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A COMMUNITY-BASED APPROACH TO RESILIENT AND SUSTAINABLE LANDSCAPES

Lessons from Phase II of the COMDEKS Programme

SATOYAMA INITIATIVE

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SATOYAMA INITIATIVE

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SATOYAMA INITIATIVE

CONTENTS

PREFACE

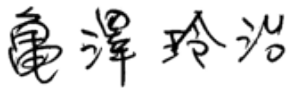
The Satoyama Initiative started as a collaboration between the Ministry of the Environment of Japan and the United Nations University Institute for the Advanced Study of Sustainability. It has brought new thinking to the practice of rural development through its popularization of the concept of socio-ecological production landscapes and seascapes (SEPLS) and its elaboration of models to sustainably manage these spaces. The vision of SEPLS has proved highly influential as a way to structure sustainable development in rural environments where livelihoods and cultures are still tightly coupled with natural resource use, and local knowledge and custom provide a foundation for sustainable land use practices. The concepts of the Satoyama Initiative have brought together the science of ecology with the human dimension of rural resource use to envision land use systems that enrich and sustain rural communities while they safeguard ecosystem services and biodiversity. These concepts stress resource management for landscape resilience and reliance on participatory governance mechanisms so that the stewards of the landscape—the local communities—also become the primary beneficiaries of this resilience.

The International Partnership for the Satoyama Initiative (IPSI), launched in October 2010, is a global platform aiming to facilitate and accelerate the implementation of activities under the Satoyama Initiative. In line with the IPSI's strategic mission, the COMDEKS Programme has been pivotal in demonstrating how these approaches can be put into practice, applying the Indicators of Resilience in SEPLS, originally developed by the United Nations University and Bioversity International. Supported by the Japan Biodiversity Fund, it is indeed the IPSI flagship effort and as such, COMDEKS' role—supported and facilitated by the United Nations Development Programme—has been ground-breaking.

COMDEKS builds on the continued collaboration between the Government of Japan and UNDP to promote knowledge sharing and expertise, and to strengthen capacities for sustainable development towards achieving the Aichi Biodiversity Targets. Thus, the COMDEKS Programme provides support for local community activities that maintain and revitalize critical production landscapes and seascapes and disseminates best practices learned from this approach. Since its inception in 2011, COMDEKS has supported 215 community-led initiatives across 20 countries globally, inspiring new visions for landscape management in rural settings, increasing local food security and livelihood opportunities, and creating dynamic landscape networks.

This report, which details achievements during the second phase of the COMDEKS Programme, shows how much progress has been made in defining the goals, planning processes, funding mechanisms, and monitoring systems needed to make sustainable landscape management a reality. It demonstrates the strengths of the COMDEKS methodology in a variety of different geographic, cultural, and governance settings, tackling a wide array of environmental, social, and economic challenges. I am sure I am not alone in being inspired by these achievements.

This excitement to embrace a holistic landscape vision and share landscape experiences is common among COMDEKS communities. Similarly, by sharing these COMDEKS successes widely through this report, I hope we can demonstrate the inherent strength of a vision of landscape resilience generated by local people, accomplished through local action, embraced by local and national government, and supported technically and financially by an innovative donor community.



Reiji Kamezawa
Director General
Nature Conservation Bureau
Ministry of the Environment of Japan

FOREWORD

With the adoption of the Sustainable Development Goals (SDGs), interest in integrated approaches to rural development is keener than ever—approaches that combine a holistic view of rural landscapes, the communities and the ecosystems that comprise them, with an ability to address the combination of income, food security, environmental, and social issues that confront rural families. The Community Development and Knowledge Management for the Satoyama Initiative Programme (COMDEKS), implemented by the United Nations Development Programme (UNDP), represents just such an approach. With its emphasis on improving landscape-level resilience through community action, COMDEKS embodies the belief that truly integrated local solutions demand a landscape approach that recognizes the interconnectedness of ecosystem services, local food production, natural resource use, income opportunities, governance and culture beyond a single community and across a larger geographical area.

The structure of the COMDEKS Programme reflects the insights of UNDP's three decades of experience in local development. The first insight is that, to be effective, community-based organizations must be the driving force in rural development strategies, meaning they must take the lead in project planning, governance, execution, and monitoring. A second insight is that participatory landscape governance represents an effective foundation for the organization of community-based, multi-stakeholder approaches to land and resource management. The third insight is that integrated solutions are best approached at a landscape scale—a scale large enough to encompass the processes and systems that underpin ecosystem services, rural economic production, and local cultures.

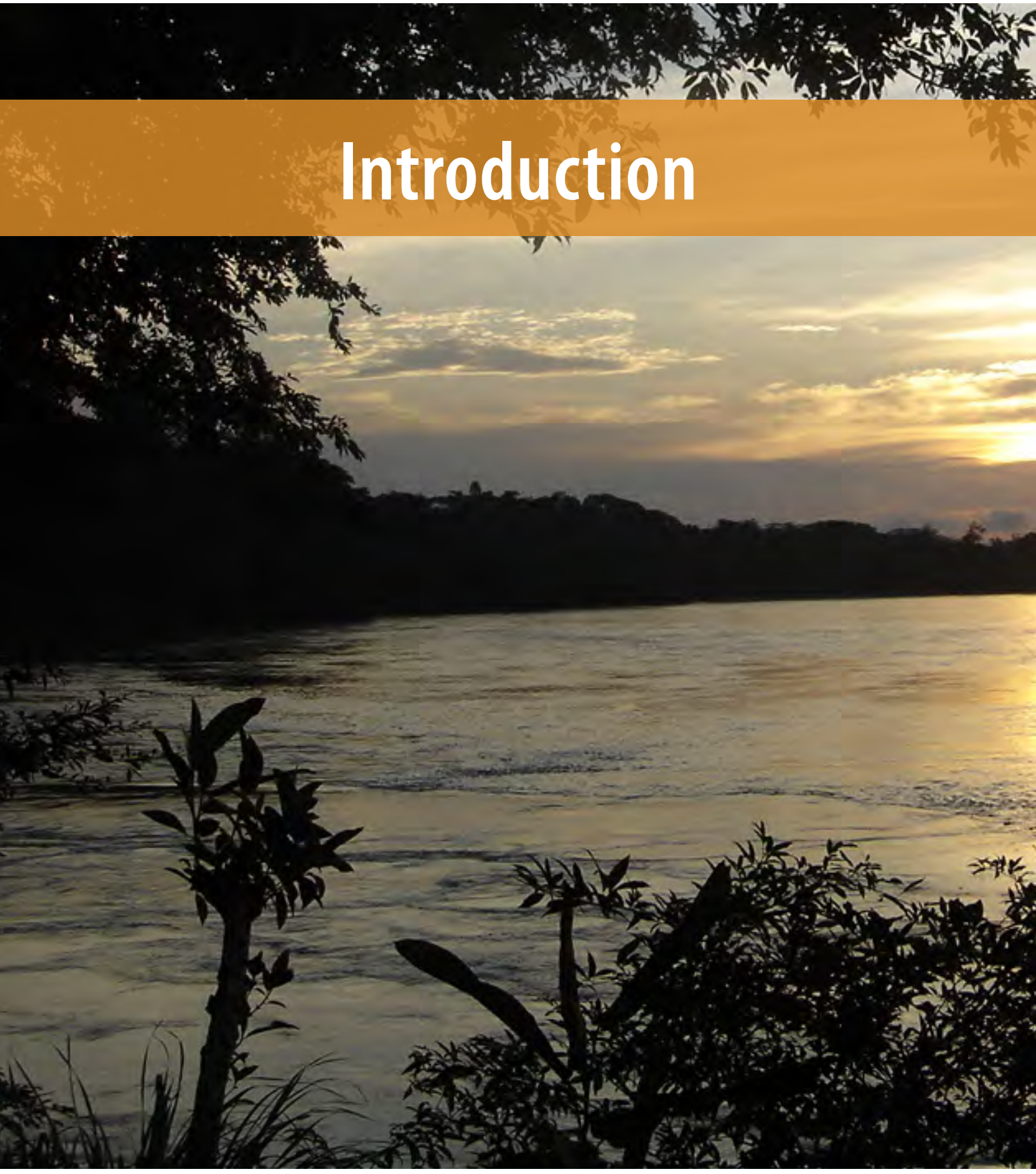
The present volume shows how effective COMDEKS has been in capturing these insights and systemizing them into a coherent community-based landscape approach. With experience in 20 pilot countries to date, the Programme has developed a step-by-step process to help landscape communities undertake a baseline assessment of landscape conditions, negotiate a multi-community Landscape Strategy to manage land uses and restore landscape resilience, and carry out a slate of community-led projects aimed at reaching the Strategy's goals. The case studies that follow provide valuable examples of the COMDEKS approach and the improvements in ecosystem services, and rural productivity, income, and community empowerment that result.

The lessons learned from these country cases will provide instrumental guidance for other UNDP programs working at the community level to deliver the SDGs and to strengthen the resilience of rural landscapes and societies to the effects of global climate change. This includes the UNDP-implemented Global Environment Facility Small Grants Programme (GEF SGP), which has recently adopted a landscape-based approach to guide its project funding decisions. In particular, the 15 SGP "Upgrading Country Programs"—the countries with the most mature project portfolios and the most developed civil society networks—will find the COMDEKS experience invaluable as they adapt their programs to embrace a landscape approach. For these and other community-based development programs, COMDEKS offers a potent example of how environment and development benefits can be scaled over larger geographic areas and over many communities simultaneously, and how these efforts can be linked to national development and land use planning to magnify their effects.

UNDP is grateful to the Ministry of the Environment of Japan, the United Nations University, and the Secretariat of the Convention on Biological Diversity for their support and collaboration in funding and implementing the COMDEKS Programme.

Magdy Martínez-Solimán
Assistant Secretary General
Assistant Administrator and Director
Bureau for Policy and Programme Support
United Nations Development Programme

Introduction



Introduction

Since its founding in 2011, Community Development and Knowledge Management for the Satoyama Initiative—the COMDEKS Programme—has piloted a community-based model of landscape management to restore the resilience of local ecosystems and sustain the working landscapes and seascapes that rural communities depend upon. These dynamic lands and waters, known as *socio-ecological production landscapes and seascapes (SEPLS)*, support a variety of land uses, including farming, grazing, fishing, and forestry. Their continued productivity is central to the economic well-being and cultural identity of rural communities throughout the developing world.

The management of these landscapes also has important environmental consequences. Since SEPLS are the repository of much of the world's crop genetic diversity and biodiversity outside of parks and protected areas, their health is critical to attaining local and global conservation goals and maintaining local crop varieties. Local land use also plays a significant role in climate change mitigation through its effects on carbon storage in soils and biomass, and is equally significant in the success of local climate change adaptation strategies.

COMDEKS provides small-scale finance—delivered through the GEF Small Grants Programme (SGP)—to local community organizations to catalyze a process of participatory landscape planning and to carry out community projects that strengthen local sustainable livelihoods, conserve biodiversity, address climate change, and support local cultures. In this way, COMDEKS activities not only restore the ecological resilience of local SEPLS, but strengthen the social and economic resilience of communities within the landscape.

In addition, the COMDEKS landscape planning process in each target landscape and the projects that flow from it produce an invaluable archive of field experience and data that is documented and disseminated—via peer-to-peer exchanges, web postings, reports, media coverage, and conferences—for other communities to learn from and adapt to their own local circumstances. As such, COMDEKS is both a laboratory for community-led landscape management practices and a platform to communicate and upscale these best practices, which in turn can provide important input to national land use policies.

The COMDEKS landscape management approach has been implemented in target landscapes in 20 countries spread over two phases since 2011. Case studies and insights from the ten COMDEKS Phase I countries—Brazil, Cambodia, Ethiopia, Fiji, Ghana, India, Malawi, Nepal, Slovakia, and Turkey—were presented in the 2014 report *Communities in Action for Landscape Resilience and Sustainability: The COMDEKS Programme*.

The current publication presents guidance, insights, and case studies from the ten COMDEKS Phase II countries: Bhutan, Cameroon, Costa Rica, Ecuador, El Salvador, Indonesia, Kyrgyzstan, Mongolia, Namibia, and Niger. The target landscapes and seascapes in these countries differ markedly, representing a range of ecosystems: river basins in Ecuador and Costa Rica; inland lakes in Niger and Kyrgyzstan; agropastoral systems in Cameroon; mountain ecosystems in Bhutan; coastal seascapes in El Salvador and Indonesia; and grasslands in Mongolia and Namibia. This variety of landscapes emphasizes the flexibility and adaptability of the COMDEKS landscape management approach, and also points up the challenges of landscape-level environmental governance in any ecosystem type.

COMDEKS is funded by the Japan Biodiversity Fund and implemented by UNDP in partnership with the Ministry of the Environment of Japan, the CBD Secretariat, and the United Nations University's Institute for the Advanced Study of Sustainability. While other community-based approaches to landscape management have been implemented by UNDP and others, COMDEKS is distinguished by its participatory methods of landscape assessment, community goal-setting and project execution, as well as its SGP funding mechanism.

COMDEKS Local Project Funding: GEF Small Grants Programme

COMDEKS activities are delivered through the GEF Small Grants Programme (SGP), a decentralized funding mechanism with more than 20 years of experience delivering small grants to community organizations for local development projects. Following SGP protocols, COMDEKS projects are approved by National Steering Committees in each country—multistakeholder groups composed of representatives from civil society organizations (a majority), along with representatives of government, UNDP, and other donors. Grants are made directly to CBOs and local NGOs, since they take the lead role in planning and carrying out local landscape projects. Within each country, a National Coordinator and a Programme Assistant support local grantees in planning and carrying out project activities, measuring progress against goals, communicating and sharing experiences with other grantees, and meeting the formal requirements of the grantmaking process.

Golden Bee Farm, Ak-Dobo village, COMDEKS Kyrgyzstan

This publication is comprised of two parts:

- **Part I** summarizes the defining principles of the COMDEKS community-based landscape management approach, and sets out the step-by-step process used to apply the approach.
- **Part II** presents up-to-date case material for each of the ten countries participating in Phase II of the COMDEKS Programme. This material describes the target landscapes, sets the local context of environmental, social, and economic conditions and challenges; describes the participatory landscape planning process; enumerates local program activities; and reports preliminary findings. Part II ends with a short consideration of what the COMDEKS Programme has achieved, how these insights can be applied both within and beyond UNDP, and the challenges that lie ahead for the COMDEKS community-based landscape approach.

Readers should note that local projects are still underway or have just concluded in many of the COMDEKS Phase II country programs. Thus, this report does not represent a final enumeration of Phase II results or an ex-post evaluation of the COMDEKS Programme's overall effectiveness.

Greenhouse with walls built from soil bags, COMDEKS Mongolia

The Satoyama Initiative

The COMDEKS Programme is the flagship of the Satoyama Initiative, a global effort to promote the sustainable use of natural resources in rural production landscapes. The Satoyama Initiative's core vision is "to realize societies in harmony with nature," that is, to build on positive human-nature relationships.

The Satoyama Initiative started as a joint collaboration between Japan's Ministry of the Environment and the United Nations University Institute for the Advanced Study of Sustainability. It recognizes that in order to promote societies in harmony with nature, it is necessary to consider not only the ecosystems that surround us but to understand the role that people around the world have played in shaping landscapes to support their livelihoods and well-being. The Initiative had its origins in 2006 in an assessment of ecosystem conditions in Japan that noted that many traditional working landscapes combining a mosaic of different land uses—such as paddy fields, woodlands, ponds, canals, and settlements—produced a bundle of goods and services that both sustained the local economy and conserved local biodiversity. In Japan, these sustainably managed landscapes are known as *satoyama*, but such living landscapes exist, to varying extents, in every nation, often as the remnants of traditional land management systems.

As the discussion of sustainable development has progressed over the last decade, it has become clear that such landscapes are important examples of the kind of human-nature relationship capable of producing the three pillars of sustainable development—environmental, social, and economic sustainability. The Satoyama Initiative is focused on revitalizing these socio-ecological production landscapes and seascapes (SEPLS) as dynamic elements of sustainable rural development and key contributors to the conservation of global biodiversity.

The Satoyama Initiative's approach to revitalizing SEPLS is built on six principles:

- Resource use within the carrying capacity and resilience of the environment.
- Cyclic use of natural resources.
- Recognition of the value and importance of local traditions and cultures.
- Multistakeholder participation and collaboration in sustainable landscape management.
- Contributions to sustainable socioeconomies, including poverty reduction, food security, sustainable livelihoods, and local community empowerment.
- Improved community resilience.

Part 1

Applying the COMDEKS Community-Based Landscape Management Approach

Principles of the COMDEKS Landscape Approach

The activities and outcomes of the COMDEKS Programme flow from its embrace of a Landscape Approach, which sees the ecosystems, land uses, and communities in the landscape as a single interactive and integrated system—a socio-ecological production landscape or seascape. In this approach, community-led projects are the focus of attention, with the goal being restoration of landscape resilience to support sustainable local livelihoods, ecosystem health, and biodiversity conservation. Using this approach, more than 100 projects by community organizations in the 20 COMDEKS pilot countries are underway. These projects are contributing to landscape-level outcomes to optimize ecosystem services, enhance agroecosystem sustainability and productivity, develop local green economies, and strengthen participatory decision-making and landscape governance.

Why a Landscape Approach?

A landscape approach is needed to integrate the mosaic of SEPLS land uses. Socio-ecological production landscapes and seascapes are typified by a mosaic of land uses and land types: small-scale farm fields, pastures, orchards and agroforestry plots; forest patches, larger unbroken forest tracts, and wild areas; ponds and waterways; as well as human settlements and infrastructure such as roads and transmission lines. These adjacent land uses and ecosystems are coupled and highly interactive, with changes in one parcel—such as removal of vegetation, water diversions, or overharvesting—affecting other parcels nearby. Managing such a mosaic of land uses requires an integrated approach that sees the interactions among landscape activities and can harmonize them to optimize production, manage trade-offs, and ensure sustainability. In a landscape approach, SEPLS are looked upon and governed as a single integrated system from which many benefits are produced that, while clearly differentiated, are nonetheless interrelated and mutually supportive. Indeed, the diversity of land uses and productive activities, when properly integrated, is one of the keys to SEPLS sustainability.

A landscape approach can accommodate landscape-scale ecological, social, and economic processes. Many processes vital to SEPLS productivity function at scales larger than the local or community level. Watershed functions, habitat quality, and biodiversity trends—all factors affecting the biological integrity of SEPLS—operate at a landscape level or larger. So do the risks from climate change, water pollution, and other environmental threats originating from outside sources. Economic and cultural forces that affect communities in the landscape—such as farm commodity prices or rural-urban migration—also reflect forces operating at larger scales. A landscape approach, by focusing beyond the local level and keeping in mind the interaction of these factors, can operate from a more holistic perspective, resulting in interventions that address these factors simultaneously and with greater effect.

