially vulnerable to climate change. Dust sandstorms plague many areas in Mongolia, especially around villages, indicating that activities in the villages are a factor that may relate to the occurrence. From 1991 to 2009, due to sandstorms and desertification, nearly threefold of fertile grassland in Mongolia has gradually disappeared.

Man-made factors such as overgrazing and indiscriminate mining development accelerated the process of desertification. The number of livestock increased from 9.6 million in 1918, to 39 million in 2007. The animals needed to support families' livelihoods are now becoming the main source of land degradation.

The increase in the annual average temperature by 1.92°C over the past 60 years has exacerbated the situation. Some 887 rivers and streams, 2,069 springs, and 1,166 lakes and ponds have disappeared. The effect on the rural population, which relies heavily on animal husbandry, has been substantial. After losing their livelihood due to climate change and desertification, a significant number of nomads had no alternative but to move to another city. Over the last 20 years, the urban population in Mongolia increased by approximately 70 percent, which led to a peri-urban slum issue. One example is Ulaanbaatar, where people who live in these peri-urban slums often lack clean drinking water, sanitation, and basic public facilities.

In 2000, in response to the unraveling disaster in Mongolia, the Green Asia Network (GAN), a nongovernmental organization from the Republic of Korea, started tree

planting activities to help to curb the effects. GAN developed a sustainable regional management model that integrated three key elements: environment, society, and the economy. This model was then scaled up and replicated successfully across six project sites in Mongolia.

Integrating the Environment

Within 15 years, 500,000 trees were planted on 500 ha of land in Mongolia, leading to increased grassland production of approximately 3.2 tons per ha, a reduction of dust sandstorms in the nearby region, and improved land fertility as well as water retention. GAN's restoration project also expanded from one to five other sites in Mongolia. Residents living near the afforestation sites observed fewer occurrences of dust storms and no longer face the destruction left by these storms. A successful example of a GAN restoration project is in Bayannuur District, where GAN planted 120 ha of trees in a village. Villagers reported that they did not see dust sandstorms occur in the approximately 1,200 ha of land surrounding the site.

In addition to the reduction of sand storms, the formation of root nodules up to 0.5 cm in size were observed in the rehabilitated land. Root nodules directly increase the productivity of the grassland.

Engagement with Local Residents, Key to the Success

The key success factor in the GAN model is active engagement and participation of the community. GAN recruited the affected local residents to attend its orientation and sensitization programs. The residents received training and the necessary skills required to manage afforestation and land rehabilitation projects. Active participation, such as discussion and idea exchanges, was highly encouraged so that participants could clearly learn and understand how the model works. Additionally, advanced training programs in afforestation, sustainable agriculture, greenhouse management, and organization operation were offered.

After training, GAN hired the participants. They earned an income for implementing and managing the projects over a limited period of time. This empowerment process enabled the local residents to be self-reliant and to manage the agriculture and tree planting activities independently in the future.

Building a sense of belonging to a community as well as solidarity among communities remains critical. A sense of community and cooperation help foster cohesion while maintaining active participation among the local workers who were environmental migrants coming from different regions of Mongolia.

GAN's SLM model was also adapted to the needs of the communities and environmental conditions of its sites. For example, in Bayannuur, the major activities were lake

rehabilitation, installation of a solar plant system, reforestation and fruit tree cultivation, while in Bagannuur and Songino, urban models were adopted, and activities focused primarily on urban afforestation. In Dondgovi, the barren land model was employed and local residents were specially trained in afforesting techniques for barren land.

Integrating the Economy for Long-Term Sustainability

Fruit tree cultivation and agriculture activities that could generate income for the local community were initiated to sustain the livelihood of the local residents. This was an essential step for ensuring project sustainability and community self-reliance. The profit from the harvest is then saved in a collective fund that is managed by an informal cooperative. This money will then be used to establish and operate a community cooperative that is responsible for managing community activities at a later stage.

Creating a Model Village

In 2010, GAN built a pilot sustainable village in Erdene, named Sky Village. This village is located near Ulaanbaatar, in the middle of a broad field suffering from desertification. Sky Village was created to attract the participation of environmental migrants seeking a better livelihood in Ulaanbaatar City.

At first, these migrants were employed by GAN to implement afforestation activities. They also participated in a training program which focused on project know-how and other income-generation activities. GAN also facilitated the organization of various income-generation activities, such as eco-tours and the cultivation of fruit trees and vegetables to help the community sustain their livelihood. Within two years, the community, which started with nothing, built a village parking area, a store house, an improved waste dumping site, and a fire hydrant system. The residents also earn income from their harvests and from selling meals to tourists. A community fund was established to collect income earnings from the activities or services to sustain their future activities. The local residents are encouraged to actively contribute ideas for improving their living conditions by participating in monthly meetings.

Power of Raising Awareness

GAN runs a variety of educational programs throughout Mongolia, and Korea as well. One of the most innovative programs uses ecotourism. It is a powerful mechanism for raising awareness about the challenges of desertification, land degradation, and drought.

GAN organizes eco-tours that attract locals and international visitors to affected areas to show them the impacts of climate change, and how SLM can improve livelihoods in other parts of the world. The participants learn about climate change and desertification and are given the opportunity to work with the local people on forestry projects. Every year, more than 600 Koreans and over 3,000 Mongolians take part in this eco-tourist awareness program.

Testimonies: Local Participation Key

Tsognamsrai Damiran

Tsognamsrai Damiran, a senior-level employee at the United Nations

Development Programme (UNDP) Community Outreach and a rural conservation development expert, was impressed with GAN's sustainable model.

"As an ecologist, my career at UNDP Mongolia started in 2008. Between 2008 and 2012, I worked on the Sustainable Land Management for Combating Desertification Project in cooperation with the Ministry of Food, Agriculture, and Light Industry of Mongolia. I was responsible for capacity building and trainings with regard to combating desertification. During that time, I became familiar with GAN activities in Mongolia, as we were doing similar activities. Because local participation is key, I learned from GAN how to get active involvement from the local people, a challenge we faced in our own project. This is why I want to introduce GAN's model to the local community in the UNDP project.

The principal objective of GAN's projects is to restore and strengthen the environment through SLM by building local capacities through an integrated approach that works for sustainable environment, economics, and society. This is done in a comprehensive way by working with communities to generate income from selling agricultural products, educating local residents, and raising awareness on environmental protection. Based on my experience in Mongolia, I know this is an appropriate and effective model of creating change that also helps communities.

Also, it's important to connect NGO work with government plans to have the biggest impact. GAN has done this by partnering with other international NGOs and the Mongolian government. By building these relationships, it can work not only at the local level, but also nationally. This has helped GAN scale and expand its projects to different areas in Mongolia.

As a person who has worked on the ground, I know GAN's strategy and activities make an excellent model in sustainable land management that can be replicated to get active participation from the local people."

Dulamsuren Badarch

Badarch is a 52-year-old woman who is a resident of Sky Village and a staff member at the Erdene site.

"Before, I was a meat retailer at a market in a nearby region, but the business didn't go well so I quit. I started working here in 2011, doing afforestation work. Currently, I am in charge of cooking in the ecotourism team, and of accounting for the community fund. The Erdene staff started selling meals to the eco-tour team visitors in 2014. The profit goes to their community fund.

Since I started working here, I feel rewarded by harvesting fruit and earning [a living] by selling meals to the eco-tourists. I have learned how to plant trees, to maintain the sites, and to make fruit jam. In the meantime, my two daughters were admitted to the university in the city. One will graduate this year and the other one next year.

Before the afforestation program, this land was covered by sand and had just a few grass patches due to desertification. Now there are trees and grass, and we even earn money by selling the fruits and vegetables we grow.

My future plan is to manage and maintain the afforestation activities in order to keep

Dulamsuren Badarch, on right

producing and harvesting more fruit to save money for the community fund and improve our livelihoods."

Ankhbold Dorlig

Dorlig, 32 years old, is the local manager of the Erdene site. After migrating from another village, Dorlig is now a member of Sky Village.

"I was born a nomad in the Hovd Aimag region in the western border province of Mongolia. But it was hard to make a living even with more than a stock of 100 goats, so in 2009, I moved to Ulaanbaatar city with my family and stock. Then the *dzud* arrived the same winter and my entire stock died. Then in 2011, the local Erdene government offered me the information job at GAN's site, where I am now the site manager.

It hurts me to see trees we have worked so hard to grow weaken during the drought. But when the trees finally survive, well, I am so proud of what we have done. By working here with my wife, we earn a salary to support our livelihood, and we also get to see and learn how nature restores a desertified area. My children also love nature. They proudly tell their friends, "My parents are planting trees."

I tell my friends what I have learned here and appeal to them to plant trees. I hope I can plant trees in my hometown one day."

Buyandelger Dashdondog

Dashdondog, 42 years old, is the agricultural manager of the Bayannuur site.

"Back in my hometown, I lived a nomadic life. I lost my livestock in the 2002 *dzud*. I started working here in 2010. At first, the work was challenging for me because I had no knowledge about afforestation. Tending saplings and agriculture were all new to me. But now, I am the manager of a nursery and have learned agriculture.

I love the feeling that I get working during the changing seasons. In spring, I am happy because the work cycle for the year begins. In autumn, I enjoy harvesting various vegetables. I am learning a lot of new things here, including how to work as a team.

In this region, we had frequent sand storms and the streams and the lakes were dry. But as the trees that we have planted grow, the land of red sand is turning into green, fertile land. I also can see that environmental awareness is growing among us. Even my children are interested in agriculture and afforestation now.

Now I have a dream—to establish a local agriculture cooperative with my colleagues."

Buyandelger Dawachereng

Dawachereng, 29 years old, is a manager at the Uggi nuur site and is full of enthusiasm.

Ankhbold Dorlig


Buyandelger Dashdondog

Buyandelger Dawachereng

"This year, GAN's project started in my region of Uggi nuur soum. There is a big lake there called Uggi. The name of this region, Uggi nuur, comes from the name of Uggi Lake. The lake was drying up and the vegetation in the region was disappearing.

I had no job before joining GAN to do the afforestation work. It was exciting to set up the fence and plant trees on our land. Digging a hole is hard work. But by far, the hardest thing for me is to see our trees die.

One of the immediate changes that this project has brought is an income for my household. Since I became a manager, I have learned how to lead my colleagues. In addition, I am learning new ways to relate to nature. Restoring nature will be a long process, but I believe that our site will contribute to the fight against the desertification of our region, and make our region an eco-region.

I have a plan. I hope to grow more trees and vegetables like in the project site in Bayannuur. In the future, I hope to run a cooperative to manage and sell the harvest we have."

Narantsengel Munkhbayar (Neil), Munkhjin Munkhsaikhan, and Tuguldur Altanzul

These three young people are members of My Club, an environmental club in Mongolia. Neil is 22, Munkhsaikhan is 23, and Altanzul is 27.

Neil: "I found My Club through Facebook, and joined it five years ago. Through My Club, I have learned to plant and manage trees and to work as a team."

Munkhsaikhan: "GAN and My Club have worked together since 2009. GAN set up afforestation sites, which creates jobs for the local communities. My Club members volunteer for the afforestation activities on GAN's sites and raise awareness among the youth in Mongolia."

Altanzul: "Hundreds of My Clubbers appreciate GAN sincerely. We support each other, and I believe we will cooperate further on various works."

Park Shin-Yeol, participant of eco-tours

"I participated in GAN's eco-tour in July this year, volunteering for afforestation work at the Erdene site, learning what we can do for the earth through environmental education and forums, and flash mob campaigns for environmental protection.

After the eco-tour, I am making the effort to share my experience with my friends about what I saw, felt, and learned from Mongolia. I hope this will lead to change in my surroundings, however small or big the change may be.

In addition, I started a regular donation for GAN. Currently, I have regular meetings with other friends in our eco-tour team. We did the flash mob about recycling and plan to save money for afforestation work through a

Park Shin-Yeol

bazaar. I will make a video clip of our efforts in order to share with others and lead the change for more people."

Resources

Green Asia Network Web Site: www.greena-sia.kr/eng

Global Asia Network, "SLM Integrated into Sustainable Regional Development," in The Green Line: Focus on Land Degradation. http://www.thegef.org/gef/greenline/sep-tember-2011/slm-integrated-sustainable-regional-development

GAN project site 2004

GAN project site 2012

Restoring Hope in the Mountain Rangeland of Afghanistan

Afghanistan once had a rich culture and diverse environment. But decades of near-constant warfare has led to the neglect of natural resource management, which has left this country with a devastated landscape. Grasslands are degraded. Forests have been cut down. Rich, productive soil has been blown away by harsh winds and precious wildlife is vanishing rapidly.

These scenarios are evident in the rangelands that cover an estimated 45 percent of Afghanistan land surface area. These lands are essential for the socioeconomic development of the country, providing the main feed supply for some 22 million small ruminants, and the byproducts (meat, dairy, wool, carpet, and leather) account for more than 50 percent of Afghanistan's export revenue. They are also important ecosystems that support services such as water catchment areas and natural control mechanisms for soil erosion and flooding. These rangelands are a unique habitat for wildlife and a globally significant "sink." The Conservation Organisation for Afghan Mountain Areas (COAM) set up five practical projects: a design lab, a design school, tree nurseries, an irrigation system, and the clean cook stove. These simple tools have transformed the state of this mountainous environment and improved the livelihoods and health of the local communities.