A landscape approach encourages cross-community interactions and synergies among community projects. In the COMDEKS Programme, communities are the focus of interventions to sustainably manage local ecosystems. They plan and carry out all local projects funded under the Programme. But these individual community-led projects do not exist in isolation, just as each community is not an island within the landscape. Rather, communities are linked with each other through their physical effects on the landscape, their social and cultural bonds, and their mutual dependence on local and regional economies. A landscape approach recognizes this interdependence, and uses it as the point of departure for landscape planning and management. Thus, in COMDEKS, all communities within the landscape come together to assess landscape conditions, agree on landscape-wide management goals, and suggest a portfolio of community projects to attain these goals. Adopting this multi-community approach fosters synergies among projects throughout the landscape, enhances communication and learning exchange among communities, and ultimately magnifies the effects of the project portfolio, creating a "landscape-level effect" over time.

Why Community-Based?

Rural communities are primary agents of landscape change, and can be prime movers in rebuilding landscape resilience. Rural communities are the residents, custodians, and everyday users of SEPLS. Their lives and livelihoods are based on SEPLS productivity, and their cultural and social lives are deeply connected to the forests, grasslands, fields, wetlands, and waterways within their landscapes. Who better, then, to manage these landscapes, both for sustainability and local well-being? In fact, local agricultural practices, grazing patterns, fishing practices, and forest uses are already a major determinant of landscape health. When these practices are unsustainable, environmental conditions in the landscape deteriorate. On the other hand, when local residents adopt environmentally appropriate land use practices, landscape health, resilience, and productivity can rebound. At the same time, no one has greater incentive to invest in sustainable landscape practices than local communities, if these practices can be shown to increase local ecosystem productivity, recover lost ecosystem services such as watershed regulation and soil fertility, or reduce local vulnerability from environmental risks such as climate change.

Communities are a storehouse of locally adapted landscape knowledge and the frontline of adaptation and innovation. Given their intimate knowledge of local conditions, community members are often in the best position to improve ecosystem conditions on the ground and restore landscape resilience. Indeed, many communities have inherited a wealth of indigenous knowledge about the plants, animals, foods, medicines, and materials found in the local landscape, and are heirs to traditional natural resource management systems and farming practices adapted over generations to be productive and sustainable under local conditions. While many of these traditional systems have been supplanted by less sustainable land use patterns more recently, they still provide a reservoir of local knowledge that can inform COMDEKS community-based projects to improve farming, forestry, and fishing practices. In fact, this knowledge base is often the root of innovation, allowing community members to adapt new technologies and practices to local ecosystem and cultural conditions.

What are SEPLS?

Socio-ecological production landscapes and seascapes (SEPLS) are dynamic mosaic landscapes with a mix of habitats and land uses including villages, farmland and adjacent woods, forests, grasslands, wetlands, and coastal areas. These landscapes and seascapes have been shaped over the years by the interaction between people and nature in ways that maintain biodiversity and provide humans with goods and services needed for their wellbeing.

Preparation of palm leaves for roofing, COMDEKS El Salvador

Communities must own the process of landscape planning and management if it is to be sustainable. The COMDEKS landscape approach is rooted in the belief that if communities are to embrace the ethic of landscape sustainability, they must own the process of landscape assessment and strategic planning, and take responsibility for the execution and evaluation of community projects. This local ownership and executive function is expressed through the leadership of community groups such as local NGOs, cooperatives, advocacy groups, self-help groups, and other community-based organizations. Decades of field experience with community-based natural resource management has shown that this kind of local empowerment can create the kind of incentive for change and commitment to collective action among local people that successful and sustainable landscape management requires. A rationale for action generated locally and promoted by local groups has proven much more effective and long-lasting than government mandates or programs generated by outside groups.

Community-led action creates a foundation for political empowerment beyond the local level. Adopting a community-based approach does not mean that community stewardship is the only factor affecting the condition of rural landscapes. Other actors are also responsible for landscape change, such as governments, corporations, and other large landowners. Indeed, the influence of these actors often dwarfs the influence of local communities in land use decisions. But increasing local agency and inspiring community action to plan and execute sustainable landscape management creates a context of empowerment and engagement that allows local people to demonstrate their capacities as land managers and assert their interests more effectively when land use decisions are made at the state or corporate level. In this context, partnerships between communities and state and corporate entities that give communities a real voice in landscape governance become more possible.

Small producer planting trees on his farm, Jesús María River Basin, COMDEKS Costa Rica

What Are the Goals of Community-Based Landscape Management?

Restore landscape resilience and promote equitable and sustainable rural development. In the broadest terms, the primary goal of community-based landscape management is to build and maintain the ecological, social, and economic resilience of SEPLS as the foundation of sustainable rural development and biodiversity conservation. Resilience is the ability of a system to absorb disturbances while retaining its basic structure and productive ability. In the context of SEPLS, ecological resilience entails the ability to deliver ecosystem services in the face of human pressures. These services underlie local food security and the long-term success of all other resource uses in the landscape.

In addition to healthy ecosystems, the social systems and economic systems at work within landscape communities must also be resilient. Economic resilience is expressed in the existence of a robust and sustainable local economy in which the availability of livelihoods rooted in the productivity of local ecosystems features prominently. Social resilience refers to the ability of community members to work together to address common problems and achieve common goals. This includes the ability to resolve conflicts and to address the needs of poor and marginalized groups within the community. It also includes the capacity of institutions and governance processes to react to complex problems and changing circumstances, such as occur on a landscape with many simultaneous occupants and land uses. Ultimately, a resilient landscape provides the ecological, social, and economic conditions in which the Sustainable Development Goals can be achieved in rural communities.

Develop the capacity of local organizations to inspire and direct collective action to manage local landscapes. Community-based landscape management functions through a process of participatory planning and project management led by local community organizations. These community-based groups are responsible for focusing local interest through the baseline landscape assessment; channeling local demand by drawing up a landscape strategy reflecting local needs and a shared community vision; and inspiring community participation to carry out local projects under the landscape strategy. Building the capacity of these groups to provide such local leadership is part of the larger goal of empowering communities to manage their working landscape effectively and sustainably.

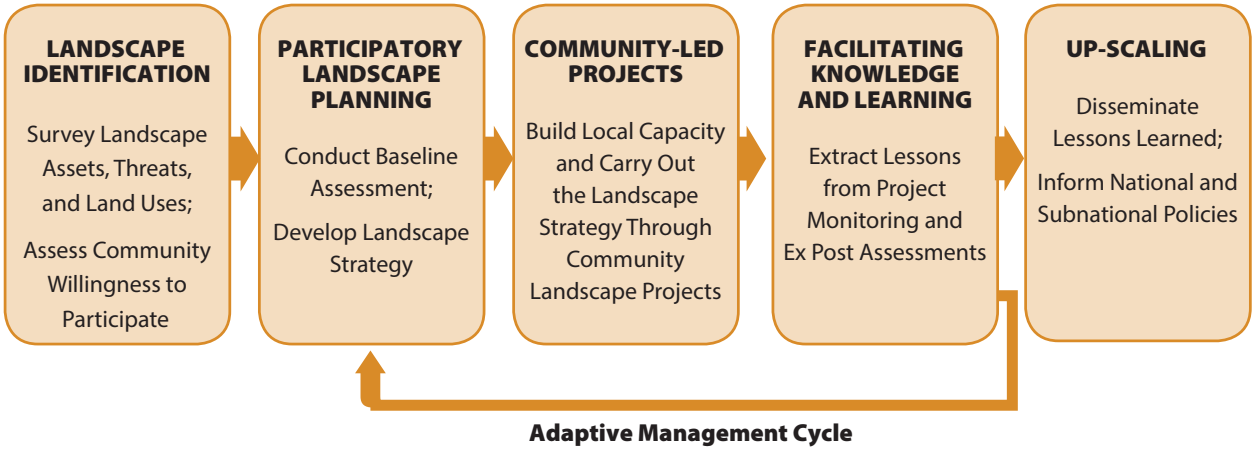
Apply adaptive management that can evolve as conditions change and knowledge increases. The dynamic nature of landscapes and the many variables that affect their productivity and health require a management approach with flexibility and the capacity to learn rapidly from experience. The community-led projects undertaken through COMDEKS represent such "adaptive management"—a learn-by-doing approach in which project results are systematically analyzed by the community and the results used to improve the next cycle of landscape projects. Thus, landscape interventions and the landscape strategy itself are approached as steps in a long-term learning process rather than one-off projects.

Achieve landscape-level outcomes that can be scaled up. The power of a community-based landscape management approach is that it links local community benefits with landscape-level outcomes. This link is forged through a process in which communities across the landscape agree on a slate of projects, each of which will be undertaken locally, but that together can affect ecosystem, economic, and social conditions over a large area. Through design, the suite of landscape projects are meant to achieve a certain scale. Further scaling up is encouraged by the practice of documenting project results and extracting project lessons that can be shared with other interested communities, either directly through site visits, or remotely via learning networks or the web.

Applying the COMDEKS Landscape Approach

The COMDEKS landscape management approach proceeds through a step-wise process in which the target landscape is first identified and a process of participatory landscape planning set in motion. A baseline assessment of ecological, social, and economic conditions on the landscape then initiates a phase of community education and mobilization, in which a consensus emerges about the state of the landscape and the actions needed to increase its resilience and meet local development needs. This consensus takes the tangible form of a Landscape Strategy with clear objectives, targets and indicators. From this effort emerges a slate of community-level initiatives to achieve the identified landscape goals—local projects managed by community groups and achieved through collective action. Regular monitoring and evaluation of results, followed by analysis, documentation, and communication to stakeholders and other interested communities are part of the project regimen. Taking stock through ex-post assessments, as well as revisiting and modifying the Landscape Strategy, complete the adaptive management cycle and leave the landscape communities poised for another round of local projects. These steps are discussed in greater detail below.

Figure 1. The COMDEKS Approach to Resilient Landscapes



1. *Identifying the Target Landscape*

The first step in piloting the COMDEKS Landscape Approach is identifying an appropriate rural landscape. Typically, pilot landscapes include several different small to moderate-size communities, a variety of local land uses, and notable biodiversity. Relevant parameters to consider in landscape selection include what natural and cultural assets the area contains, what economic activities dominate, the threats and opportunities that currently exist in the area, and the presence of particular species or unique biodiversity. Existing studies of the area and GIS analyses of the region may be helpful in evaluating these factors. One of the most critical criteria for selecting the target landscape is the interest of local communities, as well as the willingness of government agencies to encourage and facilitate the landscape management effort. Other considerations may include national land use plans already existing for the area, including the existence of Protected Areas, natural resource concessions, or infrastructure plans that may interfere with or need to be considered in local landscape planning. It may also be useful to determine whether and when other development interventions have been undertaken in the area, since this may affect the willingness and capacity of local residents to embrace the COMDEKS Programme.

Once candidate areas are identified, a stakeholder analysis is conducted to determine the salient actors in the landscape and their relative relationships. Stakeholders from all sectors should be considered, including indigenous peoples; women's, elders' and youth groups; local and national NGOs; representatives from local farmers, fishers, tourism operators, cooperatives, and labor unions; as well as local, provincial, and national governments, including Ministries such as Agriculture, Forestry, and Fisheries that have resource management responsibilities within the landscape. Preliminary contact with these stakeholders is necessary to determine the scope of possible COMDEKS activities, to identify potential allies and partners for these activities, and to help set up an effective participatory process for landscape assessment and planning, commencing with the Baseline Assessment. Preliminary consultation is also important in determining the exact boundaries and definition of the target landscape. It is essential that local people recognize these boundaries as relevant and consistent with their actual land use and with local custom, otherwise local ownership of landscape projects may be undermined.

2. Participatory Landscape Planning

The participatory landscape planning process lies at the heart of the COMDEKS model as a mechanism for community engagement and education, a tool to elicit a community-spawned vision for restoring landscape resilience, and a platform for building the social capital needed to reach consensus on and carry out the actions necessary to achieve this landscape vision. The participatory landscape planning process used in the COMDEKS Programme has three phases: conducting the Baseline Assessment, forging a Landscape Strategy based on the Baseline Assessment, and identifying suitable community-led projects to achieve the goals of the Landscape Strategy.

Site visit for the Baseline Assessment of the Bogo Landscape, COMDEKS Cameroon

Conducting the Baseline Assessment

Community engagement begins with the Baseline Assessment of landscape resilience, which generates the information communities need to understand the conditions that exist on their landscape and how these affect local livelihoods and influence local social and economic trends. The primary input to the Baseline Assessment comes directly from communities in the target area through public consultations in which community members communicate their experiences and knowledge of conditions on the landscape. This community input is generated through a structured discussion in which community members consider and score a set of 20 Resilience Indicators designed to probe the current ecological, social, and economic conditions in the target landscape. Additional input is generated on the status and vulnerability of local agroecosystems and the state of landscape governance by performing assessments in these areas with the help of specialized tools developed by COMDEKS and the Small Grants Programme (see below). The baseline assessment may also benefit from existing studies of landscape conditions undertaken by government agencies and other interested parties such as NGOs and academic institutions.

Applying the Resilience Indicators

Community consultations for the Baseline Assessment are carefully planned to be inclusive and representative of the community. Consultations are generally facilitated by a local NGO tasked with carrying out and documenting the Baseline Assessment. Sessions take place in one or more accessible locations, with representatives from the various stakeholder groups identified in the earlier stakeholder analysis. These typically include general community members, representatives of local traditional authorities and indigenous peoples, government officials and service providers, as well as private sector representatives, with special attention given to gender and age balance and the creation of an environment conducive to group interaction and discussion.

One of the main tasks before the group is to consider, discuss, and score a set of Resilience Indicators that measure five interrelated dimensions of landscape resilience:

- ecosystem protection and biodiversity maintenance;
- agricultural biodiversity;
- knowledge, learning and innovation;
- governance and social equity; and
- livelihoods and well-being.

The indicator set includes both qualitative and quantitative indicators, with measurement based on the observations, perceptions, and experiences of the local communities themselves. Indicator scoring by the group helps to determine not just current landscape conditions, but trends over time.

In practice, the basic indicator set, which was developed by the United Nations University and Bioversity International, is often customized to reflect the circumstances of each particular landscape or seascape, with the language of some questions modified or deleted entirely, and other questions added. Translation into the local language is often necessary so that language does not present a barrier to participation. In addition, although discussions are usually carried out as mixed gender sessions, in some instances separate men's and women's groups have been created to insure women's uninhibited participation.

The COMDEKS Resilience Indicator Toolkit

The experience gained in applying the Resilience Indicator set in COMDEKS pilot countries has been captured in the *Toolkit for the Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes*. This online publication provides step-by-step guidance on how to utilize the resilience indicators as part of the Baseline Assessment, both as a source of information on the state of the landscape and as an inspiration for community action. The toolkit provides a definition of resilience as it relates to SEPLS, as well as a discussion of the Resilience Indicators themselves. The Resilience Indicator set consists of 20 indicators designed to capture different aspects of key systems—ecological, agricultural, cultural, and socio-economic. They aim to provide communities with a framework for discussion and analysis of socio-ecological processes essential for SEPLS resilience. In so doing, they can contribute to a community's sense of ownership over the planning, implementation, monitoring and evaluation of their production and resource management practices. The toolkit furnishes detailed advice and examples from the field on how to apply the indicator set in many social settings, and how to score, interpret, communicate, and act on the results.

The resilience indicators provide communities with a framework for discussion and analysis of biological, social, and economic factors that determine SEPLS resilience. This relates to critical livelihood and development objectives such as food security, agricultural sustainability, human development, maintenance of ecosystem services, biodiversity preservation, strengthening local community organizations and civil society; and landscape governance that is equitable and sustainable. While these can be complex topics, experience from pilot countries shows that they become much more approachable through group discussion using local examples and personal experience. The result is that participants leave the community consultation with a good working knowledge of what resilience means in the local landscape.

Hammock weaving, COMDEKS El Salvador

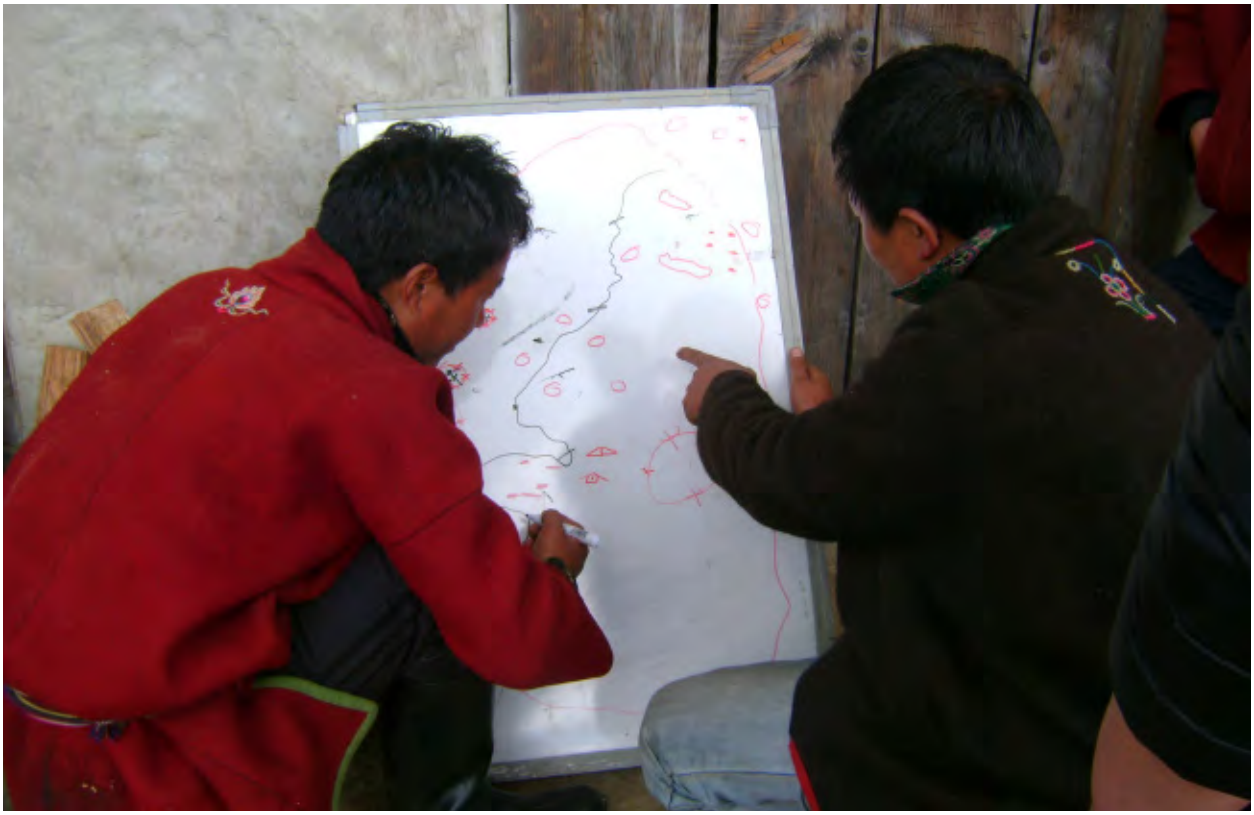
Complementing the Resilience Indicator scorecard may be other participatory exercises such as resource mapping, problem tree analyses, and focus groups on biodiversity, local agriculture, climate change, and other topics of special interest. To guide the local Baseline Assessment facilitators through the presentation, discussion, and scoring of the resilience indicator set and other group exercises in the community consultation, COMDEKS has compiled a Toolkit for the Indicators of Resilience, which provides step-by-step instructions and tips drawn from experience in COMDEKS pilot countries. (See Box.)

The benefits of the resilience indicator scoring and other joint exercises that are part of the Baseline Assessment go far beyond the actual scores produced. These exercises provide the social foundation for communication and cooperation among the sometimes disparate group of stakeholders. Joint mapping and scoring exercises offer a neutral space in which complex topics can be approached without undue conflict. They establish a mutual language and knowledge base that foster relationships of trust and mutual understanding, and form the basis for communication and negotiation going forward. Indeed, this is often the basis for multistakeholder partnerships that support landscape projects to address issues identified by the group during the Baseline Assessment.

The relationships created in this process and the networks and partnerships formed within and between landscape communities create the kind of social capital that is required to enable the collective action that lies behind successful community projects. In addition, the partnerships formed with government officials and other support groups will become key assets as communities move to implement their landscape plans in the future.

Using the resilience indicators set and landscape mapping is also essential to articulating the values behind the Participatory Landscape Planning process, such as the need to measure both biodiversity, social, and economic indicators so that the community can decide on the goals they wish to pursue in their Landscape Strategy. In effect, the resilience indicator set has values embedded within it that are part of the larger effort of awareness-raising within the community to prepare for COMDEKS interventions. For example, it highlights the importance of landscape governance, and gives community members a sense of the trade-offs that will be involved in landscape management. In the end, the application of the Resilience Indicators in the community consultation is as much about educating, orienting, and inspiring community members for the landscape visioning process to come as it is about generating data for the Baseline Assessment.

Community gardens (chakras) grow a biodiverse mix of local crops, COMDEKS Ecuador



Resource mapping of the Gamri Watershed, COMDEKS Bhutan

Agroecosystem and Landscape Governance Assessments

Given the importance of food security and the prevalence of small-holder farming in most COMDEKS landscapes, assessing the resilience of local agroecosystems takes on considerable importance in the Baseline Assessment. Consequently, COMDEKS, in partnership with SGP, has created a special assessment tool to help community members evaluate how well agroecological principles are being applied in their farming systems, determine how vulnerable their fields and crop systems are to climate and other risks, and identify how they can improve their overall resilience. While the Resilience Indicators touch upon local agricultural resilience, the *Agroecosystem Vulnerability Assessment Manual* probes more deeply into agroecosystem conditions. The manual helps community members examine factors such as soil conditions and drainage (for example, porosity, nutrient and organic matter content, and erosive potential); vegetation structure, including the presence of windrows and hedgerows; and landscape diversity, including the mix of fields, wild patches, and nearby forests.

Similarly, COMDEKS, in partnership with the NGO Natural Justice, is developing a *Landscape Governance Self-Assessment Tool* to help community members examine the institutions, platforms, and formal and informal networks that are active in managing the local landscape. A variety of formal and informal governance arrangements are often present in a given landscape, with several government agencies charged with natural resource management often existing in parallel with customary management systems, multistakeholder groups, and various levels of local municipal government. Determining the responsibilities of these various agents and how well they cooperate to govern local land uses for sustainability and local benefit is crucial to an overall picture of landscape resilience.

Participatory mapping exercise in the Central Selenge region, COMDEKS Mongolia

Developing the Landscape Strategy

The Baseline Assessment provides an organized body of data and information on local landscape conditions and trends. Through its resilience scoring exercises and public discussion, it also begins the process of building a landscape perspective and ethic—a way of viewing these trends and conditions more holistically and from the standpoint of resilience to climate shocks and other threats and pressures. Further, it initiates the process of building a "landscape community" consisting of the different local community organizations, government entities, and support groups that must come together to manage the landscape for resilience and sustainability. All these elements are important in the development of the Landscape Strategy, which is the basic blueprint that communities will use to guide their landscape management actions in both the short and longer terms.

To arrive at the Landscape Strategy, the group participating in the community consultation considers the results of the Resilience Indicator scoring exercise and other data developed on landscape conditions. Community concerns and threats to the landscape are identified and actions to address them mapped out and prioritized. From this frank discussion of the current strengths and weaknesses in landscape resilience, the group formulates a vision for what a resilient landscape should look like and identifies long-term objectives for landscape management to achieve this vision. These objectives are put in the form of Landscape Resilience Outcomes in four key topic areas:

- Ecosystem services and biodiversity;
- Sustainable production systems and food security;
- Sustainable livelihoods;
- Landscape governance.

For each of these four Landscape Resilience Outcomes, the group identifies Key Performance Indicators that can be used to determine whether and how much progress is being made toward the Outcomes. In addition, for each Outcome, the group compiles a list of suggested interventions that, if undertaken, would help achieve the Outcome. The result of these deliberations is a formal document—drafted by the group convening the Community Consultation—that profiles the target landscape, summarizes the baseline assessment results, proposes the agreed Landscape Resilience Outcomes and Key Indicators, indicates the strategies needed to achieve these, and lists a slate of potential community-based interventions. Once reviewed and accepted by landscape communities, the Landscape Strategy becomes a tangible reminder of their commitment to landscape resilience—a goalpost to rally around, a guide to short and long-term actions, and a yardstick to measure progress.

Assembling a Portfolio of Community-Led Projects

Once the strategic guidance of the Landscape Strategy has been provided, it is time to identify specific community projects—organized and executed by local community groups—that can be reasonably undertaken within the COMDEKS budget and timeline. The National Coordinator of the Small Grants Programme in each country assists candidate CBOs to plan and prepare project proposals tailored to a specific community or subregion of the target landscape. These proposals are considered by the SGP National Steering Committee in that country. Each local project must address one or more of the Landscape Resilience Outcomes in concrete and identifiable ways, under the leadership of a local CBO. Overall, the portfolio of projects must be distributed throughout the landscape, with a variety of different CBOs in charge of project management, and with all the Landscape Resilience Outcomes accounted for to some degree.

From the start, the portfolio is conceived as an integrated and interlinked set of locally driven solutions. Projects are designed to show both short-term outcomes and longer-term benefits that mature over time. And, clearly, as a portfolio, projects must also yield landscape-wide benefits. However, there is no expectation that all the outcomes set out in the Landscape Strategy will be fully achieved in a single project cycle through the chosen project portfolio.

3. Project Execution and Adaptive Management

Local Empowerment and Capacity Development

Individual projects in the COMDEKS portfolio in the target landscape are generated by local people and designed with local well-being in mind. Each project contains activities that contribute to local livelihoods, increase household incomes, and help restore the productivity of local ecosystems. They also empower the community and build its technical, business, and social capacities, since they are carried out through collective community action. Indeed, local empowerment and capacity development are paramount goals, since these are the principal means to improve economic and social resilience. They are also critical to timely and effective project implementation.

Empowerment and capacity building are especially important for the community organizations that take on a project leadership role. These local groups are responsible for project management and execution. This means drawing up and communicating project plans, organizing work groups and schedules, motivating community members to accomplish the field work, monitoring the results, and communicating the community's accomplishments. Not surprisingly, the organizational capacity of these community groups is a critical factor in the success of

the project portfolio, yet they often have limited project management experience. The COMDEKS approach therefore involves a significant investment by the SGP National Coordinator and other service providers in building the capabilities of these groups at the beginning of the project cycle through frequent meetings, workshops, and trainings, and in maintaining a mentor and advisory role throughout project implementation.

Adaptive Management Cycle: Application, Innovation, Monitoring, Evaluation, Reporting, Adjustment

COMDEKS projects are built around an adaptive management cycle that emphasizes learning, innovation, and improvement based on observed results. Local projects are looked upon as learning experiences rather than simply mechanisms to achieve a list of specified outcomes. Community groups are regarded as natural sources of innovation and adaptation and are encouraged to adjust project activities to accommodate local conditions and take advantage of indigenous knowledge. Innovation in rural landscapes often involves adapting outside technologies and resource management practices using traditional knowledge, or reconfiguring traditional practices to handle new challenges and serve new markets. The result is often a hybrid between traditional and modern practices. The COMDEKS landscape approach is predicated on the belief that encouraging such local innovation is part of the empowerment process and central to resilience in the face of landscape change.

Seedlings for home gardens, Semau Island, COMDEKS Indonesia

Monitoring and evaluation (M&E) is essential to power this cycle of learning and innovation, and to assess project performance and progress toward resilience goals. As with other aspects of project implementation, communities themselves are responsible for monitoring project results. Project participants first identify project objectives that are aligned with the landscape outcomes designated in the Landscape Strategy, and then choose appropriate indicators to assess progress and results. This participation in the design of project metrics, as well as mastery of the technical and reporting skills necessary for project monitoring, is considered another opportunity for local empowerment.

Evaluation of the overall results and impact of the project portfolio takes place at the completion of the project cycle through an Ex-post Baseline Assessment. This public meeting of the "landscape community" is the chance to analyze how projects performed individually and as a package, and to assess their impact on landscape resilience relative to the goals set out in the Landscape Strategy. Part of this portfolio assessment involves revisiting the original resilience indicator set to see how the perceptions of community members have changed upon completion of the project cycle. In this way, the Ex-post Baseline Assessment becomes a vehicle not just for project evaluation, but for continuing the "landscape education" that communities began in the original Baseline Assessment and deepening their understanding of resilience.

To complete the adaptive management cycle, communities use the findings of the Ex-post Baseline Assessment to extract lessons on project design and implementation, pinpoint successful and unsuccessful innovations, and glean landscape-level insights on governance and large-scale ecosystem trends. These lessons can then be shared with the full array of stakeholders and made available to the much wider audience of potential users in other landscapes. This commitment to knowledge management is an essential feature of the COMDEKS landscape management approach—necessary both to take full advantage of the knowledge generated, and to build the capacity of the landscape community to distil and communicate its learning. Experience in COMDEKS pilot countries shows that the process of monitoring project results, analyzing and distilling lessons, and communicating these to the outside world is fundamentally empowering and allows communities to become effective agents in scaling up their successes in other landscapes.

The final step in adaptive management is using the distilled lessons of the Ex-post Baseline Assessment to refine and update the Landscape Strategy and to plan future landscape interventions. The Landscape Strategy is meant to be a living document that changes with project experience to reflect community learning and to take advantage of new opportunities as they are recognized. One of the strengths of the COMDEKS approach is that it makes the adaptive management cycle richer and more productive by undertaking a portfolio of interlinked projects simultaneously throughout the landscape. This can result in significant evolution in the Landscape Strategy in a relatively short time. Even so, translating this learning into sustained resilience gains on the ground requires continued engagement by all concerned—including donors, NGOs and government programs—over many project cycles.

4. Landscape-Level Governance

A primary goal of the COMDEKS approach is improved landscape governance—in other words, better decision-making processes and policies around land and resource use in the landscape. This involves strengthening landscape governance institutions so that they can manage the dynamic and interacting mosaic of land uses, ecosystems, and communities in an integrated and equitable manner. COMDEKS Programme activities work to achieve this in several ways that are further explained below.

Expanding the Landscape Governance Capacity of Communities

A tenet of the COMDEKS approach is that sound landscape governance can only be achieved through the active participation of communities. COMDEKS activities help to build the capacity for this participation. By taking part in the Baseline Assessment and the creation of the Landscape Strategy, community members learn not only to understand resilience, but to appreciate the integrated nature of landscape governance, the necessity of a long-term vision to guide governance actions, and the importance of a step-wise approach, backed by competent monitoring and evaluation. They also learn the importance of building partnerships with NGOs, academic institutions, local and national governments, and other groups with a stake in landscape governance. Then, by carrying out local landscape projects, community members gain the capacity to plan and implement activities that serve a landscape vision. In particular, as local CBOs gain experience in community organizing, project management, and communication, they become more effective agents for good governance. They can steward and maintain work already accomplished, and advocate for new interventions to continue to improve landscape conditions. In fact, building the capacity of community organizations has proven one of the most effective ways to improve overall landscape governance in COMDEKS pilot countries, as these local groups become de facto overseers of the landscape.

Creating a Landscape Community

COMDEKS activities help weld engaged stakeholders in the landscape into a functioning community of interest. By bringing together representatives from different landscape communities, from government agencies with formal land and resource governance responsibilities, and from support organizations, the participatory landscape planning process and the project implementation cycle create an informal landscape community. This group is linked by a common understanding of local conditions, a common vision for landscape resilience, and a common set of project experiences. With these links as a foundation, the group can become an invaluable source of ideas, expertise, and advocacy for good landscape management practices—effectively an ad hoc working group for landscape governance. In many COMDEKS landscapes, this group becomes the core of a formal multistakeholder landscape governance group, or if such a multi-stakeholder forum already exists, it may greatly enrich the consultation process underway.

Community discussion during a monitoring mission, Lake Tabalak, COMDEKS Niger

Reconfiguring Landscape Governance Institutions

Applying the COMDEKS Landscape Approach can be a catalyst for reconfiguring the governance institutions at work on the target landscape. These can include the various government agencies with formal responsibility for land use, resource extraction, water basin management, and parks management, as well as informal water user, farmer, fisher, and pastoralist groups. COMDEKS' participatory landscape planning process and project cycle provide a context and data to evaluate the strengths and weaknesses of these institutions, and to assess their effectiveness at managing tradeoffs and achieving integrated landscape goals. The COMDEKS process also provides a ready source of local stakeholders with demonstrated landscape management capacity to act as new partners in landscape governance. The result can be the creation of new governance platforms such as happened in Ghana's Weto Range (the COMDEKS target landscape) with the formation of the "WETO Platform," a multistakeholder group that includes local civil society organizations, traditional authorities, and representatives from different levels of government, and exercises authority over resource management policies and local landscape projects in the target landscape (see Box for three examples of innovative landscape governance institutions associated with COMDEKS activities). It is also possible that existing institutions can be revitalized or augmented with new community partners and a revised mandate that formalizes local community input. In either case, the COMDEKS experience can provide a major impetus to revisit landscape governance and augment it with new perspectives and new partners.

Fostering Landscape Governance Innovations: Three Examples

COMDEKS activities can provide the impetus for innovations in landscape governance that result in greater community involvement in land use decisions and landscape-level planning processes. As the examples below demonstrate, these innovations often take the form of multistakeholder platforms with direct input into local landscape project planning and implementation. In many cases, these bodies have official government recognition and are not just advisory groups, but have decision-making authority in designated policy and implementation areas. In all cases, civil society groups play an active role in the landscape governance that results.

- **Ghana: The WETO Platform.** This multistakeholder body exercises authority over resource management policies and local landscape projects in the target landscape. It links traditional authorities, civil society groups, and government bodies in a single institution with the goal of approaching natural resource management from a landscape perspective. It has a three-tiered structure consisting of (a) the Weto Governing Council, (b) the Weto COMDEKS Consultative Body (WCCB), and (c) local groups and associations. The Weto Governing Council consists of representatives from local NGOs, local landowners, traditional authorities, District Assemblies, the Regional Coordinating Council, District Chief Executives, and academic institutions; it develops natural resource management policies for the region, approves management plans, garners political support, and settles disputes. The WCCB consists of representatives from local CSOs, collaborating government ministries, donors, and media, and makes day-to-day management decisions on COMDEKS projects, and monitors project progress. Local groups and associations are involved in project implementation; they range from agroforestry groups and beekeeping groups, to tree nursery and tree planting groups. The Weto Platform is registered as an association and certified by the Government of Ghana. It has been successful in harmonizing the landscape activities of local civil society groups and bringing them into a peer relationship with local government authorities and service providers, such as the extension services provided by the Ministry of Food and Agriculture.

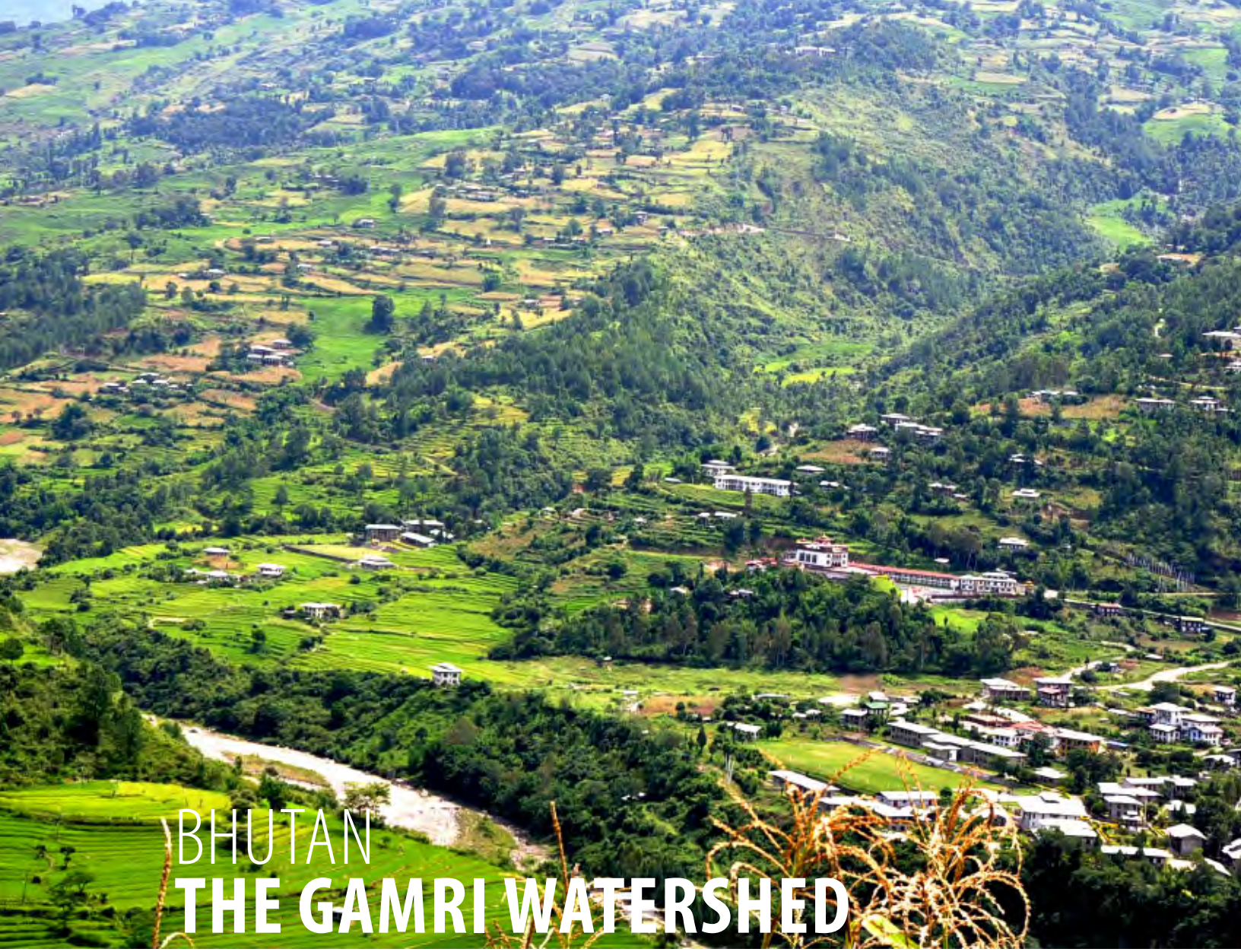
- **Ecuador: Regional Working Group and Biocorridor Roundtables.** From its origin, the COMDEKS Programme in Ecuador was harmonized with the already existing SGP Ecuador program known as Biocorridors for Living Well. This program seeks to establish expanses of land (biocorridors) where ecological connectivity is reestablished, connecting fragmented habitats, incorporating sustainable production activities into the landscape, and fostering community partnerships. To facilitate biocorridor planning in the Amazon region, a regional, multistakeholder working group was formed early on, bringing together community organizations, indigenous peoples groups, NGOs, and local and provincial government authorities, as well as other stakeholders. After significant dialogue and consultation, this working group generated a political agreement among the parties on biocorridor principles and priorities. To implement this agreement, "Biocorridor Roundtables" (Mesas de Trabajo de los Biocorredores) were set up for each of the three biocorridors planned for the Amazon region. Each Biocorridor Roundtable produced a Biocorridor Action Plan, with specific guidelines developed in line with SGP and COMDEKS objectives and also aligned with government development and resource management plans. The COMDEKS projects eventually chosen were consistent with the various Biocorridor Action Plans. The Biocorridor Roundtables provide forums for direct dialogue between stakeholders such as community organizations, indigenous groups, and the technical staff of municipal and provincial authorities and government ministries. Environmental issues, sustainable production concerns, and local policies of relevance to the biocorridor stakeholders are all taken up by the Roundtables. The fact that the Biocorridor Action Plans produced by the Roundtables are linked to existing development and land use plans has encouraged high-level buy-in by the government and has allowed the Biocorridor Roundtables to position their activities as key contributions to the government's social and environmental goals, increasing their effectiveness.