Kuchi, the dominant group of nomadic pastoralists in Afghanistan, is one of the most affected communities due to the degraded rangelands and the growth in rural settlements. Conflicts between Kuchis and settled farmers over land rights have become increasingly prevalent, as publicized recently.

Attempting to change this situation, COAM began a multifaceted endeavor with two goals: first, to stop the degradation of Afghanistan's environment, and second, to concurrently ensure a sustainable future for the local communities that live off these natural resources.

Keep it Simple and Practical

COAM set up five practical projects in the Koh-e-Baba mountain area, where the upland watershed catchment zones are home to over 3,500 people living in 21 communities. The five projects include a design lab, a design school, tree nurseries, an irrigation system, and the clean cook stove. These simple tools have transformed the state of this mountainous environment and improved the livelihoods and health of the local communities.

For instance, two new cook stoves, designed and manufactured by the design lab, have reduced smoke leaks significantly to yield about a 40 percent carbon dioxide emission. With these cook stoves; the carbon that is trapped in the house is less than 60 percent of previous levels of trapped carbon. Inhaling carbon poison is one of the greatest threats to the Afghan people. Over 54,000 women and children

die each year as a direct result of indoor air pollution, according to the World Health Organization. The improvement in the quality of indoor air has directly contributed to better health for the local people, especially women and girls. Women who have cooked with these improved stoves claim that there is no more trapped smoke in the kitchen, the kitchen is cleaner, and that they save time as the stove can perform multiple tasks at once.

The local irrigation system that COAM introduced moves water that is not being used to areas where it is needed. COAM introduced a locally designed ram pump that is powered solely by hydropower. The system is simple, but it is a cost-effective technology. It has improved the irrigation in mountainous areas that were previously unreachable by digging the widely used traditional channels, locally known as joi. This irrigation system has helped enhance the agriculture productivity and reduce soil erosion.

Trees that Create Wealth

COAM's community tree nurseries are an alternative, sustainable, environmentally friendly source of income for the community. The nurseries specialize in producing fruit trees that are adapted to the harsh local climate. Not only are there economically valuable tree species, but there are

also native shrub species that help to conserve the rangeland and reduce soil erosion. The income from nursery trees per area of land is much higher than income from any other agriculture crops currently being grown in the area. For example, a jerib (2,000 m^2) of wheat or potatoes generates about US$1,000 per year, whereas the same area of fruit trees generates US$6,000 per year. In just two years, COAM has established 13 nurseries covering over 2.33 ha of land, and more than 2,100 people have directly or indirectly benefited from the nurseries. Many residents acknowledge that they can now purchase these fruits locally at a cheaper price, and they are fresh. In addition, the nurseries also serve as a means of revitalizing and conserving the landscape by preventing erosion and introducing both new and native plant species.

Knowledge and Technology Transfer for Sustainability

In 2011, COAM set up a design school and an internship program. These two initiatives are unprecedented in Afghanistan. COAM offers different kinds of training to the local people, including women. It includes training participants in sustainable land management. COAM hopes the programs will contribute to a future of green technology innovation throughout Afghanistan. The design programs are set up to ensure that local youth have the capacity to learn, adopt, and further expand the low-cost green technology in their communities. So far, eight previously unskilled, unschooled young men from disadvantaged societies were trained for 12 months, under an internship program, in green technology design and metal work. These men have graduated as green technology designers and metal workers and are in the process of developing their own businesses within their communities. They will go on to educate others in technology, creating further employment opportunities.

Empowering Community Women

The roles and contributions of women in Afghan communities are often neglected, and women often are unable to obtain a proper education. COAM has emphasized the role of Afghan women and women-managed enterprises in the implementation of green technologies. COAM provided training on operations and maintenance to women to increase community ownership.

Testimonies

Abdul Ghani

Abdul Ghani, the head of Jawkar village in Bamyan, donated his land for use by the community. After the land was left idle for some time, it was agreed that trees should be planted on the land because they would benefit both the villagers and the owner in many ways. "We plant trees in areas where there is a risk of an avalanche. The trees helped with the greenness of the environment and weather. In the past, there was no shade or trees for the local people to sit under while working on their lands in the summer. Now we can enjoy our rest under the trees," says Ghani.

Most of the fruit trees planted have increased Ghani's income. He sells fruits and seedlings to other villagers. The villagers also benefit as they get the fruits and seedlings locally at a cheaper price than those from other markets.


Abdul Ghani

Haji Abdul Qadeer

Haji Abdul Qadeer lives in Qabr-e-Zaghak village. He farms in the rain-fed areas, known locally as Lalmi, and has suffered the effects of flooding. Lalmi are located at the feet of the mountains and hills. "Whenever it rains, the floods run directly to the land in the valleys," Qadeer explains.

Nurseries and plantations were set up to prevent major floods, reducing the damage to his land. In addition, COAM helped to build walls around areas that have a high risk of flooding and help prevent floods for the residents.

Fatima Hossaini & Narjees Jafary

Fatima Hossaini is 55 years old. She and her five children were exposed daily to the long-term health risk of carbon monoxide poisoning through the use of their mud brick oven, which produces a large amount of smoke and dirt indoors. Hossaini has to make a fire whenever she needs to boil water, cook food, make bread, or heat the house during the winter.

Hossaini says that since the clean cook stove was introduced, there is neither smoke nor dirt around the house, and she can cook, boil water, make bread, and heat up the room at the same time. The clean cook stove not only saves Hossaini time with her tasks, but it also allows her to take better care of her health and the health of her children. "This cook stove has a good result, and it costs less. Last night, we only used five pieces of wood to make the fire!"

In the past, Jafary also cooked on a mud-brick oven. These ovens are unsafe and many young girls like Jafary risk burning themselves. Sometimes she had to take turns to cook, boil water, or make bread, which was time consuming. "The clean cook stove has many benefits. It is clean and there is no smoke spreading around. It does multiple jobs at the same time, and it uses less fuel wood and saves money. More importantly, it is good for our health. This is a good program, especially for women," said Jafary.


Narjees Jafary

Hassan Rahmadullah

Hassan Rahmadullah's life is moving in a positive direction. This was not always the case. The one piece of land that he took care of all year round earned him only USD$600 a year. Then, he introduced the ram pump for irrigation, set up fruit nurseries, and started selling his plants in the market. Today, he has more work, and he earns the equivalent

of US$10,000 per year. Rahmadullah is just one of many people in Khushkak Village who have benefited from the COAM project.

Mohktar Awazzawar

"I am Mohktar Awazzawar. I live in Shibar District in Bamyan. Before I joined the COAM design school, I farmed my own fields. I helped my father and brothers in their fields too. I have not been to school. After I graduate from COAM design school, I will go back to my village. My village is very mountainous and cold, so I intend to open a shop and make good stoves for the people. If the people want to learn the skills I am learning, I will teach them those too."

Hussaindad Muhammad Kazim

"I am Hussaindad, son of Muhammad Kazim. I graduated from Center of Bamyan High School in 2006. I could not study further because my father was old and I had to take care of my family. I am married and have two children, both of them boys. After completing COAM design school, I want to make a workshop in the bazaar and teach the people of Bamyan design skills. Before I joined the COAM design school, I was a Bamyan tour guide and an English teacher for five years."

Resources

COAM video: www.youtube.com/watch?v=CIFWQ_kFby8

COAM, Finland Embassy–funded work: www.bbc.com/news/world-asia-20038511

www.myafghanmountains.org

UNEP, Women, Natural Resources, and Peacebuilding: www.unep.org/disastersandconflicts/Introduction/ECP/WomenandNaturalResourcesinPeacebuilding/tabid/131156/Default.aspx

Climate Adaptation for Rural Livelihoods and Agriculture (CARLA)

Malawi is one of the poorest countries in the world and the land is nearly everyone's source of livelihood. Agriculture is the source of 37 percent of the nation's gross productive output and it employs 80 percent of the labor force. But for every three people in Malawi, one lives in extreme poverty. The country's poor infrastructure, transport, health and education services are not only critical obstacles to development—they make Malawians even more vulnerable to climate change, and the poorest communities are always the hardest hit.

The focus of the Global Environment Facility (GEF) was to help Malawi's agricultural sector adapt to the effects of climate change and reduce poverty in the three highly vulnerable districts of Karong, Dedza, and Chikwawa. The array of sustainable land management activities undertaken to strengthen community resilience ranged from afforestation to fish farming, livestock rearing, conservation agriculture, as well as introducing drought-tolerant crops and fruit trees.

Access to water in a changing climate is critical. And in these districts, the main focus was on better water distribution, more efficient irrigation, capturing groundwater, recycling water, and revitalizing the water system. Each of the communities selected the measures to be taken based on local needs.

In the long run, the goal is to embed a system that is built on the sustainable use of natural resources, livelihood diversification, and increasing land and economic productivity so that communities are cushioned against the impacts of climate change.

A livestock program that offers an alternative stream of income has been particularly successful. It is built on a "pass-on" system. A beneficiary receives a goat and then the offspring of the goat is passed on to new beneficiaries. In 2014, the first set of beneficiaries received 989 goats.

Growing fruit trees is not only another new income stream in the districts, but is a technique aimed at reducing nutrient runoff during heavy rains. Breeding fruit trees can control flooding. By 2014, 615 farmers had been trained in methods to breed fruit trees. Mango, banana, and lemon trees were successfully adopted in various districts.

Several villages are also experimenting with irrigation. Using a treadle pump irrigation system that is powered by solar pumps, agricultural productivity has, on average, increased from 1 to 3.5 tons per ha. Boreholes are used to meet the water shortages, and six of them are already in place.

While these investments have not yet borne visible financial benefits, the farmers report that they have a new understanding of the climate change concepts, which has led them to create short- and long-term strategies to address its challenges.

Testimonies

Abraham Simkonda, CARLA Lead Farmer (Karonga District)

"As one of the beneficiaries of the CARLA project, I feel very grateful for the assistance it has provided. As you are aware, this area of Karonga District has continued to suffer from severe drought conditions this season. Thanks to CARLA, which has allowed me to plant my own orchard, I don't expect to feel the impact as much. I can sell bananas and paw paws to generate income to cover basic household needs. In appreciation of the project, I have set aside part of my garden as a nursery for issuing out free seed materials to other interested farmers in the area. So far I have issued banana suckers to 15 farmers to plant in their own orchards. After issuing the fruit trees, I follow up with training in their gardens using skills that officers from CARLA taught me. I have little doubt that within the next few years, most farmers in this area will have fruit trees on their homesteads."

Moses, Farmer (Chikwawa District)

"Our family has been vulnerable to climate change variability because we had no quick

way to generate alternative income to help us to adapt to the harsh realities of the new weather patterns. In our area, every year we experience droughts and floods, which have resulted in our family having food for only three months in a year. We did not even have the financial capacity to buy maize, which is a staple food in our meals. As a result, some family members are seeking ganyu [temporary labor]; reducing the number of their daily meals; and some are even resorting to begging. This has often impacted our integrity and standing in the community and caused us shame. Since the beginning of the CARLA project, we have received two goats and we have already given the offspring to other members of the community—there are now seven goats in our community in Khola. By the end of the project, we expect to own at least 20 goats, which we will be able to sell in the case of an emergency or rough times."

Stewart Mwangulu, Secretary, CARLA Project (Karonga District, Mwawanga Village)

"We have faced some challenges here in Mwawanga Village in relation to the climate changing. In the district of Karonga, where Mwawanga Village is located, the rainfall pattern has not been consistent and reliable. There are instances when, in the middle of preparing the fields, the rain stops abruptly. The rain pattern has been changing and it is erratic, which has lowered our yields. If it had not been for the CARLA Project and the irrigation, we would have experienced low yields during harvest."

Ferista Meki, Farmer (Chikwawa District)

"This year I have seen firsthand that using different farming methods can alleviate the effects of climate change. Despite erratic rainfall, this sorghum crop has done very well. It does not require a lot of rainfall and is drought resistant. I expect to have a bountiful harvest. The bountiful harvest will benefit me and my family. I will be able to pay my child's school fees. I want to buy livestock for rearing. CARLA's new farming methods have helped me."

Samuel S. Kamanga, Field Technician, Ministry of Agriculture, Water & Irrigation (Karonga District)

"We have a number of interventions that we are carrying out in the project area to protect communities against climate change: irrigation, horticulture, forestry, fisheries, agriculture production, and soil and water conservation. For example, in forestry, we have engaged the community in planting more trees along the main river bank. The water is washing away the maize and cassava fields downstream, causing havoc to more than 500 households."

A Holistic Approach to Harness Coping Strategies for Community Adaptation to Climate Change

Namibia is highly vulnerable to climate change impacts. This is due to its arid landscape, variable climate with frequent droughts, low economic growth, high poverty level, a high dependence on climate-sensitive natural resources, and the agriculture and fishery sectors. Historical trends from 1960 to 2006 show an increase in the number of maximum temperature days and an increase in the duration of dry seasons. In the future, Namibia is expected to face temperature increases of up to 2°C. Evaporation rates will increase by five percent per degree of warming. Namibia can also expect an increase in the frequency and intensity of both floods and droughts.