- **Semau Island, Indonesia: Environmental Forums.** The primary governance intervention associated with COMDEKS on Semau Island is the formation of village-level Environmental Forums in seven villages where COMDEKS activities are taking place. As in Ghana and Ecuador, these Forums are multistakeholder groups consisting of customary authorities, community leaders, community groups, and government authorities. Environmental governance on Semau Island is typically the responsibility of the state-recognized Village Chief, in association with the Ministry of Forestry and the Ministry of Marine Affairs and Fisheries, which administer the Marine National Recreation Area and the Marine National Park that occupy much of the island's coastal areas. The village Environmental Forums bring these parties together with the customary authority of local Landlords, who heavily influence the patterns of day-to-day land use, and with community groups undertaking landscape interventions. The goal of the Environmental Forums is to ensure restoration of damaged ecosystems in the village environs and to develop a mechanism for sustaining these ecosystems in the future. The Forums provide a place for stakeholders to discuss their vision of the landscape work that is needed, to develop implementation plans, and to carry out monitoring and oversight. One of the practical effects has been the development of binding environmental agreements among local clan leaders, village governments, and community members in different villages, particularly over water use and the protection of water catchment areas, as well as sand mining in some coastal areas. The seven village Environmental Forums also convene occasional inter-village meetings to discuss issues of common concern.

Cacao fruits, Napo River watershed, COMDEKS Ecuador

Part 2

COMDEKS Phase II Country Case Studies



BHUTAN
THE GAMRI WATERSHED

1. The Landscape

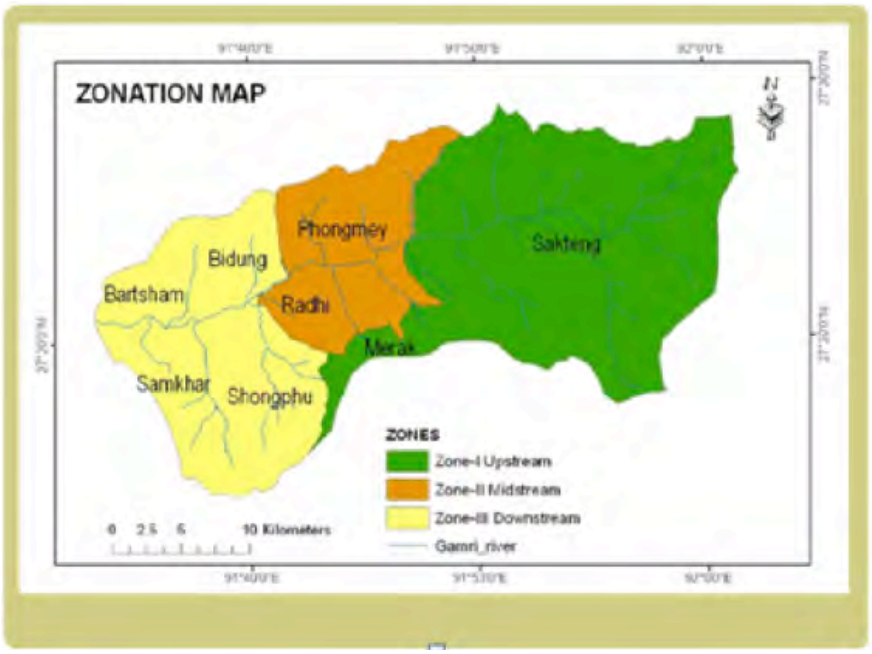
Geography

Bhutan is a small landlocked country in the eastern Himalayas, bordered by the Tibetan Autonomous Region of China in the north and the Indian states of Sikkim, West Bengal and Assam, and Arunachal Pradesh to its south-west, south, and east respectively. The country is mountainous, with a rugged and steep terrain. Altitudes plunge from over 7,500 m at the highest point to less than 200 m within a distance of 170 km in the north-south direction.

The target landscape selected for COMDEKS activities is the Gamri watershed, located in the eastern region of the country, with an area of 745 km^2. The watershed spreads over eight administrative blocks known as *gewogs* in Trashigang Dzongkhag District: Sakteng, Merak, Phongmey, Shongphu, Bidung, Bartsham, Radhi and Samkhar Gewogs. The Gamri River is formed by 19 tributaries originating in these eight gewogs. The Gamri is one of the

main tributaries of the Drangme Chhu River, which drains into the Brahmaputra River in India and finally flows into the Bay of Bengal.

Figure B-1. Gamri Watershed Zones



The Gamri watershed is divided into three distinct zones, based on elevation, terrain, land cover, and predominant agricultural activities (see Figure B-1 and Table B-1). Zone I (upstream) is comprised mostly of highland pasture and mixed conifer forest, with altitudes ranging from 2,500 to 4,000 m, and an average slope gradient of 20-30 degrees. Zone II (midstream) and Zone III (downstream) contain pastures and agricultural fields, with altitudes ranging from 700 to 2,500 m, and a slope gradient of 21-40 degrees.

Table B-1. Gamri Watershed Zones

Zones	Gewogs	Area (km^2)	Altitude (m)
Zone I-Upstream	Merak & Sakteng	375.52	2,500-4,000
Zone II-Midstream	Radhi & Phongmey	130.57	700-2,500
Zone III-Downstream	Bidung, Bartsham, Samkhar & Shongphu	224.62	700-2,500

Biological Resources and Land Use

The Gamri landscape is a significant watershed in eastern Bhutan containing more than 66 scattered settlements. The watershed was selected as the pilot landscape for COMDEKS activities mainly due to the significant biological diversity it contains and in recognition of the growing pressures on the landscape from grazing, over-extraction of fodder and fuel wood, landslides and the drying up of water sources.

Installing solar fencing to mitigate human-wildlife conflicts, Yenangbrangsa, COMDEKS Bhutan

The watershed covers a diverse climate and contains an array of ecosystems ranging from alpine meadows to broadleaf forests. Land cover consists of 69.3 percent forest, 15 percent natural pasture, and 13.9 percent agricultural land. The remaining 1.6 percent of the surface area is comprised of water bodies, rocky outcrops, settlements and eroded areas. Agriculture, livestock (including yak) rearing, and weaving are the economic mainstays of the people of the watershed.

One significant source of biodiversity within the watershed is the Sakteng Wildlife Sanctuary (SWS), which covers almost three-fourths of Merak and Sakteng Gewogs. The SWS is representative of a diverse eastern Himalayan ecosystem, consisting of alpine meadows, temperate forest and warm broadleaf forest. Of the 46 species of rhododendrons found in Bhutan, 35 species grow wild in the sanctuary, which is popularly known as the "Paradise of Rhododendrons." Overall, the sanctuary harbours at least 203 plant species, including herbs, shrubs, and trees, and is home to globally threatened and endangered animal species like the Red Panda, Himalayan Serow, Wild Dog, Goral, Common Leopard, Capped Langur, Himalayan Black Bear, Musk Deer and Jungle Cat, to name a few.

About 70 percent of Bhutan's total area is covered by forest and more than 50 percent is safeguarded as protected areas and biological corridors. Agriculture and livestock rearing are the main economic activities, with an estimated 69 percent of the population engaged in farming. With regard to the Gamri Watershed, Zone I has the highest livestock population in the target landscape, and cattle herding is the main income-generating activity. Zone II is known for its grain and staple crop production, including rice, maize, and potatoes. Both agriculture and livestock husbandry predominate in Zone III.

Socioeconomic Context

The Gamri watershed has a population of 32,364. The mean annual household income is Nu. 90,657 (US$1,333); the poverty rate is 12 percent; and the literacy rate is 60 percent. The Gamri watershed zones can be characterized as follows:

Zone I – Upstream: This zone includes the gewogs Merak and Sakteng, which are inhabited by about 4,200 people. The communities primarily comprise nomadic yak herders, locally known as Brokpas. Cattle/yak rearing is the main socioeconomic activity in this zone, contributing over 83 percent of household income. Zone I is highly significant as it is located in the upstream portion of the watershed and has the highest number of sub-watersheds. At the same time, it has the highest livestock population, which has resulted in severe land degradation due to overgrazing and deforestation from fuel wood extraction (for cooking and heating) and lopping of tress for fodder. Landslides, ravines and gullies are common in this zone, causing the loss of large areas of forests, meadows and grazing areas every year, and triggering serious consequences downstream.

Zone II – Midstream: This zone includes the gewogs Radhi and Phongmey, with a total population of 9,865 people. Farming and livestock husbandry are the major economic activities in this zone. Radhi is often referred to as the "rice bowl of eastern Bhutan" because of its fertile rice fields and grain production. Other main crops cultivated include paddy, maize, soybean, potatoes and vegetables. Additionally, Radhi is famous for silk textiles (buray gho and kira). Major challenges faced by Zone II include loss of agricultural land from flash floods (mainly triggered by overgrazing and deforestation in Zone I) and landslides during the monsoon season. Farm roads are built with poor drainage systems, thereby exacerbating these problems and causing loss of valuable crop land every year. In addition, human-wildlife conflict is a major problem in this zone, causing loss of traditional crop diversity. The crops are destroyed by wildlife such as porcupines, monkeys and wild boars, causing significant economic losses every year. In some cases, farmers leave their lands fallow due to their inability to cope with these depredations.

Farmers of Thongrong planting Napier hedgerows, COMDEKS Bhutan

Zone III – Downstream: This zone covers the four gewogs Bidung, Samkhar, Shongphu and Bartsham, with a total zone population of about 18,290. As in Zone II, agriculture and livestock husbandry are the predominant economic activities. Rangjung, the economic hub of the watershed, is located in this zone. The key challenges here are somewhat similar to those in Zone II, in terms of landslides, flash floods and human-wildlife conflict. However, Zone III faces additional problems including water scarcity, both for drinking and irrigation, and frequent forest fires during the winter season, destroying large areas of chir pine forests. Due to the acute shortage of local water resources, large tracts of agricultural land are left fallow. In addition, the water scarcity has caused conflicts between the people of Bidung and Bartsham, both of whom claim water rights to the Jhomori River.

There is serious concern that the environmental threats to the Gamri watershed are having adverse socioeconomic consequences on the region. Landslides cause considerable loss of natural pasture, rangeland, and agricultural fields, and the combination of flash floods and poor drainage systems have resulted in the loss of limited and valuable paddy and maize fields. This pressure on already limited resources has led to conflicts over forest and pasture resources. Finally, there is a challenge in the lack of diversified income-generating activities, as well as the increasing loss of culture and traditions of the Brokpas, the nomadic yak herders of the region.

2. Key Environmental and Social Challenges

As indicated in the previous section, the major environmental, economic and social challenges in the three zones of the target landscape include:

- Overgrazing and land degradation due to a growing livestock population (relevant in Zones I, II and III).
- Deforestation due to tree felling for fodder, fuelwood and timber (relevant in Zones I, II and III).
- Competition over food resources of wild animals, mainly bamboo (used in roofing semi-permanent houses), which is a key food source for Red Panda (relevant for the lower part of Zone I)
- Frequent landslides, causing loss of rangeland, natural pasture and agriculture fields (relevant in Zones I, II and III).
- Flash floods, poor drainage systems and inadequate water management, resulting in loss of limited and valuable paddy and maize fields (relevant in Zones II and III, but more severe in Zone II).
- Forests fires during the dry (winter) season (relevant in Zone II and III).
- Farming on steep slopes with inadequate land management techniques, causing soil erosion, loss of soil fertility, and loss of productivity (relevant in Zones II and III, but more severe in Zone III).
- Degeneration of the unique traditional and cultural identity of the Brokpas due to rapid socioeconomic development and increased interaction with other communities (relevant in Zone I).
- Water scarcity and the drying up of water sources both for drinking and irrigation (particularly in Zone III).
- Human-wildlife conflict and destruction of crops by wild animals, causing significant economic harm to farmers (relevant in Zones II and III).
- Limited livelihood and income-generating opportunities (relevant in all zones).
- Narrow genetic base of agricultural crops, and loss of traditional crops and crop varieties (relevant in Zones II and III).

- Recurrent competition and conflict over forest and pasture resources (relevant in Zones I and II).
- Low public awareness and lack of adequate education on environmental conservation and proper waste management (relevant in Zones I, II and III).

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

To understand the current state of the landscape and to identify interventions to develop sound biodiversity management and sustainable livelihood activities, a landscape-wide Baseline Assessment using the COMDEKS resilience indicator set was conducted in August and September 2013. The assessment was organized and directed by the Centre for Climate Change and Spatial Information, a research unit of Sherubtse College in Kanglung.

Background information for the Baseline Assessment was provided by the Gamri Watershed Management Plan of 2009—a plan developed by the provincial government to address the environmental issues of the watershed. Although the plan was not implemented due to lack of resources, its data and analysis proved invaluable in understanding the characteristics and environmental problems of the Gamri target landscape, including major interventions required to address these problems.

The Baseline Assessment itself was carried out through a series of consultations with different stakeholders, as well as field visits throughout the entire landscape. During the meetings, resilience indicator scoring exercises, focus group discussions with key informants, and participatory resource appraisals were used to determine the state of the landscape and the issues faced by the community.

Bamboo check dams for erosion control at Pemochojay Ropta, COMDEKS Bhutan

Field visits were conducted in Phongmey, Radhi, Bidung, Shongphu, Merak and Sakteng and consultations were held at the respective gewog centers, with participants including local leaders (Gups, Mangmis, Tshogpas), community members, and staff members of the agriculture, forestry, and livestock extension services of the provincial government. More than 285 individuals were consulted throughout the course of the Baseline Assessment to help prepare the landscape strategy document in a participatory manner.

Landscape Strategy

The overall objective of the Landscape Strategy for Bhutan is to:

- "Restore and manage the landscapes of the Gamri watershed for sustainable socioeconomic development, enhanced resilience of ecosystems and wellbeing of the local population through cyclic and sustainable use of natural resources; recognition of the value and importance of local traditions and cultures; and building the capacity of local institutions and communities."

Table B-2 lists the four Landscape Outcomes around which the strategy is built to achieve its overall objective, as well as the performance indicators that will be used to measure these outcomes.

Table B-2. Landscape Outcomes and Indicators from the Bhutan Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: Degraded landscapes and ecosystems of the watershed are restored and sustainably managed for continued provision of ecosystem services.	• Area and types of landscape and ecosystems restored. • Number and area of ecosystems sustainably managed.
Outcome 2: Pressure on ecosystems, landscape and natural resources is reduced for enhanced sustainability and resilience.	• Trend in livestock population of the watershed. • Area brought under improved pasture and plantation. • Number of improved/energy-efficient options adopted.
Outcome 3: Alternative livelihood and income-generation opportunities are enhanced.	• Number and type of alternative livelihood and income-generation opportunities adopted. • Increase in household income as a result of supported activities.
Outcome 4: Knowledge management and capacity of community and landscape-level institutions are strengthened to enhance landscape and community resilience.	• Number of case studies and best practices documented and disseminated. • Number of institutions or community groups engaged in integrated landscape management that are established or strengthened. • Number and type of policies influenced at the local, landscape, and national levels.

Discussing a community-led project, Gamri watershed, COMDEKS Bhutan

Community-Led Landscape Projects

To guide the selection of local projects, the Landscape Strategy for the Gamri Watershed suggests a number of potential community-based activities to accomplish each Resilience Outcome:

Outcome 1: Degraded landscapes and ecosystems of the watershed are restored and sustainably managed for continued provision of ecosystem services:

- Restoration of degraded rangeland/natural pasture through replanting and development of vegetative buffers;
- Stabilization of landslide areas through sustainable land management practices and revegetation programs;
- Protection and sustainable management of water sources, including restoration of lakes and marshlands;
- Establishment of Community Forests (CF) and enhancing the effectiveness of existing CFs; and
- Conservation and sustainable use of traditional crops and crop varieties.

Outcome 2: Pressure on ecosystems, landscape and natural resources is reduced for enhanced sustainability and resilience:

- Reduction of livestock population through breed improvement and removal of low-productivity stock;
- Development of improved pasture and fodder tree replanting programs;
- Improvement of drainage systems and water management practices to protect crop lands and forests;
- Promotion of fuel-efficient heating and cooking stoves;

- Installation of alternative energy sources like solar energy, biogas, and microhydro;
- Promotion of sustainable land management practices on steeply sloped (over 50 degrees) agricultural fields;
- Adoption of measures to reduce human-wildlife conflict and crop depredations; and
- Adoption of measures to reduce the incidence of forest fires.

Outcome 3: Alternative livelihood and income-generation opportunities are enhanced:

- Product development and marketing of non-timber forest products;
- Establishment of private forests, orchards and organic vegetable production groups;
- Support for women's groups pursuing local farm enterprises and handicrafts development; and
- Strengthening of the market chain for local products.

Outcome 4: Knowledge management and capacity of community and landscape-level institutions are strengthened to enhance landscape and community resilience:

- Documentation of traditional knowledge and practices associated with landscape and natural resource management, including preservation of local traditions and culture;
- Documentation and dissemination of best practices and lessons learned;
- Sharing of knowledge and lessons through exchange visits;
- Formation of Water User Associations and capacity development around water management; and
- Capacity building on development of improved pasture, sustainable land management (SLM) and community resources management.

Yabrang Village in the Gamri watershed, COMDEKS Bhutan

Landscape Project Portfolio

Based on this guidance, eight local projects were selected as COMDEKS Bhutan's portfolio of landscape interventions in the Gamri watershed (see Table B-3). Each is led by a different community-based organization and financed by a grant of approximately US$31,000 to US$48,000. Each project has been assigned an approximate timeline for implementation, and results are measured and reported on a regular basis by project representatives.

Table B-3. COMDEKS Community-Led Projects in the Gamri Watershed, Bhutan

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Yenangla Water Catchment Rehabilitation and Forest Fire Management, Bartsham	Yenangla Water Catchment Protection Group US$31,250	Outcomes 1, 2, 4	Rehabilitates critical water sources and degraded land, while simultaneously building institutional capacities of farmers through workshops and training on sustainable practices. Protects seven community water sources, and implements sustainable land management practices in Ngatshang to mitigate erosion threatening Bartsham town. Protects agricultural lands by constructing causeways and retaining walls. Plants 4,000 trees to rehabilitate degraded lands.
Integrated Landscape Management at Yenangbrangsa	Yenangbrangsa Watershed Management Group US$32,630	Outcomes 1, 3, 4	Promotes sustainable watershed management as a deliberate means to protect the environment, reduce mass erosion and secure rural livelihoods of the communities on a more sustainable basis. Implements sustainable land management practices to increase agricultural productivity, and installs solar fencing to reduce human-wildlife conflict. In order to support alternative sources for income generation, the project supports women's groups in the production and sale of cornflakes (a common maize snack food).
NTFP Product Development and Sustainable Management of Wangphu Choeling Community Forest, Yabrang, Phongmey	Wangphu Choeling Community Forest Group US$46,500	Outcomes 1, 2, 3, 4	Enhances income generation by reviving local organic turmeric production and establishing a turmeric marketing group. A portion of the income generated from turmeric sales will be used to fund sustainable management of the Wangphu Choeling Community Forest.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Increasing Productivity and Rural Income Through Sustainable Agriculture Landscape Management, Phongmey	Thongrong Sazhing Tshogpa US$48,300	Outcomes 1, 2, 4	Improves land productivity by enhancing manure production of cattle. This will be achieved by overcoming the current fodder shortage for cattle, promoting stall-feeding, and improving pasture fertilization. Brings agricultural land under sustainable management by establishing hedgerows and stone bunds. Forms mustard oil production groups and an oil expeller-pressing unit In order to create alternative sources of income. Reduces human-wildlife conflict and improves agricultural production through solar fencing of agricultural land.
Development and Pilot Testing of Improved Cooking and Heating Stoves	Tarayana Foundation US$41,200	Outcomes 2, 4	Demonstrates the benefits of fuel-efficient biomass stoves, including user convenience, versatility, cost-effectiveness, reduced maintenance, reduced fire hazards, reduced indoor smoke and improved energy security. Designs and pilot tests advanced biomass stoves for specialized uses such as cooking for large groups and precooking animal fodder. Documents the findings on efficiency and adoption of biomass stoves and shares these findings with stakeholders.
Agricultural Landscape Protection and Management, Radhi, Tashigang	Sazhing Yuenten Tshogpa US$38,150	Outcomes 1, 2, 3	Improves livelihoods through crop diversification and healthy farming systems, reducing the pressure on natural resources. Protects over 150 ha of rice fields through establishment of causeways and conservation of local rice varieties. Restores heavily eroded land at Chuta Langnang and Dochepangthang and plants bamboo, Napier grass, fruit trees, and fodder trees in degraded areas throughout the project site. Establishes a community dairy group to support additional income generation.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Sustainable Management of Farmland and Livelihood Improvement Through Oilseed Production and Sale, Bidung	Saling Sazhing Zinchong Detshen US$47,500	Outcomes 1, 2, 3	Improves soil fertility and controls erosion through establishment of hedgerows along the contour lines of farmland, winter cropping and other sustainable land management practices. At the same time, conserves and protects water sources and catchment areas. Promotes oilseed production, extraction and marketing to improve livelihoods. Supplies three power tillers and paddy threshers to reduce drudgery and workload of women.
Protection of Sakteng Village from Land Erosion	Sakteng Sacha Zinchong Tshogpa US$44,500	Outcomes 2, 4	Protects Sakteng village from erosion, improves the safety of local people, and reduces the environmental impact from construction of log bridges. Facilitates the construction of 330 m of gabion walls at critical erosion sites, and protects grazing land and households in the village from river erosion and diversion, which threatens flooding of the village. Bridges to connect Sakteng village with Puesa as well as within Sakteng village contribute to inhabitants' safety and productivity.

Ex-Post Baseline Assessment in the Gamri watershed, COMDEKS Bhutan

Achievements and Impacts to Date

- **Protecting water sources and establishing water user groups:** Depleted spring water sources are a growing concern in the Gamri watershed. To address this, communities have been trained in spring-shed management, and have subsequently protected 52 water sources (15 through COMDEKS funding and 37 using regular SGP co-financing) that supply drinking water to some 20,000 Gamri residents. Initial protection has been accomplished through fencing and tree-planting around the springs, while long-term protection has been promoted through the formation of 27 water user groups throughout the watershed, each of which is governed by bylaws restricting the cutting of trees and overharvesting of resources near the water sources. The water user groups are also responsible for annual maintenance of the water sources. Securing water sources in this way will mitigate water conflicts in the area and improve access to water for drinking and irrigation.

- **Promoting sustainable land management and rehabilitating degraded areas:** Land degradation, which is increasingly common in the Gamri watershed, is one of the root causes of declining agricultural productivity in the region. To combat this, 78 ha of farmland in three communities were brought under sustainable land management by planting hedgerows and installing stone bunds to prevent erosion. In addition, a total of 6,500 trees, 300 bamboos, 15,000 Napier grass clumps, 300 fruit trees, and 250 fodder trees have been planted to rehabilitate degraded areas throughout the watershed.

- **Mitigating human-wildlife conflicts:** The installation of solar fencing around 123 ha of crop lands in five communities has reduced crop losses from wildlife by approximately 80 percent and raised overall agricultural productivity. Before this project, wildlife damage—mostly from deer and boar—affected over 50 percent of crops and was a major threat to food security, farm income, and agricultural biodiversity.

- **Protecting rice paddy and conserving local rice varieties:** Through the construction of walls and causeways, 150 ha of valuable rice paddy in Zone II have been protected from flash floods, erosion, and landslides. This has not only increased rice production in the area by 15 percent, but has helped to safeguard and conserve the valuable local rice varieties Sung Sung and Sobrang, which are known for their aroma and taste, and command a premium price.

- **Introducing alternative income opportunities:** Alternative sources of income have been developed in several parts of the landscape. In Saling and Thongrong, 140 families now cultivate mustard and process mustard oil for local use and outside sales. The oil is processed through a newly formed producer group using jointly owned expeller presses. Similarly, some 130 families in Yabrang now cultivate turmeric for the production of powdered turmeric. Production of cornflakes—commonly used as food for religious offerings and snacks—has also been promoted, and a dairy producers group has been established. To ensure gender equality at all times, these livelihood efforts have emphasized participation of women during the planning process.

- **Documenting traditional knowledge:** Local traditional knowledge and practices associated with landscape and natural resource management have been an important influence in most of the COMDEKS projects. This knowledge has been recorded and embedded in local by-laws, particularly concerning the tree and plant species to use for reforestation and revegetation efforts. A short documentary has also been produced capturing the rich culture and traditions of Sakteng village.

- **Upgrading shelter and heat sources for herders:** Shelter and living conditions of 95 herders have been improved through the supply of modern building materials and the provision of improved heating and cooking stoves. This has drastically reduced herders' dependence on bamboo for shelter construction and reduced their fuel wood use significantly.

- **Installing protective structures to prevent village and farmland damage:** Over 330 m of gabion wall now protect Sakteng village and its farmlands and pastures from river erosion and diversion, which has damaged village structures and destroyed agricultural fields in the past. In addition, the construction of three semi-permanent bridges has improved safety and ease of passage of community members across the river.

Progress at the Landscape Level

While it is early in the life of the Gamri Watershed Landscape Strategy, there is evidence that a strong working relationship among the CBOs leading local projects and the representatives of local government and District technical staff is developing. The government agencies have been very supportive of the COMDEKS Programme and its goals and Landscape Strategy, and have provided full administrative and technical support to the different community-led projects. The strength of this support will undoubtedly aid in fostering the gradual formation of a landscape community in which local communities and government share a similar commitment to sustainable landscape governance. As a first step in this direction, a total of four landscape-wide meetings attended by all project leaders and local and District government representatives have been held so far to share experiences and lessons learned.

Lessons Learned

- Increasing livestock populations and degradation of rangelands is a root cause of many of the environmental problems in the Gamri watershed. Grazing lands are overexploited, in most cases without rest periods for regeneration. Consequently, almost all grazing land experiences landslides, gully formation, encroachment of non-palatable vegetation. While the sustainable land management work in the watershed is helping to mitigate some of the land degradation, there is still an urgent need to initiate a breed improvement program to reduce the cattle population and improve grazing resources.
- Another major cause of the erosion of agricultural land is the poor drainage system associated with farm roads. Investment to upgrade this drainage system will be necessary to protect valuable farmland and the health of the surrounding environment.
- Drying up of water sources, both for drinking and irrigation, is a growing concern of the landscape and country at large. COMDEKS projects have been instrumental in protecting water sources in the Gamri watershed, but there is need to conduct a detailed study on the topography of various community drinking and irrigation water sources, in order to understand recharge behavior, and to provide baseline information for a large-scale spring water rehabilitation program.
- COMDEKS projects have supported access to improved heating and cook stoves to reduce heavy dependence on fuel wood and reduce CO_2 emissions. Reliance on fuel wood for heating, brewing of local alcohol, fodder cooking, and cooking for public festivals and other large social functions remains very high. Thus, there is still a considerable need for further research and improvement of cook stoves.
- During the first year after the planting of hedgerows in the land management sites, stray cattle have been a problem, since they feed on the hedgerow grass slips. Group by-laws that have been developed and implemented at various project sites to control stray cattle have shown promise in addressing this problem.
- Low literacy rates of CBOs are a challenge in project implementation, report writing and knowledge sharing. To overcome this difficulty, GEF-SGP/COMDEKS and CBOs developed a productive partnership with local agriculture, livestock, and forest extension personnel in which extension staff have helped local CBOs to draft project proposals, and carry out competent record-keeping and reporting.
- There is a limited number of NGOs and CBOs in the target landscape, restricting the pool of local groups that can undertake landscape projects. Consequently, there is a continuing need to promote community-based groups and further strengthen their capacities.

CAMEROON
THE BOGO LANDSCAPE

1. The Landscape

Geography

The target landscape for COMDEKS activities in Cameroon is the Bogo area, a district of 93,000 ha with a population of 95,230. Located at the northernmost tip of the country, the landscape encompasses the Sahelian zone of the Lake Chad Basin and the western foothills of the Mandara Mountains. The Mayo Tsanaga river crosses the length of the Bogo landscape, which consists of a large plain dotted with hills in the southwest and northwest districts.

The landscape of Bogo is characterized by a Sahelian climate with low rainfall (500-700 mm), high temperatures (28-35°C) and low humidity. The Bogo area is endowed with diverse natural resources and agricultural systems due

to its rich alluvial soils (despite the Sahelian climate) and a cultural system conducive to tourism, which provides a solid foundation for economic activities and sustainable development.

Biological Resources and Land use

Bogo is a mosaic of picturesque landscapes, combining rolling hills, natural reforested areas, meadows, wetlands, ponds, small agroforestry plantations of mango and guava trees, as well as rural farmlands, pastures for livestock, nomadic pastoralism, and urban areas. The ability of the region's alluvial soils to retain water during the dry seasons explains the abundance and diversity of plant and animal species, including cattle, sheep, goats, donkeys, horses, warthogs, and hyenas. The area's rich birdlife includes egrets and African cormorants and is a potential draw for ecotourists.

In the Mayo Tsanaga river plain, local fish species include catfish, tilapia, eel and carp, which are sold and consumed locally. As for local agriculture, people raise and consume a variety of cereals, such as sorghum, mouskwari, sesame, finger millet, maize, and rice. The economic welfare of Bogo is determined by highly variable and unpredictable rainfall patterns that characterize Sahelian climatology. The production of food and cotton (the major local cash crop and source of income), local pastoralism, and artisanal fishing all rely on the soil/water circulation pattern maintained by the system of perennial and ephemeral rivers (known as Mayos locally).

The Bogo population depends to a significant extent on resources collected from the local environment. For example, species such as the Baobab (Adansonia digitata), Neem (Achzadirata indica) and Acacia (Acacia faidherbia) are used as firewood, building material for canoes, and as part of traditional medicine. In addition, the deeply ingrained cultural beliefs of inhabitants of this region have guided the conservation of biodiversity and the protection of sensitive ecological zones.

Socioeconomic Context

The Bogo target area population comprises groups such as the Mousgoum, Moundang, Massa, Toupouri, Kotoko, Mbororos and Fulani. Only 22 percent of the population lives in urban areas, with the remaining population spread throughout rural communities in the region. Agriculture, livestock rearing, and artisanal hunting and fishing are the primary economic activities of the region, and several products, including cassava, sweet potatoes, millet, livestock, and fish, are sold locally at low prices. Agriculture is practiced on clay and alluvial soils, sandy soils or loam soils. Infertile soils are abundant as well, and often used for pasture. Farmer-grazer conflicts are common, with the main source of tension being crop destruction as livestock cross croplands to reach nearby grazing areas or watering holes.

More than half of the population lives below the national poverty line of US$1.30/day per adult, with average annual household incomes in the range of US$150-300. Local markets are not well integrated with urban markets and most economic activity is on a small scale, occurring outside the formal sector. Indeed, only 2 percent of household revenues are generated in the formal sector. Despite the region's rich endowment of natural resources, local people are profoundly affected by the decline in agricultural productivity stemming from soil degradation and increased climate variability. In addition to this vulnerability, low levels of human development (63 percent of the populace are illiterate, and only 16 percent have education equivalent to secondary school or higher) create further setbacks for local communities.

2. Key Environmental and Social Challenges

A circular relationship between poverty and environmental degradation characterises the Bogo landscape, with the principal environmental and social vulnerabilities in the target landscape being:

- **Food insecurity linked to climate variability and soil degradation.** The low rainfall distribution has been coupled with an intensification of droughts over the past three decades. The sudden occurrence of these droughts causes crusting of soil surfaces and decreased soil fertility. During the rainy season, the sediment loads of rivers erode river banks, and destroy the quality of soil and surface water. In addition, the natural vegetation has disappeared from most cantons of Bogo and surface crusting due to old bushfires and expansion of pastures has further degraded soil quality. In conjunction with worsened climate conditions, this reduces the diversity of flora and fauna in the region and lowers agricultural productivity, leading to food insecurity.

- **Unsustainable agriculture and forestry practices.** Many factors have contributed to landscape destruction, soil erosion, and reduced agricultural yields. These include deforestation for the expansion of cultivated areas and fuel wood harvesting, exacerbated by population growth; lack of management plans for water systems and grassland ecosystems; ignorance of the importance of ecosystems; lack of training in sustainable agricultural practices; and lack of sustainable livelihood alternatives (including access to credit). Data from the Baseline Study show that chemical fertilizers given to people for cotton production are diverted to subsistence farming, and artisanal fishing remains active in streams that dry up quickly because the banks are not forested.

- **Health problems.** Various health issues stem from the lack of clean drinking water, drought, and the occurrence of extreme weather events. In the dry season, there are water shortages and wells do not always provide good water quality. Frequent flooding in the rainy season exacerbates the spread of waterborne diseases such as cholera and parasitic infections, while warm temperatures allow the spread of climate-sensitive diseases, such as malaria, meningitis, and measles. As a consequence, mortality rates in the region are high among infants, children, women and the elderly, with malaria deaths alone exceeding 300 per year.

Transporting goods and farm produce to the Bogo Market, COMDEKS Cameroon

- **Weak administrative and institutional capacity to support conservation and production.** Despite various ecological problems in the Bogo region, there are no explicit protection and management strategies for this landscape, although this landscape's resources are highly valued and well understood in oral history tradition. Systems of governance to regulate the use of land for agriculture, biodiversity conservation, and environmental safety do not exist. In addition, there is little support to enable residents to improve their livelihoods, such as access to credit and capacity development for women.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

A landscape-wide Baseline Assessment was conducted in September and October 2013, based on community consultations in 8 out of 12 counties (called "cantons") of Bogo. The assessment was organized and the consultations led by Global Mapping and Environmental Monitoring, a national NGO based in Yaoundé, Cameroon, that promotes environmental sustainability through local action and inclusive participation. A total of 330 people (including 214 men and 116 women, with an average of 28-40 people per district) scored the SEPL Resilience Indicator set to assess landscape conditions and trends.

Consultation and participatory evaluations were conducted in compliance with social conventions of the region, holding separate workshops for men and women simultaneously in each canton. This process not only increased the participation of women in the planning process but also in the implementation of the strategy. Afterwards, focus group meetings were held with each Lawan (traditional authority in charge of a community) and Djaouros (neighborhood leader) to discuss the problems and challenges specific to the township, and to determine any need to adjust the SEPLS indicator scores based on observations and experiences of the community leaders. Finally, participatory mapping sessions were held with community members.

The findings of the consultation process were then validated during a community hearing attended by more than 200 participants, involving all 12 canton representatives (women, men and youth), including local authorities (Lamido, or chiefs), as well as local government authorities (the mayor and the subdivisional officer for Bogo). Based on the community consultations conducted during the baseline assessment, a baseline report and a Landscape Strategy were developed. The draft Landscape Strategy, along with a participatory map of the Bogo landscape, were presented to local community representatives and traditional authorities during a stakeholder workshop. The draft strategy was then amended based on comments and observations made by the local community representatives.

Landscape Strategy

The baseline assessment and community consultation process led to the development of a COMDEKS Country Programme Landscape Strategy for Cameroon, a comprehensive document that, based on priorities identified by landscape stakeholders, outlines the landscape profile, expected goals and outcomes, as well as key measures and strategies for community-based actions.

- **The Bogo Landscape Strategy vision:** "Improve the resilience of the socio-ecological production landscape through community-based initiatives."