In this context, the Global Environment Facility (GEF) supported the implementation of a project in north-central Namibia. It focused on interlinking strategies designed to improve the stakeholders' adaptive capacity to current and future climate change risk through a holistic risk-transfer approach. The pilot project also aimed to develop sustainable models that can be replicated on a large scale. The target was 12,600 beneficiaries in 2,075 households in eight villages. The stakeholders were primarily female subsistence farmers and youth who depend highly on agriculture and natural resources for their livelihoods. Youth stakeholders included orphans and vulnerable children. The total project cost was USD$250,000.

Self-help groups (SHGs) were created to provide a mechanism to build awareness of climate change and nutritional issues. The groups also created the means for a bottom-up project planning, coordination and implementation approach, as well as stakeholder self-reliance. Each SHG had a Cluster Coordinator, chosen by the community, who received training in community mobilization, social needs, finance, enterprise creation, and sector-specific climate change training. They also received training on the UNDP Climate Change Toolkit and nutrition. The coordinator's role was to share this training with the SHGs.

Irrigated vegetable production was designed primarily to support HIV/AIDS (human immunodeficiency virus/acquired immunodeficiency syndrome)–affected families. A micro drip irrigation system was used to harvest flood and rainwater. This improved soil quality and enabled households to save water. Its mobile capability allowed farmers to switch the location of vegetable production during floods.

The project also focused on improving dryland crop production through soil conservation techniques such as composting, bio char, crop rotation, and conservation agriculture (CA). Through ripping and furrowing the soil, CA retains crop residue and ensures minimal disturbance of the soil, provides permanent soil cover, and supports crop rotation.

Flood- and drought-resistant crops were also introduced, as well as new crop varieties such as mushrooms and sweet stem sorghum to improve human nutrition and provide fodder for livestock and fish. These crops increased household income levels.

Local, energy-efficient stoves designed by women were promoted to reduce indoor pollution and improve health. They also reduced local deforestation and desertification, as well as the household income spent on fuel, Green House Gases (GHG) emissions, and improved household cooking efficiency.

The project used the UNDP Vulnerability Reduction Assessment tool linked to GEF criteria of global environmental benefits, which helped community-driven planning and participatory monitoring and evaluation of project results. The project has produced many benefits:

There are rewards at household level. Traditional water wells have been restored. Traditional knowledge has been used to introduce underground water-harvesting tanks. This has resulted in a more water secure household.

The soil's fertility and water-holding capacity have improved. This land was restored through sustainable land management practices that included the installation of irrigation systems from harvested rain and flood water and the use of natural fertilizers. Large-scale composting ensured green matter was not wasted in larger-scale farming operations.

Food security in households is improving after the introduction of flood- and drought-resistant crops. Sweet stem sorghum, in particular, has come with multiple benefits. It is used for livestock fodder during drought, as composting material, and to produce biogas for green stoves.

Households are also more energy secure. Solar power sources have been installed at all sources needing electric power.

Energy-efficient wood stoves have reduced firewood usage by up to 75 percent. By pairing this with the dissemination of sustainable agroforestry techniques, such as intercropping, the community's leadership of local plant nurseries has grown and has ensured the availability of large amounts of tree seedlings.

Through facilitated exchanges of experiences and coping strategies between regions, awareness increased regarding climate change, coping strategies, global warming, and nutrition.

Testimonies

Johannes Keshongo, Farmer (Okakoto Village, Omuntele Constituency, Oshikoto Region)

"I started CA with a demonstration plot three years ago. My neighbors told me that I'm wasting my time and I'm wasting my land as I wasn't planting crops on all parts of the ground. But I told them "just wait." I called my neighbors when my crops were starting to grow. They now want to do CA and the ripping system. At harvest, I get a much greater yield when using the rip and furrow system compared to the traditional disc plowing approach. If we can receive land preparation service early, we will meet government half way; they won't have to distribute drought relief.

I have shared my knowledge with other farmers on CA by showing them my farm. I have showed 170 farmers, including my whole village and all members in our local savings group, who are based all over the area. They are spreading the message to others, as it is our duty to share information on how to reduce poverty and increase crop yield through CA.

The best impact of CA is good germination, good healthy plants that give good quality seeds. In the CA system, plant roots are deeper and stronger. We sell surplus crops to others so my income has increased a lot. Before using CA in 2009, I used to sell one silo of pearl millet for 3,000 Namibian dollars. In 2012, I could sell three silos for a higher price of 5,000 Namibian dollars each. Using disc plowing, I could get four silos of crop from five ha of land. Using CA, I now get four silos from three ha. If five ha of land are all ripped by CA methods, two ha will provide enough household food for a year, with three to five ha providing surplus food."

Titus NasHima and Freda Uunona, farmers from Omusati region, visited the farmers who have already implemented CA. They were in awe. "There are no words to express what we've seen. I could faint right here! Johannes has to give this information to other farmers based on his talent. Our fields don't look like this. We have nothing. We use disc harrowing and animals for plowing. We want to start CA. There is no rain here, but still there is enough food. We will share what we have seen with others in our area."

Resources

Project report: https://www.thegef.org/gef/pubs/taking-effective-community-based-adaptation-to-scale

Project Web site: http://www.adaptation-undp.org/projects/spa-community-based-adaptation-namibia http://www.undp-alm.org/projects/spa-cba-namibia-harnessing-coping-strategies-holistic-approach-community-adaptation-climate

Project YouTube video: https://youtu.be/aSQZ-DNN4_o

Project pictures: https://www.flickr.com/search/?user_id=40412379%40N02&sort=date-taken-desc&text=namibia%20adaptation&view_all=1

SCALING UP SLM AND LAND RESTORATION INITIATIVES

SCALING UP SLM AND LAND RESTORATION INITIATIVES

Land degradation, desertification, and drought are challenges of a global dimension, but they are more pronounced in sub-Saharan Africa (SSA). There is global recognition of the economic and social significance of good land management, including soil, particularly its contribution to economic growth, biodiversity, sustainable agriculture and food security, improving water availability, women's empowerment, and eradicating poverty. Impacts and multiple benefits such as these are the result of perseverance and strategic long-term engagements in the countries.

The stories in this section from Ethiopia demonstrate how to proceed step-by-step in mobilizing communities to achieve change at scale. Ethiopia is no longer known as a land of famine. Today, it is the fifth largest economy in Africa. Tens of thousands of people living in the Ethiopian highlands have stories to tell about how their lives have been transformed by sustainable resource management.

A green revolution backed by official support and community participation has produced benefits on a scale never experienced before. Ethiopia's Sustainable Land Management Program gave women a prominent role in development activities, encouraged children to attend school rather than herd cattle, reinforced social cohesion in rural areas, reduced migration levels, and brought a sense of security. In less than ten years, 15 million ha have been restored and at least 30 million people have benefitted.

The story of Ghana, located in the heart of West Africa, is an interesting example of the evolution in innovative interventions—over three generations of investment projects. What started with a sole focus on agricultural lands evolved into sustainable land and water management (SLWM) on a broader landscape. Today, it encompasses resilient landscape management allowing for an ecosystem-based approach to addressing land degradation, climate vulnerabilities, and food insecurity. Ghana's Sustainable Land Management Projects showcase the country's strategic planning, government commitment, and long-term engagement in natural resources management. Ghana's SLM Projects underscore the importance of planning SLWM projects from a long-term perspective.

Restoring the Resilience of Ethiopia's Highland Peoples and Landscapes

Only a few generations ago, the Ethiopian highlands were abundantly endowed with forests, wildlife, grasslands, fertile soils, and springs. Communities lived in harmony with their environment. But when the military government nationalized the rural lands and distributed land parcels in the late 1970s, misuse of natural resources accelerated. The expansion of state-run farms led to a growing population struggling to meet its food needs. Affected by droughts and famine, residents turned forested communal lands into subsistence farming plots, without using proper land-management practices. This process triggered unprecedented soil erosion and land degradation.

Restoration efforts started in the 1990s with food-for-work programs that tied soil conservation efforts to food distribution. The efforts were mostly imposed from the top down. Predictably, most failed. A sustained, integrated intervention to reverse the highlands' environmental and economic slide was badly needed.

A big step forward came in 2006 with the introduction of a landmark national initiative: the Sustainable Land Management Program. It was supported by the World Bank, the GEF, and other donors including Canada, Germany, Norway, the International Fund for Agricultural Development (IFAD), and the European Union (EU).

Ethiopia's Sustainable Land Management Program has been under implementation since 2008 with almost $300m in coordinated financing from the World Bank, GEF, Norway, Canada, Germany, IFAD and other partners cooperating under the TerrAfrica partnership and led by the Ethiopia Government's Rural Economic Development and Food Security platform. The program supports the government's ambition to achieve a climate resilient green economy by restoring watersheds and improving tenure security for more resilient livelihoods for millions of people on hundreds of thousands of hectares of degraded land. The program has enjoyed a recent upscaling after joining the US$1.1 billion regional WB/GEF Sahel and West Africa Program (SAWAP) for the Great Green Wall Initiative.

The approach targeted micro-watersheds. It connected communities having common interests and involved communities fully in decision making. At every administrative level, the government provided policy and technical support, and requested its development partners to support and implement the program. Government support came through incentive-based policies, benefit-sharing measures, mass campaigns and mobilization, as well as through the wide dissemination of technologies through community-based learning.

Many farmers initially resisted this program, but then readily joined in once they saw their interests were being respected, and that their livelihoods and livestock would benefit from conservation actions. Soon, the highlands started to turn green and the program was

nicknamed "father of the land." The vicious cycle was broken. A virtuous cycle has taken hold.

Testimonies from Amhara Region

Teje Gelaw, Farmer

"I am a farmer. I till my plot of land to earn a living. SLM gave me this plot of land to farm. It used to be eroded, but now you can see how fertile it is. Since the terraces were built, the grass is well protected and we cut it for use as animal feed. The terraces are built such that grass grows on the sides, while the seeds grow in between. So, we are able to produce enough for ourselves and for the cattle.

Before the terraces were built, the cattle would destroy everything and the grass had no chance of growing. Our crops are much better than they were before. We produced a lot last year—about nine quintals per 900 kg. I grow enough grass to feed my cattle and to sell at the market. My family's livelihood depends on this plot.

Benefits come when you own your own land. I was given this land, and a certificate which prevents the land from being given to someone else. It guarantees that it is only to be used by my family. In the future, I want to keep producing more high-quality seeds and to improve my livelihood year after year."

Meri Geta Hulgize Nurelgne, Farmer

"I am a farmer, and I also do traditional handwriting on goat skin. SLM has changed my life completely. The land here used to be barren and dry. No trees grew and the soil kept washing away down the hill into the Nile. Large rocks would often roll down and drop on our villages. It was very sad and dangerous.

To trap and hold the soil, SLM trained us to build terraces and plant trees along them. These trees also feed the animals, and the stones used to build the terraces create water reservoirs. The SLM project also built a drip-irrigation system. The SLM project gave us high-quality seeds and fertilizers.

Since building the terraces using the trees, we are able to find water within seven meters of the ground level. We used to struggle to find water at 20 meters. I now produce a higher quality crop, with two to three times the yield. As the terraces hold plenty of water, my crops do not dry out so easily. The seeds grow so well that I can use fewer seeds. This means I don't have to spend so many hours weeding. My farm produces more crops, and of a higher quality than ever before.

The training I was given by the SLM project, along with 300–400 other farmers from different areas, taught me a lot. I also learned a lot about SLM through the radio programs transmitted for us. We farmers discuss our knowledge at every opportunity, in church or at social gatherings. I myself am a religious leader, and in my sermons I make sure that people know about the benefit of preserving the resources of the earth using scientific methods. I tell them that the earth cannot support life if we do not protect it.

What has also made a difference is that now I own my own land. I have a certificate that guarantees that these pieces of land are owned by my family. Now that I know the land is mine, I take good care of it. Before,


Meri Geta Hulgize Nurelgne

anybody could claim the land that I tilled; there was no guarantee of ownership. Planting permanent things was a waste of energy—but now I plant apple trees and I own a cow. The SLM project gave her to me as a calf, and now she is grown. I sell her milk at the market. I have also been able to raise an ox, a donkey, and a horse that I have sold for good money. I plan to grow seedlings and grass on my land to make the soil richer.

I can now send my children to school. I have three daughters at university—one just finished her master's degree. I also have a son at school, and I send my grandchildren to school too. Making the most of my small farm, I want to educate my children and make sure they can join professional industries. SLM has made a very big difference to my life."

Chernet Sinte, Kebele Administrator

"I am the chairperson of Zegora. Before the SLM project was launched, the problems here were quite vast. We never understood our problems before, so we struggled to change anything. Now we understand the damage that has been done so far, and how to heal the land. We can answer our questions. The farmers never thought this area could be turned into such a fertile place.

We got support with the supply of quality seeds and better methods of cattle breeding. This enabled us to give our produce and experiences to other kebeles. Rotating loans are given out from kebele to kebele, which support farmers in other kebeles. The SLM project has created ways of reaching all the neighboring kebeles, so we all equally benefit from the project. We have been able to rehabilitate and protect the mountain around us, and use its grass to feed our cattle.

Most of the land here is mountainous, so the few flat areas are used as a resting place for cattle in the mornings. All the cattle then go into a dedicated field, called the mother

field, while their mangers are cleaned. The grass that grows in the protected areas is collected and split among the groups, who then divide them between the households.

Before the project began, all the mountains and fields were open for grazing. Now, we have narrowed the grazing area and protect the rest of the mountain and fields. At first, forbidding uncontrolled grazing was met with a strong resistance by the community. Some wanted to protest. But after they saw how fat the restricted cattle were, they agreed to keep their cattle at home and in the designated areas too. The fields where the cattle used to graze are now growing a surprising amount of grass, which is cut to feed the cattle at home. There are still some farmers who don't understand the benefits of feeding their cattle at home, but the change is coming.

Facilitating community dialogues was the project's first step. Change was brought about gradually through continuous discussions with farmers. To promote the project in 2001, a few farmers were persuaded to try out some new methods of preserving the land. This was very successful, so these farmers then went to the other farmers to spread the knowledge they had acquired.

With regard to development, I think that women are the primary agents in making it

possible. However, there are still some cultural barriers that limit women's participation in community dialogues. When we try to organize the women in ways so they can benefit from the mountain's rehabilitation, they refuse to take part in the decision making. So we have begun organizing the women so they benefit from the natural wealth. We haven't yet been able to find a way to do this on a larger scale though. While our efforts have not been as successful as desired, we are doing everything we can to equally benefit the women here.

We have helped a number of youths to manage their own bee hives and fatten cattle. Ten youths organized last year are now successful in cattle fattening. There is a great opportunity to obtain wealth from developing and maintaining the natural resources here. Everyone is happy now."

Gedefaw Tesfaw, Kebele General Manager

"I am the chairperson of the water steering committee in the kebele. As a member and chairperson, I work closely with the SLM project. My job in this project is to facilitate better working environments for the farmers. This involves providing specific training programs and advising them how to best make use of this training. I also advise them on whom they should pass their new knowledge to. In addition, I facilitate the provision of high-quality seeds.

Gedefaw Tesfaw

Before launching the project, the SLM representatives and the leaders of our district decided which parts of the SLM project would succeed if implemented. They then held a council with us and discussed how we would benefit from it, and how it would change our lives. After a clear understanding was reached, the project was launched in 2001.

To involve the community in the SLM project, we first talked to the kebele water steering committee. Several water streams are targeted by the project. Each committee tells the kebele officials about the benefits of this project. Then, committee members persuade individual farmers to take part in the project.

The community gets many benefits from this project. The project does many different things. It gives capacity-building training to farmers and introduces various technologies that enhance crop productivity and irrigation. It also supplies higher-yielding seeds and modern beehives. The project provides us with the best breeds of cattle, chickens and bees, and supports farmers with technology, quality seeds, and the best farming practices. Farmers here have the capacity to produce a lot, but this has been limited in the past because of financial difficulties. These all help to improve our livelihoods.

The SLM project is also carrying out activities in building awareness about using and protecting natural resources. This creates awareness about improving fertility of farmland and improving farming skills. The project taught us how serious soil depletion is to the lives of farmers. It provided farmers with indigenous seedlings and hired workers to help them to rehabilitate the soil with different plants. This will maintain the soil's fertility.

The plots of farmland are held by the community in common. Farmers grow grass and feed their cattle together. These pieces of land are not owned by any particular person, and anyone who is a member of the water catchment area can farm there. Some breed

cattle, and some take their share of the grass and sell it at the market. Others use the trees for beekeeping.

Before, the common land was used without any guidelines or rules. The cattle were free to graze on the mountains, which depleted its resources. The cattle would roam the depleted mountain, but there was little food to find—only rocks. Since the project came into effect, the farmers can only use the green area agreed on to grow grass for their cattle. They gather the grass from the protected forest to feed their cattle, instead of grazing them in the forest. The cattle are kept in a manger away from the sun, and they don't get sick from fly-bite while grazing in the mountains. They are well fed now with the grass we grow and collect. We have all seen a big improvement in their health.

Everyone in the community benefits from the SLM project. The project helps those who are able to work, but cannot afford to. They are given cattle to breed and farming equipment. The project also supports the young and the elderly. The elderly are involved in small tasks and in giving moral support and advice to the younger people. Men and women have equally participated in the activities and the building of the terraces and the water reservoirs, thus, they have benefited together.

The people of this community are very happy. Before, we lived in such disadvantage. Now, our cows are well fed, and even cows that never gave milk before are now producing quality milk that we can sell. The change here is very tangible."

Testimonies from North Shewa

Dr. Teshome, Deputy Manager, Amhara Region Agriculture Office

"I am the deputy chairperson of the Agricultural Bureau of the Amhara region.

Our region has quite a diverse agro-ecology compared to other regions. However, its soil and natural resources are mostly depleted due to a very long history of farming.

Fifty-eight percent of the entire country's soil erosion occurs in this region. So, conducting sustainable land management is vital for the region.

Activities of sustainable land management are carried out in a manner that actively involves the community. The interventions are carried out after studying which area needs what kind of intervention, and the work is done according to these needs. Since the interventions are not just about physically building terraces and check dams, but also restoring the entire environment sustainably, this project is more effective compared to others.

Every activity has to actively engage the people of the community, if we want them to be fruitful. So, in our water catchment projects, the people are involved from the beginning. They make the plans, then put them into practice. They are also involved in the evaluation and follow up. In the end, they are the ones who benefit from the intervention. The community gains a lot when they are a part of the whole process.

I believe our organization is very good; from the kebele all the way up to the federal government. The link between the district office and the project stations is very strong. Information reaches the stations and the district immediately because the information flow is smooth and efficient. On the kebele level, we have this group organization we call one to five, and we also have a development team. Whenever a new technology is introduced, we first make sure it gets to the district office alongside the other daily routine work, then the district office passes it to the project stations, then the station relays it. By doing this, the information reaches about 3,000 kebeles in Bahir Dar within just two or three days. In the same manner, we collect feedback. If we have one kebele that has a good experience to share, we record the feedback from the people in that kebele, compile it, and send it to all other districts and kebeles. This is very effective and efficient too.

Each project has a steering committee on a regional level. And under the steering committee, there are departments, such as the departments of natural resources and

irrigation. We also have an extension department and a raw materials department. The departments have deputy officers who give specific assignments to everyone. Moreover, we meet every month and evaluate the work done.

We also facilitate experience-sharing platforms between projects in the different kebeles. The steering committee also goes out to the regions and kebeles regularly to evaluate whether the projects are carried out according to the plans made by the programme, and they see and evaluate how well the steering committee is doing its job.

The plans are also made at the kebele level. The officers in the districts are responsible for this. The steering committees evaluate the projects on a quarterly basis and give feedback, encouraging the farmers who are doing well and helping those who are not in order to enhance their efficiency through trainings and discussions. Every six months, we have evaluations on a regional level in the presence of the districts.

So, all in all, a system has been put in place through which we evaluate each other and share experiences between regions, zones, districts and kebeles, thereby enhancing each other's capacity through experience sharing and trainings.

I have gone around and witnessed great things. We search for the areas where best practices have been seen and we evaluate their performance. For instance, there is very good work being done in the kebeles in the Bore district on soil and water conservation, vegetable and fruit production, and biogas production. What is considered the best practice is then replicated in other kebeles. What we take into consideration is not the outcome, *but the methodology* and *techniques used to produce* these results. We take this information and share it with other kebeles to be used as a model for other farmers.

On top of that, we have a program whereby we give annual awards to the farmers who have done well. The award is not only for those in the project; it is for all the farmers in the region. So, the regional government gives them recognition for the exceptional work they have done and this is a great incentive for the other farmers in the area. The leaders of the one to five groups are the farmers who have worked very hard and changed not only their lives, but the lives of the people in their communities by sharing and replicating their experiences. It is the group leaders in SLM who have brought about these changes. So, the extension program we have designed makes it easy to use the advantages of the project to produce a ripple effect in other districts.

The SLM project is carried out in only 17 districts at the moment. Maybe it will be replicated in all 56 districts in the future. While 17 districts is not a lot, compared to the vast nature of our region, it has been a great opportunity to help us realize that we can create change through sustainable land-use practices. So, we have to integrate this experience into the regular extension system and

expand it. Then SLM will advance agricultural practices. We have now done the main thing, which is rehabilitating the soil and the water. However, we still need to transform the way the farmers work their lands by introducing mechanized farming and scientific methods of enriching the land. There is a way of keeping the soil rich just by properly maintaining the land. Work needs to be done in relation to marketing their products and helping the farmers improve their standard of living.

Capacity building must be carried out too, as this work not only requires skills, it also requires knowledge. We have almost finished learning how to use the technologies. But the people's capacity needs to be built—they will need more knowledge to sustainably increase productivity. Other than that, we also need to record the tangible results this SLM project has brought to the people. What is the improvement in land management? How much water were we able to accumulate? What has been SLM's contribution toward the productivity of farming? Detailed documentation of what has been done and what has been achieved also needs to be kept properly, to witness the work done and to educate the coming generation. We shouldn't just capture random things. We should collect and document scientific data that can be analyzed.

This is not going to be a one-time thing. It will continue for a long time. Compared to the usual farming style, we can say the system is changing a lot. The reason for the depletion of natural resources in our area is because the communities earn a living by farming. But the rehabilitation is done alongside growing cattle fodder. So, farmers can now breed and fatten their cattle much better than before. The animal fodder is easily obtained from the plants that grow in the protected areas, and people keep their cattle at home and feed them. The plants will also enable farmers to start bee keeping since it is easy to keep bees if there are plenty of trees and plants. It is also useful now that we have access to the underground water source for irrigation, instead of depending only on rain water. Beyond that, the intervention helped restore the big gullies that prevented people from simply crossing to the other side, let alone farming around the gullies. This has generated more income. So, looking at all these changes in the lives of the people and in farming, one can conclude the project has been truly helpful, and it is changing the farming style in the area for the better."

Yenager Tadesse, Youth Group Member

"I work on a farm as part of a youth group that was established in 2000.

Before SLM started here, my friends and I were casual laborers. But now, we build check dams for SLM projects and we are paid very well for it. SLM gave each of us a sheep, and we breed them as a group. We also work on the farmland given to us by the government, and we sell the produce at the market. Every month, the SLM project trains us at the kebele.

We are now organized in groups and can earn a decent living. I don't have to bend over for other people any more. I work for myself. SLM has done great things for us. We have been given a few oxen to fatten. If we are given a few more oxen, we could even buy trucks in a few years. This is my dream."

Abyu Tezazu, Farmer and Pastoralist

"This gully was very eroded before SLM came here. Sending out the cattle was also

Abyu Tezazu

useless and dangerous. The cattle would over-consume the grass and trample on it. They were exposed to the burning sun all day for no reward of food, and they used to spend all day fighting, falling off cliffs, getting stuck in mud, and getting injured.

Everyone saw how useless the old way of doing things was. So we decided to try the new SLM method. Now, we keep the cattle at home, and feed them with the grass we cut from the protected areas. They are well fed, and more comfortable in the shade. We gather the grass from the catchment in our area three times per year. The cattle now get fresh grass even in May. This was unthinkable before.

Before, I only had one ox. It was very difficult for me to take care of it, because it was so hard to find a grassy area. Now, I work on fattening this ox through the SLM project. When I began working on the project, a lot of people were against me because they didn't understand it. But I persevered and bought two new oxen with the money from the sale of my fattened ox. I also have a farm, and now produce much more. I am no longer financially stressed, and I don't have to ask anyone for help. I can support myself and buy fertilizers. The SLM representatives taught me to build check dams around my farm to prevent the fertile soil from being washed away.

SLM is making sure that the poor are benefiting particularly from this project. The project gives its primary support to poor farmers. Each farmer is motivated to work hard on private and common lands, whether they make money out of it or not. The farmers are aware of the advantages of SLM practices and are working hard to improve the land.

We are enjoying the change in the area. Today, our soil is not eroded at all. The dams protect them. If anyone's farm is eroded and starts to affect their neighbor's land, they are asked to build tiers and check dams to fix the situation. If they don't, legal measures are taken. We usually don't go to the kebele to sort this out, we handle it among ourselves.

We are happy with the fruit of our decision to take up SLM—we can now sit back and enjoy the change."

Girmaw Tezazu, Member of Catchment Committee

"SLM representatives came and helped our community for four years. After they assessed the situation, they held a community dialogue to propose a solution for the challenges. They decided to put together a catchment committee, composed of youth, elders, priests, and the wealthy people of the area. We educated the community about the catchment, and the SLM project was launched in 2002.

The SLM project built check dams, gabions, and fences to stop the gullies and cliffs from forming due to soil erosion. It supported the community by providing the tools and skills needed to overcome the challenges we faced. The project also organized the youth and gave them continuous support, so we achieved this victory.

The grass you see here is the result of the SLM project. We cut and bundle it to feed our cattle. We rotate the grazing to let the grass grow.

From what we have learned from this project, we are going to replicate the same techniques at the other parts along the river, where landslides are frequent. The catchment committee mobilizes the community and discusses what we have to do to rehabilitate the land."

Serayetu Zelalm, Committee Member

"I am a member of the catchment committee in North Shewa.