To define this vision, the Landscape Strategy is built on four interrelated outcomes meant to increase landscape resilience in four critical areas. Table C-1 lists these landscape outcomes for the Bogo Region, along with the performance indicators that will be used to assess the extent to which these outcomes have been achieved.

Table C-1. Landscape Outcomes and Indicators from the Cameroon Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: Improved protection of ecosystems (wildlife habitat, water pools, hydro systems and watersheds) through better management of land and water (water and soil conservation), mitigating and reversing the processes of erosion and desertification.	• Surface area of natural ecosystems revitalized and restored. • Improved water retention: volume of water retained due to improved ecosystem management practices, such as forest restoration and erosion combatting activities.
Outcome 2: Strengthened agricultural and pastoral production systems with increased agrobiodiversity and landscape resilience through the promotion of sustainable agricultural practices.	• Area (in ha) on which sustainable practices (e.g. quick set hedges and agroforestry) are applied. • Number and types of traditional varieties of plants and animals adapted to drought that are used in local agricultural and pastoral systems.
Outcome 3: Improvement of the livelihoods and well-being of communities through the development of sustainable income-generating activities based on local resources.	• Increase in household incomes and household production. • Number and type of alternative sources of income created through diversification of livelihoods.
Outcome 4: Strengthened institutional capacity at the landscape level, including integrated participation of stakeholders in decision making, as well as the establishment of local organizations focused on the reduction of diseases endemic to the region.	• Number of institutions (participatory governance mechanisms covering more than one community) created or strengthened by engagement in integrated landscape management. • Number of associations established for women and young people. • Number and types of relevant plans and decisions for the landscape target agreed and implemented. • Number of community members and women participating in decision-making.

Community-Led Landscape Projects

Based on the feedback from the community consultation process, the Landscape Strategy for Cameroon prioritized the following activities and interventions that together would contribute to the Strategy's specified Resilience Outcomes:

Outcome 1: Improved protection of ecosystems (wildlife habitat, water pools, hydro systems and watersheds) through better management of land and water (water and soil conservation), mitigating and reversing the processes of erosion and desertification:

- Restoring and protecting wetlands and watersheds and their associated ecosystem services;

Vegetable trader at the Bogo Market, COMDEKS Cameroon

- Managing water and water systems more effectively, and enhancing soil water retention and water conservation through appropriate infrastructure, such as water harvesting structures (digging individual wells, rainwater collection, and constructing entrapment areas to collect and use groundwater for small-scale irrigation).

Outcome 2: Strengthened agricultural and pastoral production systems with increased agrobiodiversity and landscape resilience through the promotion of sustainable agricultural practices:

- Supporting the diversification of agricultural landscapes through agroforestry and tree management on farms;
- Promoting diversification of production systems through the use of increased crop varieties, mixed farming, and multiple stages to restore soil and safeguard the integrity of the landscape;
- Promoting farming techniques with low inputs, creation of nurseries (with native and selected exotic species), installation of hedges around fields to protect crops against soil erosion, and use of crop varieties that can produce outside of the rainy season;
- Developing small-scale irrigation systems.

Outcome 3: Improvement of the livelihoods and well-being of communities through the development of sustainable income-generating activities based on local resources:

- Developing community agrobiodiversity initiatives such as seed banks of improved cereal varieties for livestock feed (e.g. wheat, bran, peanut and cottonseed);
- Processing of local foods—for example, local manufacture of cassava flour and tapioca from locally produced cassava tubers;

- Promoting innovations in processing of local milk production for cheese and "kossam" (a fermented milk-based beverage from northern Cameroon with great symbolic and social value for the local population).

Outcome 4: Strengthened institutional capacity at the landscape level, including integrated participation of stakeholders in decision making, as well as the establishment of structures focused on the reduction of diseases endemic to the region:

- Promoting the integration of all stakeholders in decision-making on the landscape, especially women and youth;
- Training at the community level focused on the management of local natural resources;
- Creating revolving funds to finance sustainable alternative livelihoods for women;
- Developing and promoting traditional medicine from local plants, such as Neem, whose leaves and seeds can be used in the treatment of malaria, amoebas, worms, and other ailments.

Landscape Project Portfolio

With these guidelines in mind, seven local projects were selected for Cameroon's portfolio of COMDEKS landscape interventions in the Bogo region (see Table C-2). The projects are spread among several communities within the target landscape, and each focuses on improving resilience of the area's natural resources and communities.

Women of Moungoussi during community consultations, COMDEKS Cameroon

Table C-2. COMDEKS Community-Led Projects in Bogo, Cameroon

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Improved Management of Woodlands by Exploiting Local Plant Detritus for Biofuel Production for Households by Local Women of Bogo	Association Horizon Info (AHI) US$32,340	Outcomes 1, 2, 4	Develop and produce biofuels from agricultural waste to reduce the demand for fuel wood, which has substantially driven deforestation and loss of vegetation in Bogo. Raise the awareness of local communities on the environmental effects of the use of fossil fuels, charcoal and fuel wood. Train and empower women, youth and men in production of biofuels from agricultural (corn, millet, groundnuts) and household waste as well as in producing improved stoves that use the new biofuel. Create and strengthen a women's cooperative and establish a women-managed biofuel processing unit. Local manufacture of biofuel production equipment will further increase incomes of local communities.
Conservation of Biodiversity and Drilling of Boreholes Equipped With Solar Powered Pumps in Three Villages in Bogo	MBOSCUDA Women's Social and Welfare Committee (MBOSCUDA) US$41,484	Outcome 1, 2, 3, 4	Drill boreholes in three villages for provision of clean water and sanitation, using solar-powered pumps to ease water collection and simplify maintenance. Empower women through implementation of adult literacy programs. Construct drinking points for livestock to reduce conflicts between humans and animals at water points. Increase incomes and improve livelihoods by training community members in new agricultural practices, such as use of drought-tolerant crops (onions, moringa, etc.) and post-harvest processing techniques. Establish a Women-led Sustainable Development fund to help support income-generating activities for local women.

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Protection of Ecosystems and Biodiversity Conservation in the Communities of Tchabawol and Djiddel	Ifriqia the Root US$28,192	Outcomes 1, 2, 3, 4	Rehabilitate two water ponds to facilitate easier water collection for the local community and to provide water for vegetable crops, fruit cultivation, and livestock, thereby diversifying income-generating activities. Reforest the community perimeter and reintroduce specific plant species usually found in the Sahel region (such as agave and aloe) to restore wetlands and increase their ability to recharge groundwater.
Rehabilitation and Management of the "Moussi" Pond of Moungoussi for Improving the Livelihood of the Communities of Saoudjo, Balda and Bogo Center	Organisation for Rural Development Integration (ODRI) US$31,842	Outcomes 1, 2, 3, 4	Rehabilitate the Moussi pond to provide water for local people and their livestock as well as for cultivation of vegetables. Improving water conservation and local governance of water resources will improve the community's access to clean water. Training in plant cultivation and reforestation initiatives will improve the ecosystem's ability to recharge ground water. The project further supports income-generating activities, particularly for vulnerable groups in the local community, such as women and youth.
Resilience to Climate Change, Integrated Sustainable Management of Natural Resources, and Social Inclusion in the Communities of Bagalaf, Ouro-Messeré, Tankirou and Dambai	Cellule D'appui au Developpement Local Participatif Integre (CADEPI) US$32,167	Outcomes 1, 2, 3, 4	Promote agroforestry to diversify household livelihood options. Provide training in the manufacturing of improved cookstoves. Promote the adoption of biogas technology as a domestic energy source and the use of bio slurry as a fertilizer to improve agricultural productivity and reduce the use of chemical fertilizers. Establish demonstration plots and onion production farms led by women to develop local women's capacities and generate additional income.

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Promotion of Soil Conservation Techniques and Empowerment of Vulnerable Groups (Women and Youth) of Borey Communities, Bogo	Cellule de Formation et D'appui Aux Initiatives de Developpement (CFAID) US$31,960	Outcomes 1, 2, 3, 4	Promote soil conservation techniques, implement soil and water conservation measures, and strengthen the capacity of vulnerable groups (particularly women and youth) to obtain access to resources. The project builds the capacity of community members in rehabilitation of degraded land and improved agricultural techniques, while promoting the use of traditional knowledge of medicinal plants (traditional pharmacopeia) and improving stakeholder engagement in local environmental governance and decision-making.
Support for Community-Based Natural Resource Management and Participatory Development for the Communities of Balda and Tchabawol	Cameroon Association For Environmental Education (ACEEN) US$32,021	Outcomes 1, 2, 3, 4	Establish guidelines and regulations for sustainable natural resource management. Support organizations that lobby and advocate for joint management, capacity and skill-building, and logistics support. Facilitate communication among stakeholders about natural resource utilization, and improve stakeholder engagement. Build capacities of community leaders and local authorities in management of conflicts.

Demonstrating to primary school students the importance of planting trees, COMDEKS Cameroon

Irrigation canals for better water management and improved production, COMDEKS Cameroon

Impacts and Achievements to Date

- **Raising local environmental awareness:** Awareness raising and environmental sensitization initiatives have been carried out in eight communities and attended by at least 500 local community members. Topics of the workshops have included issues of climate change, natural resource management, soil and water conservation techniques to prevent soil erosion, the use of drought-resistant plant and animal species, post-harvest conservation techniques, and organic agriculture, among others.

- **Improving access to water:** To improve drinking water access and quality, solar-powered boreholes were constructed in several communities to pump water from underground and lift it to an elevated storage reservoir. Water taps were then installed for community members, while drinking water points were established for livestock. The establishment of water points for livestock and boreholes for domestic consumption, as well as improved water conservation through the cleaning of water ponds, has reduced conflicts over water and improved drinking water quality. Increased water availability in the dry season has also made it possible to practice off-season agriculture of local vegetable varieties as an income-generation activity for women and youth. The fact that borehole pumps and filtering systems are solar energy-powered ensures their sustained use in the future. In addition, a multi-stakeholder water management committee has been established to attend to the maintenance and management of the new water systems. The elected seven-member committee is made up of three women, three men and a youth. It has been trained in water management, purification, hygiene, and maintenance of water systems in case of damage, and has conducted community trainings to pass on this knowledge to other community members. Overall, this water access project has had such a positive impact on community livelihoods that the government is now promoting its upscaling and replication in other dryland areas of northern Cameroon.

- **Promoting sustainable crop and fruit cultivation:** Community nurseries have been established for the production of fruit tree seedlings that will increase community fruit production and sources of income. The planting of 1,500 fruit trees (including mangoes) and other local drought-tolerant species in the target landscape has helped to restore local vegetation and improve the microclimate. Training on agroforestry techniques and improved agricultural practices has caused farmers to rethink their practices and has resulted in more than 350 community members converting to more sustainable agricultural methods, including use of animal dung and kitchen waste for fertilization. Community members are now convinced that high yields can be obtained using organic manure.

- **Manufacturing biofuels, reducing woodfuel use, and empowering women:** A biofuel production unit has been established, managed by local women. At the facility, more than 120 women have been trained in the production of biofuel pellets using agricultural waste. Men function as technicians and take care of tasks requiring physical strength. In addition, women manufacture improved cooking stoves capable of burning the biofuel pellets. The stoves are made from local materials. More than 100 of these energy-efficient stoves have been distributed to households, helping them reduce their use of wood fuels. Other sources of sustainable energy such as biogas have also been promoted locally. Similar to stove manufacturing, community members have been trained in the construction of biodigesters. The bio-slurry that these digesters produce is now used as manure for the cultivation of vegetables.

- **Restoring forests and degraded lands:** More than 1,300 fruit trees and nitrogen-fixing trees have been produced and planted by farmers as part of their reforestation efforts. Community members have also been trained in soil and water conservation measures to rehabilitate degraded land. This work has resulted in the restoration of 20 ha of degraded land to active agriculture. In addition, six villages have agreed to form a community forest of about 3,962 ha and to employ sustainable natural resource management practices there. These communities are now going through the process of applying for legal recognition of this community forest by the Ministry of Forest and Wildlife. When its legal status is secured, it is expected that the community will be better empowered to initiate and implement forest conservation activities to ensure equitable and sustainable benefits from the forest for the entire community.

- **Introducing climate change-resistant crop varieties:** About 100 women, 50 men, and 50 youths have received training in the cultivation of two new onion varieties that are resistant to climate change effects. Training has also been conducted on the construction of improved racks for drying and conserving onions. Other climate change-resistant crops have also been introduced into local agriculture, including new varieties of sorghum, beans, okra, moringas, and folere. COMDEKS activities have been instrumental in increasing agricultural yields for some key crops. For example, sorghum production has increased almost 80 percent, and onion production has risen 60 percent.

- **Providing access to finance and improving basic literacy:** A revolving fund was established for community groups to improve their standard of living by providing them financing for sustainable income-generating activities. Through the loans made by the revolving fund, women have been economically empowered to establish small enterprises. The income obtained has allowed the women involved to contribute to their families' health and education expenses. Adult literacy programs have also added to the empowerment of women and youth and have been important in helping women to legally register their Common Initiative Groups (CIG), which are local organizations formed to pursue a business or community activity.

- **Improving stakeholder engagement in environmental governance:** COMDEKS activities in Bogo prompted the creation of new community advisory groups to give local people a direct voice in environmental management. In many communities, Environment Committees (including youth and women) have been established and trained in forestry law, techniques of rural organizing and environmental education (to support schools interested in environmental education). Similarly, in villages with existing Community Development

Committees, these groups were strengthened by creating subcommittees directed toward natural resources management. In the case of some COMDEKS community projects, local people established a Management Committee that included men, women and youth of the affected community to ensure community ownership of the project by providing oversight and allowing direct input into the project management by community members.

Progress at the Landscape Level

Communities in the Bogo landscape have begun to develop a greater awareness of and involvement in environmental governance. This is evident in the establishment of environment committees and project management committees to allow community members an avenue to weigh in on local environmental management decisions at the village level. At the same time, collaboration among six villages to establish a community forest and agree on by-laws for forest management shows the beginning of a concern for environmental governance beyond the village level. Similarly, the establishment of a seven-member committee to oversee water access projects shows awareness of the connectivity between landscape projects. Also, there has been wide participation by and support of the COMDEKS landscape activities by both traditional authorities and government institutions. Some 70 traditional authorities (including the Paramount Chief and County Chiefs) are directly involved in landscape activities, as well as the local mayor and local council members, and representatives of the Ministry of Agriculture and Rural Development, the Ministry of Forests and Wildlife, and the Ministry of Women and Family Affairs. While these are hopeful signs of the development of a landscape ethic in the Bogo region, no landscape-wide group or forum has yet been officially established to share landscape concerns or project experiences on a regular basis.

Lessons Learned

- During the Baseline Assessment, the questions and the descriptions in the Resilience Indicator set were not always readily understandable to the Assessment participants. Thus, workshop leaders and community hearings to provide local examples were crucial to guide understanding and ownership of these ideas and concepts by people participating in the Assessment. In addition, the local language was used for the duration of the workshops and community consultations.

- Use of the Resilience Indicators in the Baseline Assessment has influenced the way people perceive women's capacities with regard to the use and management of natural resources, and has helped them embrace a less limited role for women. After interpretation of results from the Baseline Assessment, women desired support for their greater involvement and empowerment in community revitalization efforts—for example, women wanted to help in the management of agricultural techniques, in literacy efforts, and in the creation of community governance systems for sustainable development. Today, landscape communities are ready to accept women's skills, as well as other innovations they might have resisted before, such as the introduction of new crops (e.g. soybeans, moringa, and vegetable crops), and the establishment of hedgerows around crops and water points.

- Using local experiences, stories related to life among communities and examples from other regions, it was possible to alter the perception of various stakeholders and even the importance they assign to various efforts. For example, more people now view reforestation as crucial to the region along with the issue of improving food granaries.

- The notion of "sacred" has some influence on landscape conservation in Africa. So it would be better to use the term "sacred areas" in the Baseline Assessment, as that is more culturally accepted than the institutional and political connotations of "protected areas."

- In community mobilization efforts, it is important that people are well informed and made aware of the scope and interest of a project. They are then willing to make the necessary sacrifices. However, in this region the mobilization must be led by the district chief or Lawan in order to comply with the accepted hierarchy of local authorities.
- The ownership shown by the community for projects they are involved in from the design to implementation is a key to success. Local community members and leaders widely expressed their interest in ownership of COMDEKS projects. To create this sense of local ownership of projects for the preservation of biodiversity and the spread of sustainable production techniques, inclusion of traditional cultural knowledge and experiences is essential. For example, soil and water conservation measures incorporating traditional knowledge of community elders have been effective as a landscape restoration approach, involving different community groups in the implementation process.
- Community consultations during the Baseline Assessment were held separately for men and women, as some men do not express their views in the presence of women and vice versa. However, the synchronization session or community hearing bringing together men, women and youth was very illustrative. Indeed, the ability to bring together men, women, youth, elderly and traditional leaders to exchange calmly on topics of community interest facilitates understanding within and between generations and solidifies community ownership of the subject under discussion and the resulting projects. Although men will readily participate in the implementation of COMDEKS projects, membership for women requires active support and empowerment in a society where women have long been marginalized. It is also important that most projects involving women are led by women.
- Security issues can be a serious impediment to community-led projects. In the Bogo area, insecurity created by recurrent attacks from the insurgent group Boko Haram has led the local government to prohibit gatherings and meetings, which has slowed implementation of landscape project activities.
- Increasing the number of CBOs in the Bogo landscape would allow the SGP/COMDEKS country team to more efficiently implement COMDEKS in Cameroon, including launching the community projects and organizing a training workshop for the grantees, as well as conducting the M&E and final evaluation of each community project.

Traditional authorities attend a COMDEKS workshop in Bogo, COMDEKS Cameroon

COSTA RICA
JESÚS MARÍA RIVER BASIN

1. The Landscape

Geography

The target landscape selected as the focus of COMDEKS activities in Costa Rica is the Jesús María River Basin, located in the country's Pacific region. Spanning 35,280 ha, the region is a diverse landscape comprised of forests, coffee and fruit trees, mangroves, pastures, plantations, water bodies, and urban areas.

The Jesús María River Basin consists of several sub-basins, including the Paires, Jesús María, Surubres, Machuca, and the Cuarros Rivers, whose headwaters are located between 1,000 and 1,440 m above sea level in the Constancia, Pelón, Berlin and Aguacate hills. Except for the Cuarros, these rivers converge in the flat lands of the Labrador in the lower part of the watershed between 80 and 120 m above sea level. The entire basin drains into the Pacific Ocean in

the Tivives wetland (a Wildlife Protected Area, WPA), with its mangrove and estuarine system. Tivives is a wetland of great importance because it retains a variety of mangrove species, including the Red Mangrove (Rhizophora mangle); helps trap sediment transported by the rivers from the highlands; and regulates the entry of seawater. Moreover, it is a critical breeding ground for marine life, and is the basis for the livelihoods of artisanal fishers in the Gulf of Nicoya.