This area here used to be very dusty. The cattle would get stranded with nothing to eat. People used to survive by taking loans from each other, and we would struggle to find firewood. Furthermore, we could only eat sorghum, and there was never enough to eat.

Now, a lot of good things have happened to us. We collect firewood from the protected areas, and we don't have to buy it anymore. SLM enables us to harvest all the cattle feed and firewood right here. After our SLM training, we now harvest sorghum, beans, red pepper, cabbage, and other plants from our gardens, so we don't have to buy food anymore. We just eat from our backyards using the skills SLM has given us. I make piles of grass and firewood and feed my cattle. Everyone wants to take part in this project and benefit from it.

Secondly, I now have a title deed certificate to my land. This means that if anyone comes to claim my land, I have the legal right to defend it. It is proof that I own the land and am the only person entitled to its benefits. Before, people's lands would often be taken, because there was no way of proving ownership. It was very normal for people to come up and claim your land. Now, that's not an option.

I am now an elected member of a committee. I walk up and down the village like a man and help with the decision making in seed propagation and developmental works. I have benefited a lot from this. Before, I was just a housewife and I didn't know anything. I just sat at home all day.

All my friends and neighbors are also on the committee. We tell other women to go out and work, to learn productive skills and make use of them, instead of sitting at home and doing nothing. Seeing our improvements, other women are motivated to learn the same skills. Now they go out to work too, and we are seeing change in every kebele.

Serayetu Zelalm

Before, we couldn't afford to eat more than once a day. But now we eat more than twice a day. Everyone works their own land and creates their own fortune.

We have seen these improvements in our lives because we took the trainings. We are not done here yet. We will continue to work and produce more. There is much more work to do."

Ato Dejene Metku, Deputy Chairperson, Amhara Rehabilitation and Development Organization

"I am the deputy chairperson of the Amhara Rehabilitation and Development Office, and I am the SLM Program Coordinator.

We launched this project in 2001. It was organized by the head of the region's agricultural office and by the SLM organizing committee.

The role of SLM in this region is highly decisive. Agriculture began in the Amhara region thousands of years ago. In fact some believe it dates back as far as 5,000 years, particularly in the western part of the Amhara region. Population in this area has grown rapidly. Farm lands were taken over by inhabitants, who degraded the quality of the soil. The role of SLM is vital in the effort to rehabilitate the land and benefit the community.

The project's main objective is to carry out a rehabilitation work that enriches the catchment and life around the water source by working with the youth, women, and the farmers for their own benefit.

One problem we had was that farmers used to send their cattle to uncontrolled grazing areas. This exposed the soil and was the main cause of land degradation. Soon after the project was launched, the farmers began keeping the cattle at home and grew grass to feed the cattle. So people from other districts learn from this district. It is a very efficient development model.

The project has successfully executed its four-year plan. I see many changes in the lives of the people here. Many gullies have recovered, the vegetation in the mountains has improved, and water and soil have been conserved. Productivity and production have increased in the areas where the intervention has taken place. For instance, production of potato has risen to 400 quintals (40 tons) from only 80 quintals (eight tons) per ha. The project has improved agricultural production.

Women have especially benefited from this work. The project has brought environmental security to the area.

The major problem of this region is youth unemployment. Under the project, income-generating activities such as farming have been carried out such that the unemployed youth are benefitting financially. The project has been working alongside other government projects, such as Mass Mobilization. About four million people are mobilized and have been working every day for two months now. This mobilization of the people has resulted in the rehabilitation of water sources and soil in this area within a very short period of time. There are now attempts to replicate these interventions in other areas.

The people are the reason behind this project. Looking at this change, we always wish we had started a bit earlier. This generation is unfortunate, in that the past generation did not carry out activities like this. So, we believe that this generation has to carry the torch light and lead the way. It should leave something useful for the generation to come.

Women, the youth, and the farmers are taking advantage of the project and improving their livelihoods.

As for the management of the project, we work on strategic issues selected by the committee. A steady flow of information and data are vital for this. First, the issues raised by the community are gathered and given to the district. The plan is then jointly made by the district and the community. It is then evaluated and approved at the project coordination office level, and is then presented to the steering committee. The committee then evaluates the plan's activity and budget, adds its own amendments or suggestions, approves it, and sends it back to the task force to be put into effect. Thereafter, the activities are evaluated by the steering committee based on the quarterly reports produced by the task force. The committee assesses each report and encourages those who performed well, while pointing out those who have weaknesses and gives better alternatives. The results of these evaluations are given to the task force.

These evaluations are a way to encourage the work that is well done and to improve poor performances. It builds up the capacity of district heads and team leaders. The members of the committee also go out to selected districts twice a year to monitor activities, encourage those who are doing well, and give support to those who need it.

The land management office of our region has done its job competently—from approving the annual budget to presenting quarterly reports and undergoing evaluations. We also go out to the field to observe if the district heads are doing their jobs properly. The office reviews the farming work and fills any gaps to help the activities run efficiently. As an nongovernmental organization, we have been able to work smoothly in close cooperation with several different government offices. We believe this will be a lesson for others. Working hand in hand guaranteed the success of this project.

My message to the people would be that we should openly welcome projects such as this one, and dedicate ourselves to them in order to improve our lives. I also would like to ask the World Bank to continue supporting projects like these, which have such noble ideas and practical ways of improving the lives of people and the region in general. In the future, we will continue to resolve the project's weaknesses and expand similar interventions throughout the region."

Testimonies from Gusha Shnekurta

Bayeh Meselu, Farmer and Committee Coordinator

"The SLM project was launched in 2001. At first it was difficult to convince the farmers to participate. They were confused and complained that there wasn't anything they could do about the gullies. Gradually, they began to understand the benefit of this intervention. Then we passed governing rules and a fine for those who wouldn't abide by the law. I took the law to the district and had it approved. So, then people came to be convinced to work toward the goals set by the project. The people of the community now have ownership over the project. And now they think it is very important and must continue this way. People cooperate both in providing labor and taking responsibility. Now if anyone sees any cattle out in the open, they will come and report to the committee or the officer. People have become quite positive and supportive.

Earlier, the cattle were simply released to the fields. We used to do things traditionally and the area was covered with gullies from erosion because of overgrazing. Now, farmers keep their cows at home because they have come to see how useful that is. The cattle are now much more productive than when they spent the whole day in the dusty fields. We now develop water dams, catchments, and seedlings.

Before the project was launched, we didn't know how to carry out these activities. Now that SLM has given us the necessary training, we don't abuse the land anymore. We work together in taking care of the land and seedlings. We now feed the cattle from the common lands assigned, for grazing only in turns. We alternate them between the rainy and dry seasons to revive the lands. These designated lands are well protected; people are fined if they let their cattle graze there.

The people have also benefited from the crop production. Since 2001, people have begun taking responsibility for their lands. The soil has been rehabilitated now and we are farming it well. The land is now ready to be seeded even without fertilizer. As you have seen, our soil has become fertile. Farmers would like to carry out similar interventions on all the remaining land.

The participation of women is substantial in this project. They say they will support and

take care of SLM as long as they live. They have been particularly impressed by the energy-saving stove. The same goes for the youth. As the work is their own, women and youth participate with a lot of enthusiasm. They are highly motivated to participate when they see the green forest and improved crop production like never before. The youth are particularly very supportive. They are the ones who stand by the elderly and give them tremendous support.

This project has improved our income significantly. Before, the land was so depleted and didn't produce much. But now, the soil fertility has been restored and it produces very well. The farm lands will be very fertile by March. So, the farmers have benefited financially from this project. They want the private grazing lands to cease to exist, and they also want to grow food for their cattle on their own lands. The people of the community are very happy. They would like this intervention to continue."

Webnesh Teshager, Farmer

"The land was not useful before. But now it has become very useful because terraces have been made and the cattle are kept at home rather than grazing uncontrolled. Now, we use the vegetation for cattle feed. The land used to be hard to till, and the crops would hardly grow because the cattle used to trample the crop all day. But now farming has become very easy. I now also have a title deed certificate. I work in this project like everyone else. I do all the digging and the farming. I help plant seedlings. And I benefit from the project well. And there are other women who also benefit from this project as I do."

Testimonies from Gulem Danjene

Teriuye Negatu, Farmer

"I built a biogas stove in cooperation with the SLM project. I supplied eight m3 of

stone, and the project provided me with one quarter track of sand, 13 quintals/1,300 kg of cement, and a professional who helped me do the work. I took care of the manual labor myself. When the work of building was completed, the region's Office of Mineral, Energy, and Water supplied us with the lamps and the rest of the parts we needed, and a professional from SLM assembled everything for me.

Once the construction was completed, we started using it to cook our meals instead of using fire wood. Now we can cook and boil anything in just five minutes. We add three jars of cow dung and three jars of water in to the biogas hole every day, and it produces the gas we use every day. We also use it as a light source. So, we are very happy with the benefit of the biogas project.

Turning to farming, since this project came in and built this canal, our productivity has improved. We were given capacity-building training. Now we produce different fruits and vegetables, such as sugar cane, bananas, mangos, cabbage, onions and others, in our backyards. We have benefited a great deal from this. Before, we could only grow "gesho," a plant used to make local meat. With the support from the district, the kebele professionals, and the SLM training, our lives have changed."

Anchenalu Tade, Farmer

"There is a lot of improvement in our lives. The biogas stove saves everything; hard labor, firewood, and energy. I no longer have to toil up and down the mountain. I can now sit back, make my tea and coffee, and relax. It has saved a lot of firewood.

I use my SLM experience to educate others around me. We now grow everything in our backyards."


Anchenalu Tade

Asechale Almeqre, Farmer (Bure Zuria)

"SLM has been here for ten years now. Before SLM came, a lot of water was wasted, we never had a supply of quality seeds, and we had skills shortcomings. We were not very productive because we did the farming and crop production traditionally.

Since SLM came here and built the irrigation canal, the water is supplied to farmers without any wastage. SLM also provides seedlings and seeds of different fruit and vegetables to everyone. There has been substantial improvement in our lives. The project has also supported those without finance, but with the will and energy to work. It has provided the money so they can go into the chicken farming or cattle breeding businesses. This is a time in which the lives of people here are improving.

Before SLM came, we didn't have enough produce for our daily home consumption, let alone enough for the market. Now, we produce enough for ourselves and the market, and we make money to buy clothes and other items. We can also send our children to school. We are now moving from smaller houses to bigger ones, and we're building houses with metal roofs instead of grass thatch.

I now have a title deed. The land certificate proves that the land is mine and helps me to

clearly identify my borders. It is also used to prevent others from claiming my land, and gives me the right to work on it. It also has lessons in it that teach me how to take care of my land."

Azemera Zelalem, Farmer

"Before SLM came, we had a shortage of water. Now, we have access to plenty of water, and we grow fruits, coffee, and sugar cane. We are benefiting a great deal. There is a tremendous growth in production. The change is great.

I work my farm and make money. I send my children to school with the money I make. I also buy things for my house. So far, I have only been able to sell my sugar cane. But I am sure when the season comes; I will harvest my coffee, mangoes, and other fruits and make good money. There is no problem. We have been provided with everything we need."

Endge Derse, Amhara Region SLM Project Coordinator

"The main objective of the SLM project is to enable the farmers to produce more crops from their small plots of land. We cannot expand the size of these farm lands due to the shortage of land. What we want to do is help the farmers use their land more efficiently and produce the maximum possible crops. We introduce new and better technologies that will help the farmers become more productive.

The main impetus behind this SLM project was to solve the problems related to soil degradation due to erosion. This soil degradation problem had reached the stage where it significantly decreased the productivity of the farmers.

So, the project was launched to increase the productivity of the farmers, to improve the quality of the soil, and to improve the productivity and production of the farmers by providing quality seeds and introducing

new technology. So, this is a project that was designed to help the farmers produce the highest possible quantity from the small farms they have.

The first thing we considered is the fact that farmers are more motivated to take care of their land if they own it. The farmers are now self-motivated to work their farms. Other than that, the fact that different land rehabilitation works are done has minimized the chance of soil depletion. We have also been able to prevent the soil from being washed away by flood water. What is more, we also supply the farmers with quality seeds and fertilizers in an effort to increase productivity. The farmers can now produce large quantities from their small farms. Before, the farmers produced only eight quintals (800 kg) of grain per ha. Now they can produce 20 to 30 quintals (two to three tons). The production of potatoes has improved from 80 quintals to 400 quintals (eight to 40 tons) per ha. SLM is not only benefiting the soil, but is also helping the farmers enhance their production and productivity.

There were different activities carried out in launching the project. The farmers were made aware of why they have to take care of their lands—we sat down with them and discussed the problems and solutions for their lands through the committee members they elected themselves. So, now the informed community members work their farms with a huge sense of responsibility and ownership. They also produce animal fodder for their cattle from the protected areas, increasing the amount of milk they can get from their cattle. Apart from that, there has been a substantial improvement in the price of oxen. Before, they never sold for more than 2,000 birr (US$95). Now, with improved access to food, they are fattened well to sell for 20,000–25,000 birr (US$947 to US$1,184).

Before the SLM intervention started here, the farmers' crop production was insignificant, and they could only produce once a year. Now the project has devised a way for farmers to produce market-oriented crops using the modern irrigation system introduced. So, the farmers are now able to produce different things such as sugar cane, fruit, and many others. This has significantly improved their income. Some farmers who live closer to the city are now buying better houses. Others are able to buy water-pumping generators that enable them to produce two or three times a year, increasing their production and productivity. Farming is being transformed from only producing enough for basic daily consumption, to producing larger quantities that can be sold at the market.

In terms of the process of SLM, the first training was on the new farming methodology. This was held at a regional level; professionals from the region were invited. We then took these trainings to the district level. We finally facilitated a way for the district to pass these trainings on to the kebele and the people in the community. Trainings focus particularly on new ideas and methods. These are presented to the community members, who hold discussions among themselves and finally put them into practice.

We also have a system through which we get feedback on how well these new technologies were put in practice, and what results they have produced. This feedback is compiled in reports created every three and six months. We also go out to the farms in person and witness the work done. We gather firsthand feedback from the farmers, ask them how useful the new technologies have been, what challenges and shortcomings they face, and what they would like the project to do for them in order for these new technologies to become more productive. So, we go back and devise improved strategies according to this feedback.

Beyond that, we have workshops on a quarterly basis. The first workshop is one that we use to evaluate the work done from zonal to district level. We assess the challenges we have come across on the job, both at the leadership and professional

levels. Then, we suggest ways of tackling these challenges. The solutions agreed on are shared all the way down to the individual communities that need them to solve the problem. Lastly, we get the feedback through a participatory assessment platform, where we discuss and debate the ideas and problems face to face. This is a kind of group visit conducted in the presence of selected farmers from at least three catchments in the area. We visit these water sources together with the farmers and discuss better approaches with them on site. So, we have a common platform with the farmers, where together we work out the challenges they face. Both the new and old methods will be evaluated and the results of these methods are presented and amendments are made. The program is making all this possible.

There is a main committee at the regional level that facilitates the evaluations. Then there are committee members that provide technical support to the main committee. The regional committee meets twice a year to see if the project is achieving its goals. This is done to assess, firstly, whether the project is properly implementing the plans, and secondly, to find out what the outcomes of the project are and to see what is expected to make it all work. This main committee makes very serious decisions. The committee takes the reports that come in and goes through them. Once the committee has reviewed the reports, it evaluates how well the work is going compared to the plan. The committee identifies any shortcomings and sends to the zonal and district offices circulars with workable solutions.

If a problem is difficult to solve through discussion and new strategies from the office, we go down to that particular piece of land and try to find a solution on site. However, it was suggested that meeting only twice a year is not enough to see the projects through effectively. So, we came to the conclusion that it is not only the committee that should try and work out the problems; management itself has to intervene. Therefore, it has been decided that deputy officers shall work in close cooperation with the management, and that the offices of each region should submit reports to the committee every month. So, the first evaluation was completed in October 2014, and the next one in November 2014."

Testimonies from Tigray Region

Lealmet Mebrehatu, Farmer

"This place used to be a useless, empty place. Now everything has changed and it is productive. People used to damage the trees, but now they are respected and we are making use of them properly."

Haregu Gebre Selassie, Farmer

"This used to be a barren place. It was only used for cattle grazing, and all the soil was eroded by floods. Now everything is changing. What used to be desolate is now a respected forest. We are able to gather food twice a year. There are a lot of new things we are working on, we are planning for the future and we are very productive.

I have bought a dairy cow with the money SLM gave me. SLM gives me 10,000 birr (USD$474) every year. I am a little sick, so I can't go far to work.

I have four children. With the money I get from selling tomatoes and other goods, I send them to school. I can buy my children exercise books, clothes, and everything else they need.

I am very happy with what is happening. I am much happier now than I used to be."

Meresa Demts, Farmer

"I am 78 years old. This area was very dark before, but now there is light. Before, the farmer was in the dark, uneducated, and

worried about a lot of things. These days, it is being replaced by something bright.

Previously, there were challenges on the managerial level, and other issues. Things were not being done in the right way. Just recently, farmers were having some really tough times. Neither the management nor the court helped when the farmers went to them for help. Starting from this year though, we are starting to see lots of changes and the changes can be clearly seen in the farmer's work. Farmers are working hard and can have quality private time with their families too. Everyone is working nonstop and benefiting from it.

We have seen a lot of change. Those who were jobless now have jobs and are very productive. The farmer is able to work and pay his debts on time and also have enough food. We are also taking part in road construction. Because of all this, we are seeing a lot of changes. This year, the road to the station is being cleared and constructed. It will help many people. Now everyone has equal opportunity to work, change themselves, and benefit.

Everything is done in a good way. The only ones that are not working are those who live in areas without water. Those who do have water are working and are very happy. Things have started to brighten up and everyone is hopeful. Those who did not work before are very happy now because they are working and changing themselves. I myself did not have water, but now I have piped water and I am using it to plant vegetables. I am very happy about it and also very hopeful. Those who did not have seed now receive it from SLM and the government. Everyone is very happy about the way things are done.

At first, everyone was a little scared and confused, but whoever got the chance to work with SLM benefited. There was a little misunderstanding with the management. But most of those who had the chance got what they worked for.

If we do things properly without wasting all the things we get, we will do very well and the future is going to be very bright."

Gebreegziabher Gebre Medhen, Watershed Chair Person

"Five years ago, this was just an empty place. Nobody knew how to be productive. Since SLM came, we have started being productive. The way we are going now has a lot of benefits; we are producing a lot. Even those who have good farming land are working to protect the mountain soil from erosion. Everyone is working on irrigation and preventing soil erosion. SLM is providing training in this area. It is also working on terracing and road construction and is leading us toward change.

The problems in this area were drought and lack of awareness on how to be productive. We knew that if we didn't get enough rain within a year, we would have to just pack up and leave. Now, things have completely changed, everyone is enthusiastic and working 24 hours a day.

We have the chance now to produce food two to three times a year. Everyone has a good income, and we are also starting to save. Wells are being dug and used for irrigation. We have a land ownership certificate so we are able to freely work on our land. We work and also plan big for the future.

It is not only me; the whole society is very happy because of these benefits."

Letearegay Gebre Selassie, Team Leader

"Before, there was famine. People had migrated and gone into exile, and the soil was gone because of floods and erosion. Previously, I wasn't able to use irrigation. Since SLM started, I have been able to irrigate my crops. We plant crops on the land, which also prevents the soil from being eroded. I have planted more than 30 types of plants. Because of this program, now I am able to plant tomatoes, oranges, and other vegetables as well. Everything has changed. Now, there is productivity, irrigation, and there is money.

We keep our money and withdraw it when we need it. We can also pay our debts on time

and educate our children. Since SLM came to our station, we have many work opportunities and we are even starting to have telephones.

Since I have a land ownership certificate I feel like I have benefited. Nobody can come and claim the land. I can keep my land all for myself.

Places that are held in common are being worked by the youth and are very productive with the help of SLM. These places have water pipes and beehives.

If it weren't for all these things, we would not be standing here today. Now, I make money and I am very productive and happy."

Gebreegziabher Gebre Wahed, Kebele Leader and Station Chairman

"Many changes came to this station because of SLM.

The main challenge in our station was the problem of natural resources. Our lands were empty because of soil erosion, and because of this our people were forced to migrate. After SLM, many ways to prevent soil erosion are being implemented. Those who left because of these reasons now have the chance to come back to their homes and be productive.

Our station has three categories of people. The first is the youth, the second is women, and the third is the elderly. SLM gives us a budget and also pays us for working on natural resource protection. This help us in two ways. Those who wanted to leave for other places to work are now staying home and they are also being productive.

What we do is first ask the society what they want. It's after we clearly find out exactly what they want that we move to action. If it's irrigation they want first, we work on it first. If they want us to start with the natural resources, we start with that. Everything we do depends on what the society wants.

We also regularly assess and supervise the work; both process and implementation. We have a committee that studies how things are going, and presents it to the communities and makes plans for the future. The committee is also concerned with how the money is being spent—whether everyone is having their fair share and also if the money spent matches the work done. These things are thoroughly assessed and presented to the council.

The strategy that SLM has on eradicating poverty is very effective. Honestly speaking, if it wasn't for SLM, this station would have never existed. SLM is indeed a major warrior in the war against poverty. It is because of SLM that the people of Merere station are content and proud. A lot has been done on irrigation, natural resources conservation, vegetables, and cattle. We are being able to produce crops two to three times a year.

If SLM continues this way we will grow as big as the other stations.

What I want to say is that I am very happy that you took the time and trouble to come all the way out here to ask us about the different changes. If you keep the follow up like this, I am sure we will be in a much bigger position than we are now in a short time."

Haleqa Moges Hailu, Youth Coordinator

"Five years ago, this station was an empty place. Since SLM arrived four years ago, a lot has happened. Not only farmers, but the youth have benefited. SLM trained people to work on beekeeping, irrigation, and to rear cattle. Over 200 youth are working on these activities, and the water we use is a product of their hard work on SLM. We have also set aside about 80 ha of land for the youth to work on. Before, the youth had no land at all. The roads are being improved to help the water to reach the farms.

Through irrigation, we have been able to grow tomatoes, lettuce, and other vegetables. We sell them at the market. The youth sell honey, and we have also started breeding bees to sell. Everyone is benefiting.

SLM trained the youth and the chairpersons on how to manage the land. Many people participate in this station's work. We are organized in unions. Our plan for the future is to continue growing. We want to form working unions and hire cars to sell our products in large markets. We are all very lucky that this project came to us."

Debes Kahesay, Kebele Leader and Station Manager

"SLM came to this station in 2009. Before SLM, all the soil was badly eroded. The community had a lot of problems. They didn't have any wood and there were no dams. Since SLM, there have been no floods because of the dams. SLM first worked on terracing. We will have irrigation by March. We used to have a problem finding food for the cattle. That is not a problem anymore because everyone takes part and makes use of the grass that grows on the fields and mountains.

When we first implemented the project, we gathered the elderly and decided with them how we would overcome the existing challenges. After that, everyone, young and old, went straight to work. Everyone has seen for themselves the kind of benefits they can get out of this, so they don't need any more telling.

Everyone's focus was not on the payment. Rather, it was on the vision of saving the environment. Everyone gets paid equally. Women and the youth are also major partakers of the benefit, mainly by breeding cattle. We gather the grass for them two or three times a year from the mountain.

Now everyone is sending their children to school. The cows are fat. I don't think there is anyone who grieves about anything because everyone knows the benefits and has been benefiting for three to four years. Also we have enough milk in the summer and winter. Right now there is nothing lacking in the community."

Gebre Geiorgis Gebre Mariam, Farmer

"At first, I opposed the whole program. But after they came and explained the whole thing, I believed in it and started to participate. Today, I am the biggest defender of the program.

At first we didn't think it was going to turn out the way it has. But when we finally saw how green and productive this previously empty place had become, which was really just a road for floods, we were very happy. As you can see, the outcome is visible. It has turned into productive farmland.

Lands that did not have any farming activity have been turned into farms, and crops and other plants are being planted on them. The chaos created by the flooding is gone. My backyard was once hit by a flood and it became empty. But now, because there is no more flooding, I have planted many things; there is not a single trace of what happened. Before, I had stopped farming because my land looked like a meatless bone. But now it is flourishing. It has never looked this good.

Before this, it was a place unsuitable for humans, let alone cattle. We were considering leaving. But since SLM, we have started turning this once stony place into a very productive place. The land is also safe from cattle grazing because they are fed at home. The type of grass we only used to hear about in stories, we now see with our very eyes. We are also using the wood from the trees to make musical instruments. We have planted trees in our backyard.

Everyone's income has increased. Before, we produced about three quintals (300 kg) of teff from our fields. Now, we get eight quintals

(800 kg). It's the same with the vegetables in my backyard. The type of teff you see on the fields now has never grown here before. Since SLM came to our station, everything is comfortable. We are able to get fertilizers, and as part of the project, agricultural experts come and follow up. They also taught us to plant in lines, which has helped the fields to flourish a lot. You won't find a single hungry person in this station.

We now have land ownership certificates. The government is working on a dispute process for disputes that arise because of land inheritance. It has not reached Bahara station yet, but we are expecting it to. It will be useful, as it will help to settle any arguments on land ownership and inheritance.

What you find on this field is papaya, bamboo, beans, and more. It's our dream to transfer this knowledge to our children. The government has given us an irrigation system, so we can work all year round.

We have many benefits, more than we expected. We are very happy about it. We are able to produce grass for our cattle from our backyard. The children that used to tend to the animals now have the chance to go to school."

Testimonies from Lalo Chollie, Gimbi, West Welega

Bekele Genete, Farmer

"In the past, this area was losing its natural nutrients. It was on the verge of being destroyed. Thanks to this project, we've been able to save the area. This is thanks to our hard work with the project."

Tafesech Tadele, Farmer

"In the time of our fathers, our land was empty—washed away by rain and wind. Our soil was eroded, our lakes had dried up. There was no water to fetch or drink, and there was no forest around this area. These are the conditions I knew since I was born.

But thank God, Meles Zenawi made it feasible for different projects to operate in this country.

When this project initially started, they told us that this area will go back to its natural state. We didn't believe them at first, because it's difficult to say that eroded soil can go back to normal and actually grow trees. We then took their word for it and started working on this project.