Biological Resources and Land Use

The Jesús María River Basin is divided into three topographic zones covering different altitudes. The upper basin, between 440 and 1,440 m, makes up 19 percent of the total basin; the middle basin, between 220 and 440 m, makes up 24 percent; and the lower basin, which extends from 0 to 220 m, covers 57 percent of the basin.

Upper Basin: The primary production activities in this landscape are coffee production and small-scale livestock breeding on the area's pasturelands. The secondary activities are cultivation of corn, vegetables and ornamental plants. Approximately 3,000 ha of forest shade coffee are grown in this area, with some farms on fertile volcanic soils and others on degraded soils more prone to landslides. Land ownership in the area is characterized by small coffee farms of 2-5 ha in the hands of about 500 families. However, there are also some larger livestock farms for chickens, pigs and dairy cattle. This basin is the closest to the Central Valley and the nation's capital city of San Jose.

Middle basin: This zone is characterized by extensive jaragua pastures (used for cattle rearing on large farms), palms and trees in pastures, forest fragments in the central area (Cerro Surubres), river gallery forests, and about 4,000 ha of sugar cane and fruits such as mango, avocado, sapote and, to a lesser extent, citrus, acerola (malpighia), cashews and tamarind in the transept between Desamparados of San Mateo and Nances of Esparza. Large chicken and pig farms of 50-200 ha each, typically owned by farmers who do not live in the region, also appear in the Paires sub-basin.

Lower Basin: Prevalent in this area are plantations of cucurbits (melon and watermelon), sugar cane, rice, papaya, pepper and tomato, as well as improved pasture for dairy and beef cattle, forest plantations and fruit trees. Various industrial plants are also found along the road corridor between Ceiba and Salinas (Route 27). The city of San Mateo and part of the city of Orotina are located in this lower basin, including various real estate developments for vacation homes of urban residents on lands that were part of a previous agrarian reform. There are also large livestock farms and agro-industrial production sites owned by large estates, which coexist with old plots dating from the agrarian reform process.

Although originally a productive landscape rich in biodiversity, the Jesús María River Basin has lost the majority of its forest cover due to agrarian producers clearing the riparian forest so that they could farm up to the river banks—a practice prohibited by national law. This deforestation, exacerbated by poor road design and insufficient vegetative cover, is leading to greater erosion. It is also causing acceleration of river currents and flooding, where river levels rise rapidly during heavy rains, and water flow is neither slowed nor controlled by the riparian forest. The watershed is also experiencing declines in biodiversity, agricultural productivity, and water availability. Fresh water scarcity during the dry season and unsustainable agricultural practices are putting increasing pressure on both the environment and local communities.

Approximately 30 percent of the target landscape is covered by forests, which are mostly composed of secondary forest, teak plantations, and coffee and fruit trees. Apart from approximately 150 ha of mangrove forest at the mouth of the Jesús María River, no natural or primary forests remain throughout the watershed. Another 40 percent of the land comprises pastures and thickets, and the remaining 30 percent is urban areas and melon plantations.

Loss of natural forest cover impairs the Jesús María river basin, COMDEKS Costa Rica

The upper basin of the target landscape consists mostly of small coffee plantations, where communities jointly organize their coffee production. This creates a diverse ecosystem of coffee trees, citrus, and trees planted for lumber, as well as pasturing of pigs and chickens. In the middle basin, fruits grown include mango, avocado, and sapote. This portion of the landscape is also home to various birds and small mammals, which coexist within the context of the commercial fruit production. The lower region stands out for the unique estuary and mangrove ecosystem, the majority of which has been razed in recent years. Due to deforestation, the area is facing increasing degradation, as well as pressure from reductions in freshwater availability.

Throughout the basin, the loss of natural forest cover has left the landscape highly fragmented. Consequently, biodiversity loss has been substantial. Only small relicts of primary forest remain in the galleries of the main rivers and mangroves. The remaining forest cover comprises heavily managed and fragmented secondary forests, located in the upper reaches of the hills, with poor connectivity between these secondary forest fragments. Shade coffee, fruit trees and planted teak forests are also important elements of the remaining forest cover.

Socioeconomic Context

The target landscape area occupies 14 separate diffusely populated districts within San Ramon, San Mateo, Esparza, Heredia, and Garabito counties. The region is characterized by high levels of interagency cooperation and coordination through a wide array of social groups, community farms and coops, and even various local sports teams, which collectively create a strong sense of community and empowerment on a local level. Furthermore, human development levels are considered moderate to high, so extreme poverty and food insecurity are not problems in the region. The main economic activity in the area is agriculture, with most production focused on

coffee, rice, sugar cane, and fruit. In spite of its current productivity, there is concern that the environmental threats to the Jesús María River Basin will have adverse socioeconomic consequences.

Parts of the surrounding landscape, such as the city of Orotina Esparza, are undergoing a rapid cultural transition with urbanization. The majority of employment is in the service sector of Greater Puntarenas, the nearest sizeable city. The cultural background is diverse and can be classified as a "mestizo" culture, the product of a mix of Indigenous, African and Sephardic Hispanic ancestors stemming from the colonial era.

2. Key Environmental and Social Challenges

- **Landslides and soil erosion due to local topography:** In the upper basin, steep slopes characterize the topography in altitudes between 400 m and 1,400 m. This accelerates the movement of runoff and sediment and increases erosion. In this part of the basin, the hydraulic structure follows a very complex dendritic pattern and rivers originate in volcanic formations of the Upper Tertiary. This is an area with high natural potential for soil erosion, where restoration of vegetative cover is a key issue, particularly within the coffee landscape.
- **Poor design of infrastructure:** In the upper and middle basin, public and private roads on steep slopes with insufficient vegetative cover are poorly designed, water drainage systems are inappropriately engineered, terrace cuts produce gullies, and maintenance is insufficient, increasing erosion. Road design and gullies must be addressed through multi-stakeholder governance platforms to plan, prioritize and involve national institutions responsible for roads and transport to undertake major engineering for infrastructure, retaining walls or geo-membranes.
- **Deforestation and land degradation:** The Cuarros River sub-basin has a less elongated shape than the other sub-basins; it is flat and therefore less susceptible to erosion. Nevertheless, historic deforestation for extensive cattle pastures and monoculture agriculture have made the Jesús María River Basin one of the most degraded watersheds in the country, according to the Advisory Commission on Land Degradation (CADETI). Livestock and agricultural activities in areas with steep slopes and poor vegetative cover have led to its further deterioration. The watershed requires immediate changes in production systems and improved management of small-scale livestock activities to mitigate further soil erosion and degradation, and to start recovering soil productivity.
- **Loss of agrobiodiversity:** The inhabitants of the basin are intensive commercial producers of crops like coffee, rice, sugar cane, fruit, cucurbits (melon, watermelon, pipián and pumpkins) and cattle. As food security is not a concern for the majority of farmers, most now concentrate on cash crops. The number of corn and bean growers and farmers growing for home consumption are getting fewer every year. Consequently, the agrobiodiversity of formerly integrated farming systems has rapidly been lost, and some native or traditional cultivars of maize, beans, mangoes, avocados, cashews, rice, papayas, coffee, cucurbits, peppers and other crops are now gone. Recovery of this lost agrobiodiversity is key to increasing the resilience of the target landscape.
- **Lack of a basin-wide governance platform:** The primary environmental governance challenge in the Jesús María River Basin is to establish a commission to organize and manage land and resource uses in the basin. This will require improving coordination among all agencies working for the restoration of the basin, as well as support structures such as ASADAS in the management of water resources, and the County Agricultural Centers (CACs) regarding issues such as Payment for Environmental Services, agricultural marketing, and management of organic fairs, among others.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

One of the main aims of the Baseline Assessment is to develop a country landscape strategy. In December 2013, a Baseline Assessment was conducted by the Association for the Organic Agriculture Movement of the Central Pacific (Asociación para el Movimiento de Agricultura Orgánica del Pacifico Central) in order to evaluate the state of the landscape and to identify key environmental and socioeconomic issues. The assessment was carried out through a series of consultations with local community leaders, as well as field visits across the region. Three workshops were held with local community members from throughout the watershed, during which a total of 105 local community leaders (31 women, 74 men) were invited to rate the state of the region using the Socio-ecological Productive Landscapes and Seascapes (SEPLS) Resilience Indicators to gain input from the community.

The results from the consultation process and the draft Landscape Strategy were then presented in a final workshop with 40 stakeholders from the watershed area. The Baseline Assessment identified the need to improve the dissemination of scientific knowledge at the decision-making level and at the community level in order to improve the resilience and recuperation of the degraded resources. It also identified the need to take measures that could ensure the sustainability of the production activities at the local and regional levels, and to promote the use of new technologies and practices such as water harvesting, stone walls to prevent erosion, and the use of biodigesters.

Landscape strategy workshop in the target landscape, COMDEKS Costa Rica

Landscape Strategy

Using the landscape assessment as a basis, the COMDEKS Landscape Strategy for Costa Rica was developed. The Landscape Strategy describes and analyzes the landscape data and findings from the assessment, defines expected landscape outcomes and indicators that communities have agreed to jointly pursue, and outlines potential community-based activities to achieve these outcomes.

The long-term objective of the Landscape Strategy is the development of sustainable socioeconomic production activities within the Jesús María River Basin through information sharing, capacity building, and restoration of the natural landscape. Table A-1 lists the five Landscape Outcomes around which the strategy is built, as well as performance indicators that will be used to measure these outcomes.

Table A-1. Landscape Outcomes and Indicators from the Costa Rica Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: Land degradation is comprehensively addressed through actions that prevent soil erosion and sediment transport to water bodies.	• Number of hectares of coffee plantation managed under shade and organic agroforestry systems, with soil conservation works and vegetative ground cover management. • Number of hectares of fruit trees in agroforestry systems and integrated farms, with soil conservation works and vegetative ground cover management. • Number of hectares of pasture sustainably managed through silvopastoral systems.
Outcome 2: Forest cover throughout the river basin is increased through mechanisms such as Payment for Environmental Services (PES) and strengthening of local protected areas.	• Numbers of hectares under forest cover (primary forests, reforested areas, natural regeneration, fruticulture, coffee cultivation, agroforestry and silvopastoral systems). • Number of farmers receiving Payments for Environmental Services as an incentive to maintain and increase forest cover. • Number of functioning biocorridors. • Adoption of defined management plans for Tivives WPA and Biological Corridor Montes del Aguacate.
Outcome 3: Sustainable agricultural production practices are established in the socio-ecological production landscape, including local coffee production in the upper basin, fruit growing in the middle basin, and integrated pastoral and agro-silvopastoral production in the middle and lower basin.	• Number of hectares under organic and sustainable farming systems. • Number of rural communities working on sustainable production systems through integrated and organic farms. • Number of peasant families with at least 20% increase in income due to water harvesting and mini-irrigation systems.

Landscape Outcomes	Key Performance Indicators
Outcome 4: Scientific knowledge, traditional knowledge and technological innovation is strengthened and shared among producers, farm owners and the general public.	• Number of new technologies and tools transferred to producers and farmers. • Amount of technical and scientific information about Jesús María River basin made available to the public. • Number of communities with improved lifestyle and livelihoods due to better access to drinking water. • Number of schools offering environmental education programs and organic agriculture training.
Outcome 5: Governance and landscape management capacity of local and regional organizations is strengthened in the target landscape.	• Number of grassroots organizations strengthened through COMDEKS project activities. • Political steps taken to finalize Payment for Environmental Services in the target area with National Forestry Department financing.

Coffee farm with contour planting and guard channels in the upper river basin, COMDEKS Costa Rica

Community-Led Landscape Projects

To guide the selection of local projects, the COMDEKS Landscape Strategy for the Jesús María River Basin suggests a number of activities that would help achieve the specified Resilience Outcomes:

Outcome 1: Land degradation in the target landscape is comprehensively addressed through interventions that prevent soil erosion and sediment transport to water bodies:

- Negotiate with the Rural Development Institute (INDER) to correct the structural design of roads to prevent erosion;
- Institute soil conservation practices—such as contours, sediment traps and planting of woody plants and fruit trees—in coffee plantations;
- Establish integrated silvopastoral farms with shade trees in pastures, hedgerows, windbreaks, improved pastures, and water sources for the animals;
- Conduct tree-planting campaigns and restore riparian forests throughout the basin.

Outcome 2: Forest cover throughout the river basin is increased through mechanisms such as payment for environmental services and strengthening of local protected areas:

- Distribute Payments for Environmental Services (PES) in the middle basin for planting trees in water protection areas, and fruit trees throughout the landscape;
- Distribute Payments for Environmental Services in Agroforestry Systems (PSA-SAF) in coffee plantations in the upper basin.

Outcome 3: Sustainable agricultural production practices are established in the socio-ecological production landscape, including local coffee production in the upper basin, fruit growing in the middle basin, and integrated pastoral and agro-silvopastoral in the middle and lower basin:

- Diversification of production units by creating comprehensive, sustainable and high resilience farms;
- Conservation of water through systems of rainwater harvesting, small dams and water intakes for drip irrigation, and reducing the water quantity used for livestock and fishponds;
- Development of responsible certified organic fairs and markets for sustainable products; increase value-added for coffee and fruits and fruit processing factories.

Outcome 4: Scientific knowledge, traditional knowledge and technological innovation is strengthened and shared among producers, farm owners and the general public:

- Promote environmental education programs on organic production and soil conservation in all schools in the basin;
- Protect forests in recharge areas and purchase properties that are water sources for communities, with support from INDER.

Outcome 5: Governance and landscape management capacity of local and regional organizations is strengthened in the target landscape:

- Strengthen infrastructure for water distribution by enhancing water intakes and constructing water tanks, rural aqueducts, and water management and maintenance offices;

- Strengthen interagency coordination among all agencies working on the restoration of the basin to streamline different initiatives into a single strategy.

Landscape Project Portfolio

Based on this guidance, five local projects were selected as part of COMDEKS Costa Rica's portfolio of landscape interventions in the Jesús María River Basin (see Table A-2). Each is led by a different community-based organization, with grants ranging from US$30,000 to US$50,000.

Inspecting a stone wall used to prevent soil erosion on slopes, COMDEKS Costa Rica

Table A-2. COMDEKS Community-Led Projects in the Jesús María River Basin, Costa Rica

Project Title	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Integrated Water Resources Management, Marañonal Esparza	Association for the Organic Agriculture Movement of the Central Pacific (MAOPAC) US$50,000	Outcomes 1, 2, 5	Construct runoff water reservoirs in agricultural production areas and reduce erosion in the basin from planting and harvesting. About 25 producers in the upper middle part of watershed will participate by implementing water harvesting to channel agricultural runoff water.
Water Resource Protection and Sustainable Production, Cuenca Alta del Jesus Maria	Esparza Cantonal Agricultural Center (CAC Esparza) US$50,000	Outcomes 2, 3, 5	Replant native timber species in the region as well as fruit trees that provide medium-term continuity of commercial activities and improve community living conditions. About 20,000 trees will be planted in the watershed every year for four years to help rehabilitate degraded areas of the basin.
Implementation of Silvopastoral Systems, San Mateo County	Cantonal Agricultural Center of San Mateo (CACSM) US$50,000	Outcomes 1, 2, 4, 5	Restore degraded lands by instituting silvopastoral systems that help reduce soil loss. About 150 producers will participate in training courses, on-the-ground practice sessions, experience exchanges, and peer-to-peer learning sessions on implementing silvopastoral practices, thereby generating environmental benefits on their farms, as well as in the basin as a whole.
Agro Conservation, Jesús María River Basin	Comprehensive Development Association Berlin San Ramon US$50,000	Outcomes 2, 3, 5	Mitigate soil degradation by initiating agro-conservation practices. About 45 local producers will participate in training courses and experience sharing on soil conservation practices to implement on their farms. Some soil conservation techniques being implemented include guard channels, hillside ditches, application of organic fertilizers, application of calcium carbonate, constructing individual terraces, and instituting agroforestry systems. All these practices will be systematized for the development of a practical user manual for other producers in the basin and other regions.

Project Title	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Organic Production, Jesús María River Basin	Cantonal Agricultural Center of Orotina US$30,000	Outcomes 1, 3, 4, 5	Promote the switch to organic production, including training of farmers in organic production techniques. Approximately 75 producers in the basin will receive training in organic farming and will implement the lessons learned on their farms as a demonstration model of organic production suitable for other producers in the basin.

Achievements and Impacts to Date

- **Restoring and reconnecting basin forests and generating income:** To restore and reconnect forest ecosystems in the river basin, communities have planted some 54,000 trees in degraded forest areas. Many of these are species of native hardwood trees, but at least 20,000 are fruit trees common in the area, including mango, cashew, loquat, sapote, guava, star apple, citrus, and avocado, with another 20,000 fruit trees slated for planting each of the next three years. Produce from these trees has provided farmers the opportunity to participate in local farmers markets, creating another income source. Planted trees have also provided other services, such as providing shade for cattle, and creating wind breaks for crops to reduce soil erosion. Trees for reforestation are grown in a new government nursery, with local farmers participating by collecting fruit tree seeds to be raised at the nursery, and also participating in tree grafting in exchange for tree seedlings. Tree planting, along with installation of 5 km of fencing, has also been a key strategy in protecting river banks, springs, and headwater areas from farming and cattle damage. In addition, 13 farmers have each agreed to set aside 1 ha of their farmland for forest restoration in exchange for annual PES payments from the government.

- **Reforming grazing practices and diversifying income:** To mitigate the soil degradation problems faced in the middle basin, zero-grazing livestock production systems have been put in place along with the implementation of silvopastoral activities, such as live fences, and the construction of silos and paddocks. To date, some 150 structures have been built for stabling cattle in zero-grazing systems and storing fodder to feed them. Fodder banks planted with species such as sugar cane and maralfalfa grass have been established to help provide high-quality feed for livestock during the dry season. Planting legumes as fodder crops also increases yields of subsequent vegetable crops due to their nitrogen-fixing ability, which will be increasingly important in areas where population pressure exists. About 313 ha of land have been dedicated to fodder banks by producers so far. One side benefit of the zero-grazing systems and reorganization of livestock farms has been the diversification of income-generating activities on these farms. Some livestock producers have begun to produce organic fertilizer for sale, to make cheese, and to process fruit to augment their livestock incomes.

- **Harvesting, storing, and managing water for agriculture:** Farmers have started using new techniques for harvesting and conserving water using rainwater, small dams and water intakes in spring areas. The water is used for drip irrigation, mini-irrigation, watering livestock, the cleaning and maintenance of pigsties, and to feed aquaculture fishponds. In addition, 12 out of a planned 25 water reservoirs have been constructed for on-farm water storage, with local Community Water Committees identifying the appropriate location for the reservoirs. These small reservoirs, designed by university graduate students, are built to provide water for agricultural activities during the dry season.