We started the initial work by reserving a flood area of 50 meters by 50 meters, and maintaining a space of ten meters between terraces. Then we planted different trees, plants and grasses, and kept our cattle away from this area. After a while, the vegetation grew. It is now looking great. So, this place can be taken as an example for other areas as well.

We farmed a section of our land and grew food for our cattle in another section. By so doing, we managed to overcome drought and hunger through this project and our community. The benefit obtained is shared across our community, our cattle, our soil, and our environment.

As long as this project supports us, we will move forward with what we've achieved and this will change our lives. There are other places that haven't had this opportunity, so my wish is to benefit other areas like we have greatly benefitted."

Dawit Adugna, Farmer

"As you may know, this is a place we are working on to protect it from being washed away by rain. In the past, this place was progressively washed away by rain and strong wind. Nothing grew because the land had lost its natural minerals to erosion. The strong wind made our lives difficult and our cattle had no grazing land.

When the SLM project was introduced, it gave trainings to our community on how to protect our land from losing its natural minerals, and so we were able to get this area back to its original, green state.

The SLM project trained us by grouping our community and giving us theoretical, practical, and financial support to protect this area. In addition, this project helped us to know what kind of trees and seeds to plant in order to protect the soil, and they gave us many different kinds of seeds and plants. Now people are working on their own in line with the training they received through the SLM project.

In addition to protecting the soil, our community is doing a good job. If you look at the surrounding area, we grow different kinds of foods, both for ourselves and to sell. For example, we are producing honey in groups and are exploring other means of generating income.

Now if you see our surrounding area, we grow different kinds of food, both for ourselves and to sell. We are now producing honey, fish, bananas, avocado, coffee, and also fattening cattle. And the mountains are covered with trees; they have turned into a forest and a home to different animals. All this is due to this project.

This project has changed our soil, our way of life, and our entire society."

Tafesse Gobena, Elderly Resident

"In the past, Lalo Chollie was famous for its grass and forest. Then, termites conquered the area. But over the past couple of years, under this project, we have developed the area beautifully. Grass and trees reappeared in the area. We did it on our own. We worked on it and benefited from it.

We work, while the government gives us support. We thank God and we are very grateful for this support. We don't have any complaint. We work together, mobilizing our youth and adults. We will continue working. May God prolong the age of the government and our youths."

Shiferam Negesse, Trainer

"As you can see, the coffee plants are very old and give very little produce. In the past, the farmers here didn't know how to renew the old coffee plants. They didn't know which plants needed to be renewed, which needed to be replaced, or which were old and how they could systematically renew them.

After observing this, we showed the farmers, through the program, how to apply partial coffee stumping, whereby the least productive head is removed and the productive heads are left to grow. This renews the coffee plant. After stumping, the plant produces beans and grows. We brought in professionals who showed the farmers how to stump the plants. The coffee plants look like new and flourish, giving good produce.

From now on, the farmers will continue stumping old plants to renew them. Through the SLM project, we were able to teach the farmers a new method to increase their productivity."

A Programmatic Approach for Transformational Changes and Integrated Solutions

Land resources are critical for Ghana's economic growth and represent a critical asset for most of the population. Land also provides critical environmental services and important biodiversity values. Notably, Ghana is endowed with several national parks and reserves that are important for animal migration because of the natural habitat corridors that link the Mole National Park and the Gbele Resource Reserve (GRR). While Ghana's rural land generates much of the country's income and employment, directly and indirectly, it is highly vulnerable to degradation. Natural habitats and biodiversity are also being lost as part of the broader process of land degradation. Significantly, degradation has also severely compromised services, including nutrient cycling, regulation of hydrological flows, provision of natural resources, and the amelioration of climatic extremes and floods.

In the face of these challenges, the government of Ghana adopted a programmatic approach to address land degradation in the country. In 2009, with support from the World Bank Group's TerrAfrica Program, Ghana developed its Strategic Investment Framework (GSIF) for SLM and the Agriculture Sustainable Land Management Strategy and Action Plan. In addition, several analytical pieces of work, such as the country environmental analysis and the NRM and Growth Sustainability, Mapping, and Valuing Water Services in Ghana study further helped shape the agenda. This shows the significance of having a strong analytical base in-country.

In 2010, based on the GSIF recommendation, Ghana developed and implemented its SLM Project under TerrAfrica's Strategic Investment Framework Program [SIP]. This marked the beginning of a series of projects, with this as the first generation project. The project, funded in collaboration with the Global Environment Facility, focused essentially on addressing land degradation in agricultural lands. As implementation progressed, it became clear that, both upstream and downstream, sustainability in land management required interventions beyond just agricultural lands. Thus, an innovative approach evolved to move beyond single-sector interventions.

With the additional funding provided, Ghana in 2012 progressively expanded the scope of its SLM Project to integrated landscape management, which connected protected areas, forests, woodlands, agroforestry land, rangelands, and croplands. This paved the way for an ecosystem-based approach to address land degradation. The Sustainable Land and Water Management (SLWM) Project, under the Sahel and West Africa Program [SAWAP] in support of the Great Green Wall, became Ghana's second generation investment on the ground. The SLWM Project is providing a comprehensive approach that combines soft and hard investments at the community level. For instance, the maintenance of ecological infrastructure is combined with planning

activities aiming at eventually integrating these into a much larger program of water and flood management infrastructure across the northern savanna eco-agricultural zone. Subproject grants and community-based interventions have enabled the implementation of SLWM technologies and the creation of community conservation areas within biological corridors.

In the more recent emerging context of food security and resilience, Ghana is expanding the scope and geographic coverage of the SLWM Project. In 2015, it is preparing the Sustainable Landscapes Management Project, which will contribute directly to Ghana's Sustainable Development Initiative for the northern savannah. Its vision is "a diversified and resilient economic zone in the north," while supporting the development of the country's emerging investment platform on SLWM. This project will become the third generation investment on the ground. It will emphasize SLWM as a key element for connecting the different, fragmented habitats in Ghana; improvements in the contiguity of communities living along specific watershed areas and biological corridors; and increased benefits for the communities.

In general, there is growing support regionally and globally for enhancing cross-sector enabling environments to support integrated landscape management. This is a holistic approach that integrates social, economic, physical, and biological assets.

Resources

TerrAfrica: an Africa-based and Africa-led partnership of 26 sub-Saharan countries and 20 partners including regional economic communities, United Nations bodies, international organizations, the European Union, bilaterals, and civil society organizations (www.terrafrica.org).

The Strategic Investment Program for SLM in sub-Saharan Africa, under the TerrAfrica Partnership, is an umbrella program for scaling up integrated and multistakeholder SLM approaches for greater and more sustainable impacts.

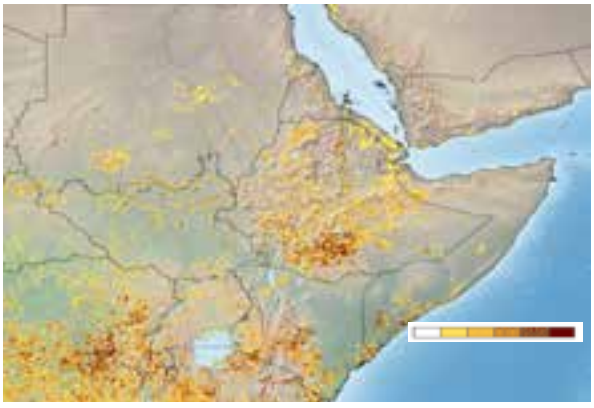
SAWAP is an umbrella program under the TerrAfrica Partnership that aims at expanding SLWM in targeted landscapes and in climate-vulnerable areas in West African and Sahelian countries.

Advancing Towards Landscape Restoration through Innovative Solutions in the Horn of Africa

The Horn of Africa (HOA) is part of Africa's drylands, which account for 43 percent of Africa's total land area. The drylands account for 75 percent of the area used for agriculture and are home to 50 percent of the population (figure 4). With their multifaceted vulnerabilities, these drylands present special development challenges. As the HOA develops, it is overcoming growing challenges in managing its environmental and renewable natural resources—the land, water, forests, fish, and ecosystems on which they depend—in a way that will not only benefit present generations, but also ensures that future development opportunities are not compromised.

At the same time, pastoral communities in the drylands of eastern Africa, such as the Samburu, Pokot, Turkana, Rendille, Borana and Karamajong, are becoming increasingly vulnerable to food and livelihood crises. Not surprisingly, the increase in the number of forced migrants and other displaced people is leading to greater conflicts over the inequitable access to natural resources. Because of resource scarcity, communities living in the underdeveloped and sparsely populated country border points also face similar, if not greater challenges, especially when devastating droughts occur.

Figure 4. Horn of Africa



Building resilience and strengthening the long-term sustainability of natural resources and vulnerable groups are therefore critical for sustainable development in the HOA. Countries face shared challenges that transcend institutional and geographic boundaries and can gain from a shared response.

This context led to the HOA Initiative launched in 2014. The initiative signals political commitment backed by new, substantial financial assistance for countries in the region to tackle vulnerability and strengthen regional stability by boosting economic growth and opportunity, reducing poverty, and spurring business activity.

The multi-dimensional challenge of land degradation, unsustainable land use, and climate variability in the HOA demand innovative solutions and financing. In support of the HOA Initiative and using the TerrAfrica platform,

Figure 5. Mosaic Landscape Restoration

the World Bank Group is developing a programmatic approach (multi-country program): the Resilient Landscapes for Development Program. The approach will apply integrated management within a mosaic of production systems— pastoral areas, rangelands, protected area habitats, dry forestlands, and natural assets that together form the rural landscape for the eastern and HOA countries.

This new programmatic approach aims to enhance the resilience of the ecosystems and peoples, and to improve community well-being and support sustainable livelihoods. It will emphasize the productive use of natural resources in marginal areas and borderlands. The program, through individual but related investment projects, will apply sustainable integrated landscapes management at scale (figure 5).

The Resilient Landscapes for Development Program will help countries scale up best-fit SLWM practices for the restoration of the targeted areas. TerrAfrica's SLM in Practice handbook is also available to help countries to design individual projects. The program will also support community-based activities to mitigate and prevent the impacts of disasters through climate risk management responses; forest management planning; payment for environmental services; and through activities aimed at increasing ecological connectivity (corridor development) and improving forest biodiversity values at the landscape level.

The Resilient Landscapes for Development Program will help countries strengthen institutions and design policy reforms aimed at restoration and resilience to support the enabling environments conducive for scaling up SLWM, and help build national and local capacities to implement, harmonize, and coordinate investments, policies, and information. TerrAfrica has contributed extensively to SLWM and adaptation agendas in many of these countries, the program will build upon its lessons and results.

Countries and development partners alike recognize that a stronger regional political dimension is key for development to be both successful and sustainable. National programs alone are not sufficient to mitigate a sub-region's vulnerability. Programs that move toward sustainable landscape production systems are not only the building blocks to restoring degraded land, but to providing long-term economic stability for its residents.

Improving Livelihoods in Uttarakhand in India

Uttarakhand is a mountainous state in northern India known for its diverse eco-system, rich faunal and floral biodiversity, rivers and valleys, and a rich cultural heritage. Over 89 percent of the land is hilly with fragile soil and steep slopes that are highly prone to soil erosion during the Monsoon season. Each year the state is losing fertile soil at the rate of up to 10 times the national average. This problem is further compounded by declining soil fertility.

The farming systems in the hills are dominated by subsistence farming based on cereal crop production, dairy cattle and exploitation of forest biomass. Although agriculture is one of the core economic activities for over 80 percent of the population, the role of forests in sustaining the agriculture and animal husbandry systems is equally critical in sustaining livelihoods.

The total population of the state is about 8.5 million people. About 38.5 percent of them live below the poverty line as compared to 26 percent living on the plain. The growing human population (19.3 percent in the last decade) and livestock population is increasing the demands for food, fuel wood, and fodder for livestock. As population and livestock densities increase, the rate of degradation and the dependence on common property resources also increase. It has led to the migration of young people from the area.

This four year project, with a total cost of US$90 million, was designed to abate soil erosion and loss of forest biomass that both lead to a decline in agricultural production, expansion of the cultivated area coupled with loss of biodiversity, and lowering of the underground water table. It was designed with the objectives of restoring and sustaining ecosystem functions and biodiversity while simultaneously enhancing income and livelihood functions, and generating lessons learned that can be scaled-up and mainstreamed at state and national levels. The project therefore, focused on improving livelihoods through;

- community and gender-driven interventions,
- integrated ecosystem management practices,
- effective community participation, multi-stakeholder and institutional frameworks that are essential for implementing integrated ecosystem management (IEM) in watersheds,
- monitoring and accountability with best practices and tools to enhance sustainability of project outcomes,
- knowledge sharing, documentation, and communication to increase awareness and potential for scaling up IEM, and
- innovative technologies that promote learning, knowledge exchange and informed decision making for management of natural resources.

To successfully implement the activities, the project allowed for a wide spectrum of actors ranging from local communities, a non-governmental women group, the academia and the government of Uttarakhand State. In this project women were involved at every stage of the life of the project. The non-governmental women group laid the ground work by empowering women to find their voice in the community, which led to the establishment of women leaders to guide and advise other women in the communities.

One of the activities was the development and marketing of a cost effective technology to process chir pine (*Pinus roxburgii*) needles into briquettes to be used as fuel to meet the household energy requirements. Such a technological breakthrough allows households to switch from wood fuel and thereby reduce the pressure on the forest. Importantly, it also reduces the risk of forest fires, as chir pine needles frequently are sources of such fires.

The project purposefully targeted micro-watersheds that have high erosion indices and are left behind in terms of socio-economic development. Watersheds are the focus because they contain a number of biophysical resources, such as soil and water, along with vegetation in the forms of trees, bushes, grasses and herbs that provide sustenance for livestock production and farming as well as a number of other enterprises.

This project led to a 10 percent increase in livelihood opportunities in treated areas, and sustainable watershed management. It was mainstreamed into 20 micro-watersheds plans, including parts of watersheds for which two or more Gram Panchayats share governance responsibility. This led to a 20-30

percent increase in the micro-watershed area where the SLM techniques were implemented, including an increase in vegetative cover by 10 percent in the treated 20 micro-watersheds.

The project led to the implementation of 5 to 10 alternative technologies and approaches for enhancing water availability for agriculture and other domestic use. About 2000 households reduced their dependence directly or indirectly on forest for fuel wood. The opportunities for sustainable alternative livelihoods (non-farm based livelihood options) have increased by at least 10 percent, including at least 20 percent of the targeted households that entered the market for pine briquettes (produced from pine needles). The project has directly and indirectly increased key species of flora and fauna in 20 micro-watersheds. Land rehabilitation, coupled with improved water recharge, has enabled communities to cultivate at least 5 local medicinal and aromatic plants. On the policy front, the project has facilitated the formulation of a strategy to manage the impacts of climate change in mountain ecosystems. At least five improved and innovative techniques and approaches have been documented, disseminated and scaled up, including the production of more than 500 metric tons of pine briquette within the Uttarakhand state.

Testimonies – about Land

Kishan Singh Lamgaria

"This entire area was sliding every year. This riverbank was eroding, and everything was sinking. Since the check dams construction along this river, our area is safer thanks to more bushes. This also keeps the silt in place and preserves our water sources better. Before, especially in summers, they used to dry up." We're not afraid of the mud slides anymore.

Kiran Lamgaria

"Since this dam was constructed, it has helped us and our children a lot. Thanks to these check dams, slopes and streams are now better maintained. Our house is also safe. Without the dams, it would have been washed away."

Sarojni Melkani, Van Sarpanch

"The trenches that we dug retain moisture and rain water. We planted trees and fenced the area to keep the cows away. Now our forest is much greener."

Neema Bahuguna

"Before the installation of the pine briquette plant, we used to walk long distances to collect wood in the forest. It was time consuming. The smoke from firewood used to irritate our eyes and tarnish the utensils, making them hard to clean."

Pandev Bahuguna

"Initially, storing cow dung for composting was unhygienic and problematic. Now, I can turn manure into slurry thanks to the plant."

Testimonies – about Water

Kheemanand Upadhyaya (Farmer)

"Jalagam people helped us a lot. They created a pond for us. Our cattle come to drink water from it. Next to it, we planted Lemongrass and Nappier grass. Lemongrass is used for medicinal purposes, and Nappier grass is used as fodder. We also have a nursery nearby which gets moisture from the pond. Now, the springs and streams down the village are providing drinking water all year round."

Smt. Munni Joshi (Homemaker)

"Before, we had to travel long distances to fetch water from the seasonal streams for our households. Now, we collect the rain water using the tanks. We use this water to meet our household needs and care for the cattle."

Kailash Singh Nayal (Student)

"There was no drinking water in our school. We had to fetch water from local streams and ponds, which required a lot of time. Now, we have running water here, and all the students have access to drinking water without having to go far."

Girish Kandpal (School Director)

"We had no water in the school before. Now we have running water taps and toilets. Before, people had to fetch water from far away. Because of that, they used to get sick often. Now they have tapped water right here."

Devendra Chandra Arya (Sahara User Group)

"We bought a water pump and installed it at the bottom of the hill. This helped pump the water to the irrigation tanks in the upper ridges of the slope. When there was no irrigation system, we used to grow only wheat and potato, and had to leave the fields during dry seasons. Now, we grow tomatoes, peas, and other cash crops."

Testimonies – about Food Security

Ganesh Lamgaria (Farmer)

"Before, we had nothing. After installing a greenhouse, we can now grow off-season vegetables. These vegetables are in high demand on the market and give us good profit. We grow squash, eggplant, bell pepper, radish, onions and much more. I sell my vegetables and share the surplus with my other family members."

Dr. S.K Upadhyaya, Deputy Project Director

"Food production increased thanks to high-yielding seeds and hybrid vegetable varieties. We also marketed the surplus and established a support group for this purpose that helped create market links. Gradually, we were able to cut out the middle man, which benefitted farmers a great deal."

Roshan Singh Lamgaria (Entrepreneur)

"Before, we had no work in the village because unemployment was high. Thanks to the project, I got a juicer and started a small juice shop. Soon, I was able to expand. Thanks to this project, I have an income and can take care of my children."

Testimonies – about Women's Empowerment

Neetu Mehtolia

"Initially, we never went to meetings because we were never called. Women had no importance. Later, we started organizing community meetings. This gave us confidence, taught us decision-making skills, and expanded our roles in communities and families."

Hema Negi

"Thanks to the project, more people listen to and consider our suggestions now. We learned how to manage our finances better by getting involved in matters outside of our households."

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Gender inclusion: https://www.youtube.com/watch?v=-UJYoKJ14wc

Project pictures: https://flic.kr/s/aHsjNgWWQN

CONCLUSION

CONCLUSION

Global initiatives to restore land are on the rise. The Great Green Wall for the Sahara and Sahel Initiative, the Great Green Wall of China, the 20X20 Initiative in Latin America, the Africa Forest and Landscapes Restoration Initiative and the Bonn Challenge are typical examples. The purpose of these initiatives is to scale up sustainable land management practices in order to avoid further degradation of the limited productive land remaining and to rehabilitate degraded land that can be restored back to health. The ambition is high and attainable, but the scope of positive impact on households and individual families is often forgotten. The case studies presented show the human side of these successes and give voice to the people behind the success: first, the land owners and users; and second, the agents supporting the mobilization of the people. The stories provide other important insights about the affected populations that are often the targets of the SLM initiatives.

Mobilizing small-scale land owners and local communities to work together is an epic task, but the rewards are transformational. The case studies from Jordan, Kenya and Lebanon show that the adoption of sustainable land management is most effective when policies, by-laws or rules integrate the local and traditional norms of resource use. In short, SLM techniques can be adopted, but their sustainability rests on the social acceptance of the regimes enacted.

There is a near universal agreement that women's involvement in sustainable land management is indispensable. There is also near universal agreement that cultural constraints are a particularly strong barrier to this engagement among rural communities. The case studies from Ethiopia and Morocco demonstrate how change was achieved, with women's economic, political and social empowerment taking root among pastoral communities that are among the most conservative culturally.

Transformational change is achieved by ensuring four key ingredients are brought into the mix: a large number of women participate at the lowest community level; their specific needs are identified alongside the needs of other groups and included in the broader context of community needs; the most powerful gatekeepers of the local culture are central players in the processes; and very specific organizational capacities that are needed by the local communities are identified and addressed.

Mainstreaming sustainable land management techniques and scaling them up to a landscape or ecosystem level is vital for building the resilience of small scale land users to climate change, for conserving biological diversity and for sustaining the long-term productivity of the land. The case studies from China, Egypt, Ethiopia and Morocco offer different models of action: a private sector model where profit-making is an important end goal; a governmental public works model that at once meets job-creation, profit-making, household and environmental needs; and a not-for-profit voluntary approach that draws on public and private sector mechanisms to make it

sustainable. The advantages and weaknesses of each model are apparent, as are the possibilities that exist to address each of their weaknesses by drawing on the strengths of the other models. This suggests that for an effective and efficient scaling up of SLM, project designers should draw on the strengths of all these models.

The closing chapters of the book offer timely advice for the policy-makers and development agents who will be taking the decisions about funding allocation. The restoration of degraded land at scale is an endeavor of long durée. Learning, adapting and re-engaging will be essential. Initiatives aiming to improve both livelihoods and land management need to take a programmatic approach, even if they start as small projects. The Sustainable Development Goals adopted last year have a 15-year time-frame, which is sufficient for the SLM interventions starting now to demonstrate clear outcomes and broad social change by 2030.

Most of the communities profiled in the book were initially selected because of their vulnerability or that of the environment on which they rely for ecosystem services. The improvement in the conditions of individual households and communities after adopting sustainable land management shows that improving the flow of ecosystem services has social, economic and environmental benefits. The underlying message is this: there is a link between sustainable land management and the ecosystem services from the land on which the livelihoods of poor people everywhere depend.

Sustainable land management leads to improved ecosystems. Healthy ecosystems create wealth. Wealth enables households and communities to diversify their livelihood options. The evidence that ecosystem services will be available in the long-term, a community's is becoming less and less vulnerable to environmental disasters, different sectors are able to adapt, and people are using infrastructure with a low carbon footprint all signal that the resilience of a community is growing.

Resources

United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa.

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Acknowledgments

Publication Coordinators: Wagaki Wischnewski and Madjiguene Seck
Printing: United Nations Environment Programme, Nairobi, Kenya
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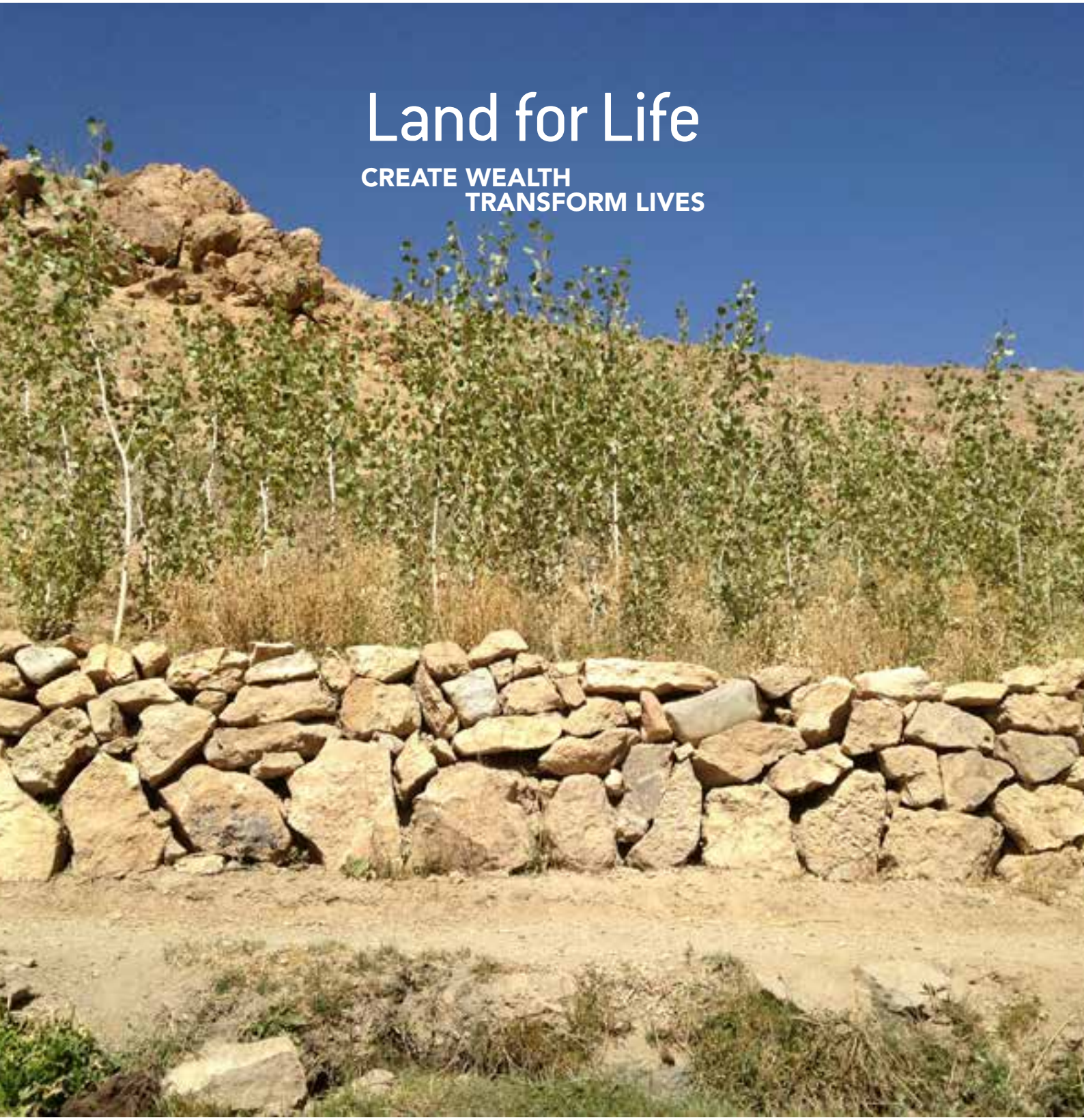

Land for Life

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