Community-improved pasture in Desmonte, Jesús María river basin, COMDEKS Costa Rica

- **Implementing soil conservation measures:** Through a systematized and practical training module on soil conservation practices, producers have learned techniques such as building guard channels, constructing soil terraces, and applying organic fertilizer. There are now some 99 miles of ditches built to prevent soil erosion, promote water infiltration, and address soil degradation in the target landscape.
- **Promoting organic agriculture:** Some 280 farmers have received training in organic agriculture systems and have visited demonstration projects in southern Costa Rica to exchange best practices. In addition, an environmental education curriculum was introduced at six elementary and high schools in the area, in which students were trained in organic agriculture. Many of these schools have created an organic gardening area in which to practice these skills, with the crops raised there used at the community dining halls.
- **Documenting, organizing, and making available information on sustainable production practices:** Several knowledge products have been assembled so far for use in different applications. One is a toolkit for Agricultural Extension Agents that documents 44 sustainable production practices implemented in COMDEKS projects in the river basin. In addition, an alliance between COMDEKS project leaders and three government departments produced a planning tool that farmers can use to track their farm production, and which also disseminates soil conservation practices. Another alliance with the academic institution CATIE produced a series of documents that documented traditional and scientific knowledge about best practices implemented in the target landscape.

Progress at the Landscape Level

Experience from COMDEKS projects, combined with experience from previous projects funded by SGP Costa Rica using the same community-based ecosystem management philosophy, have produced a resident population with significant social capital and technical experience with landscape projects and measures of landscape resilience. Field visits and exchanges of findings and results among COMDEKS communities have augmented this fledgling landscape community. In addition, many partnerships with government departments such as the Ministry of Agriculture and the Ministry of Environment, the National Learning Institute, and others, have offered a base of support services and training to communities in the area. This offers a good basis going forward for landscape governance and continued community-led projects to restore resilience and support sustainable livelihoods. Efforts are also on-going to create a basin-wide land and resource governance platform that will legally empower communities to bring their landscape experience into the decision-making realm. This would take the form of a Jesús María River Basin management committee, including both civil society and government representatives.

A reservoir in the mid-river basin provides water for irrigation, animals, and other uses, COMDEKS Costa Rica

Lessons Learned

- The Baseline Assessment for COMDEKS Costa Rica demonstrated that communities in the target landscape lacked awareness of erosion and land degradation problems. The assessment highlighted the need to improve the dissemination of scientific knowledge at the farmer level—the most immediate level of decision-making in the landscape—to ensure the sustainability of productive activities at the local and regional level, and to promote the use of new technologies. This insight framed many of the COMDEKS project plans.

- Soil salinization is another critical issue that needs to be dealt with, as is soil erosion on river banks, mangrove sedimentation, sediment clogging at the river mouth, flooding, and changes in river mechanics (river course and meanders). Further promotion of silvopastoral livestock systems, as well as other activities to prevent salinization and erosion, should be looked into in planning future community projects.

- Increasing forest cover and stabilizing riverbanks with fruit trees will likely have a positive impact on the socio-ecological production landscape. However, caution is called for in tree selection. Using commercial fruit tree varieties of mango, avocado and cashew result in greater fruit production, but at the same time the seeds of traditional varieties (landraces) are being lost or forgotten.

- The sustainable agricultural production practices promoted in COMDEKS projects were designed based on the specific characteristics of the river basin: local coffee production in the upper basin, fruit growing in the middle basin, and integrated pastoral and agro-silvopastoral systems in the middle and lower basins. This land planning scheme was developed in collaboration with local producers and technical personnel of the Ministry of Agriculture to ensure that locally appropriate practices to prevent soil degradation are implemented. Such essential collaboration is anticipated to continue and even increase in the future.

- One way to encourage farmers to participate in the government's Payment for Environmental Services program, in which they set aside one hectare of their land for forest conservation in exchange for a yearly payment, is to have them sign a voluntary agreement. Although this agreement is not legally binding, it provides a helpful formality that allows the farmer to better visualize this as an economic and environmental opportunity.

- The upper basin is the most homogeneous area in the target landscape in terms of culture and produce. Producers all come from the same cultural background (called Cartagos, or whites from the West Central Valley), and have been farming a single crop—coffee—for over a century. This relative homogeneity has allowed them to work together in an integrated and cooperative manner and to be open to adopting new technologies and other innovative solutions that could increase their crop production. It has also made them interested in acquiring new knowledge on the cultivation of other crops and their associated ecology.

ECUADOR
NAPO RIVER WATERSHED, AMAZON

1. The Landscape

Geography

The target landscape for COMDEKS activities in Ecuador is located in the Napo River watershed between the provinces of Napo, Orellana, and Pastaza (Figure E-1). The Napo River is a tributary of the Amazon located on the western slope of the Andes Mountains and flowing through one of the most biodiverse areas of the Amazon Basin.

Ecuador Amazon's rainforest covers 30 percent of the country's total land area, making it the country's largest biogeographical region and one that has been characterized as "mega-diverse." The Napo runs parallel to the Northern border of the 970,000-ha Yasuni National Park, Ecuador's largest protected tract of rainforest and a UNESCO Biosphere Reserve. The target landscape itself is 4,840 km^2, with a population of 44,250.

Figure E-1. The COMDEKS-Ecuador Target Landscape

Biological Resources and Land Use

The reason for the ecological uniqueness of the selected landscape comes from the fact that during the last Ice Age, the Napo River Canyon acted as a "Pleistocene refuge" for a wide variety of species whose continued diversification has been unimpeded. The Amazon region plays a critical role in regulating the climate as it retains large amounts of organic carbon and contributes to the regulation of the Amazon basin, one of the most important freshwater systems on the planet. Within the waters of the Amazon Basin there are over 1,000 species of fish (including electric eels and piranhas), as well as more than 400 species of amphibians and reptiles. The most notable mammals living in this environment include freshwater dolphins and manatees.

The target landscape is a zone rich in biodiversity and ecosystem services. Its inhabitants retain many traditional methods for sustainable resource management and ancestral knowledge of biodiversity. However, it is also an area that has lost nearly 20 percent of its natural vegetative cover in the past 50 years. The main trigger for this has been the rise of resource-extractive industries, particularly the oil and mining industries, which were promoted without taking into account their negative impact on the environment.

A community nursery provides seedlings for reforestation in the Napo River watershed, COMDEKS Ecuador

Since the 1970s, when the oil industry first entered the area, the landscape has become fragmented. The construction of oil-related settlements and infrastructure; the clearance of forest areas for palm oil and soybean plantations, and the use of other unsustainable agricultural practices; the extraction of timber and mining of gold; and also the desire of settlers and local people to own land have all contributed to this fragmentation and environmental decline. Destruction of the area's ecosystems directly affects the rural communities, which base their livelihoods on local natural resources. This ecological disruption also changes the cultural dynamics of transmitting traditional environmental knowledge to new generations.

In spite of these negative trends, one positive factor in the target landscape is that, while the majority of local land is now under private ownership, the land in most indigenous communities still remains under communal tenure—that is, held as common property among community members. This ensures that important conservation areas are not fragmented in indigenous territories, due to the cultural practice of preserving sacred sites and protecting lands for future generations.

Socioeconomic Context

The socioeconomic context of the COMDEKS target landscape is characterized by indigenous rural communities—mostly Kichwa communities—with high rates of poverty, social exclusion and discrimination. Most of the population living in the rural sector derives its income from activities related to agriculture, livestock, forestry, fishing and tourism, according to the 2010 Census. The mestizo settler population, which makes up about 20 percent of the population in the target landscape, is also engaged in agriculture and logging, as well as more urban services as are found in parish and county seats.

Many communities are dispersed throughout the landscape. There are 85 communities in the Yaku Samay area, mainly Kichwa, spread throughout the rural parishes of Archidona, Tena and Arosemena Tola cantons. In the Akllak Sacha area there are 26 communities located in the rural parishes of Santa Clara, San Jose and Arajuno. These communities, which are populated mostly by indigenous people, are organized and represented by community associations—grassroots organizations that are legally empowered to represent the community's political, social, and commercial interests.

An important element of the landscape is that the communities that have evolved amid the rich local ecosystems have developed a culture rooted in the understanding, appreciation, and respect of the land. This has generated forms of ownership and land management that have not only contributed to conserve the forest, but have also created a great deal of knowledge about the potential of its biodiversity, this being the key to the survival of these communities.

One of the unique forms of agricultural production and subsistence economy that have arisen from indigenous knowledge of the landscape is known as the "Kichwa chakra system," in which a biodiverse mixture of local crops are grown together, including coffee, corn, naranjilla, pineapple, beans, cassava, rice and wild varieties of peanuts. Although today this system has been supplanted to a great extent by less diverse and less sustainable farm practices, it remains a viable, biodiversity-friendly economic strategy and has become one of the focuses of COMDEKS livelihood support in the target landscape.

2. Key Environmental and Social Challenges

- **Decreasing soil fertility:** Threats to soil fertility come from livestock and agriculture—activities that have not taken into account the fragility of local ecosystems. Although the Amazon may seem a fertile land due to its vast forests, what is not generally known is that the forest is sustained by its own decomposition, so that all crop and livestock farming is detrimental over the medium to long term. This creates a vicious cycle where unsuitable practices, such as the decrease in crop rotation, the conversion from intercropping to monocultures, or cultivation of fragile soils, deplete the nutrients that were originally sourced from the decomposition of the forest's organic matter. This makes the soil increasingly less fertile and results in a continual search for more areas to cultivate.
- **Deforestation:** Logging is a common economic activity carried out by locals because other income sources are limited. Forest areas in the Amazon Region are vast and capacities to control and reduce illegal logging are insufficient, despite the current efforts to avoid deforestation.
- **River contamination is a serious problem in the cantons of Arajuno and Curaray:** The Arajuno River is located in the center of an oil development block. Additionally, mining activities pollute rivers due to the chemicals used to separate the gold and then discharged into the river, making the water unusable for local communities without affecting their health.
- **Low crop diversity:** Local crop diversity has dropped as communities have been influenced by central government policies encouraging monoculture systems and the use of agrochemicals. Unfortunately, these monoculture crops are inherently susceptible to insects and plant pathogens and therefore biologically unstable unless considerable effort is expended to keep out pests and weeds.
- **Environmental threats from infrastructure construction:** By law, some of the oil revenues generated in the target landscape are returned to the area to support local infrastructure development. While some of

this has been useful, some has been spent on roads and other facilities that have further threatened the environmental integrity of the area through noise and pollution, as well as invasion of the ancestral lands of indigenous communities.

- **Lack of technical and financial resources:** Communities lack the information, knowledge and skills to design, implement, monitor and evaluate development projects for effective learning and adaptive management. For instance, monitoring the restoration of native fish populations (one of the COMDEKS project activities) in the rivers is a technical challenge for communities.
- **Lack of support provided by government** entities makes it difficult to carry out project activities. During the project planning phase, co-financing support from local governments was agreed and allocated; nevertheless, during project implementation, most of this co-financing was not delivered.
- **Lack of innovative marketing strategies** for selling the local products from the "chakra system"—products that, if marketed correctly, would provide a sustainable alternative income source. For such value-added products, proper planning for sales and branding is necessary to make them competitive in local and national markets.
- **Migration and labor shortages:** The scarcity of income opportunities in rural communities gives rise to significant out-migration, particularly among young adults who leave the local farms to seek employment in towns and cities. Aside from the social disruption this causes in rural communities, it also causes local labor shortages, which can affect the ability to meet community goals and achieve sustainable development.
- **Loss of traditional knowledge:** There is a need for restoration of local knowledge regarding health, use of medicinal plants, agriculture, local cuisine and traditions, as there has been a considerable decline in interest by new generations.

Leadership workshop, Asociación de Moradores de Arajuno Project, COMDEKS Ecuador

- **Cultural differences among communities:** Every community has its own set of beliefs and practices, and gaining acceptance from communities for outside ideas and practices is a gradual process. This can make sharing traditional knowledge among communities and offering locally tailored training a challenge, and can potentially slow down landscape-wide activities.

3. COMDEKS Activities, Achievements, and Impacts

Baseline Assessment and Community Consultation

To engage communities in the target landscape and understand the current landscape conditions, a Baseline Assessment was conducted in 2013, led by the Sacha Causai Foundation. The assessment involved meetings with local community leaders, site visits to preselected areas in the target landscape and workshops for the participatory selection and design of projects. A Community Consultation was conducted based on the COMDEKS questionnaire and Resilience Indicators of socio-ecological production landscapes (SEPLS), gathering information from men and women from local communities. A Kichwa translator facilitated the consultation to ensure full engagement of community members.

In undertaking the Baseline Assessment and Community Consultation, COMDEKS Ecuador built upon a considerable foundation of work accomplished earlier through the SGP grants in support of Ecuador's "Biocorridors for Good Living" program. This work included mapping, ecological analyses, and community organizing around the Biocorridors program.

Landscape Strategy

Results of the baseline assessment provided the basis for the development of the COMDEKS Landscape Strategy in the Ecuadorian Amazon Region, aiming to guide local communities in the development of community-based projects, as well as conduct project monitoring, thereby enhancing resilience of the target landscape.

The goal of COMDEKS activities in the area is to consolidate, replicate, and scale up the work already under way by indigenous and rural community organizations to protect the biodiversity and culture of the areas surrounding the Napo River. The landscape approach supported by COMDEKS in Ecuador builds upon the concept of "Biocorridors for Good Living" (Buen Vivir or Sumak Kawsay), a concept adapted from the 2008 Constitution of Ecuador and the National Plan for Good Living, and implemented earlier by the Ecuador GEF Small Grants Programme (SGP), with the aim to support local initiatives focused on promoting biodiversity conservation throughout Ecuador's various ecosystems.

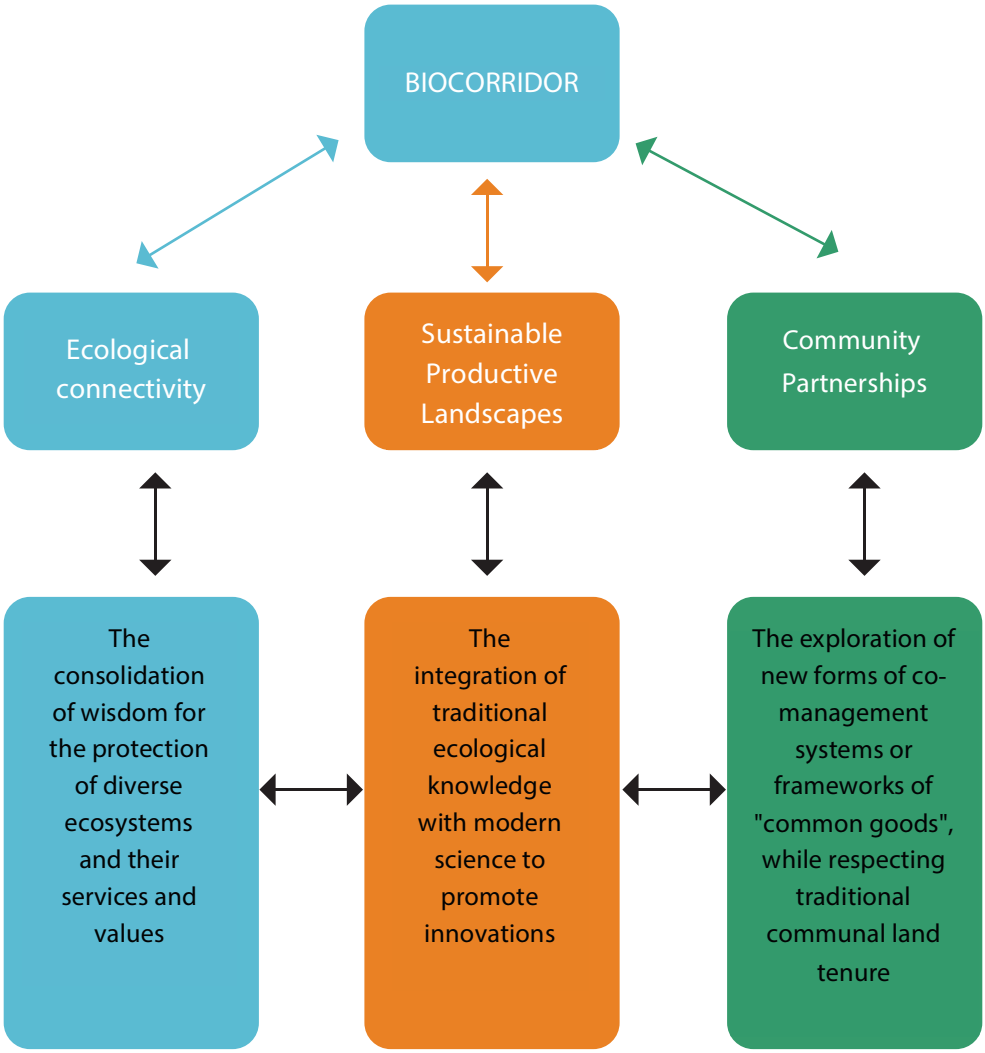
"Biocorridors for Good Living" are described as expanses of land where ecological connectivity is reestablished, connecting fragmented habitats, incorporating sustainable production activities into the landscape, and fostering community partnerships. The GEF SGP Ecuador Country Programme supports four priority ecosystems: paramos (Neotropical high mountain biomes), dry forests, mangroves, and tropical forests). The Amazon Region, where the COMDEKS target area is located, is one of the four priority ecosystems supported by the GEF SGP Ecuador Country Programme. It is an area with particularly relevant ecosystems, which belong to indigenous and rural communities engaged in productive activities and which are under pressure from large-scale resource extraction activities.

The COMDEKS approach is interrelated with the approach and strategies used by the SGP Ecuador Country Programme to build the Kamanwi, Yaku Samay and Akllak Sacha Biocorridors —a participatory process in which many local actors cooperated. Figure E-2 shows the operational-level linkages, ensuring that COMDEKS and SGP act in a common conceptual and operational platform.

"Biocorridors for Living Well are expanses of land where ecological connectivity is re-established, connecting fragmented habitats, incorporating sustainable productive activities into the landscape and fostering community partnerships."

SGP Ecuador 2012 (Our Biocorridors for Living Well)

Figure E-2. Conceptual Framework of "Biocorridors for Good Living"



Stakeholders in the COMDEKS target landscape crafted their Landscape Strategy with the intention of building on the achievements and lessons of the SGP Ecuador Country Programme and its work on Biocorridors for Good Living. Table E-1 lists the three Landscape Outcomes around which the Ecuador Landscape Strategy is built, as well as performance indicators that will be used to measure these outcomes.

Table E-1. Landscape Outcomes and Indicators from the Ecuador Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: Greater ecological connectivity and improved biodiversity through reforestation activities and protection of watersheds.	• Number of communities with agroecological farms. • Number of plants planted, by species. • Number of forest species recovered. • Kilometers of riverbank reforested. • Number of water sources protected.
Outcome 2: Sustainable production landscapes: Improved local livelihoods through the development of sustainable enterprises.	• Number of community tourism companies operating. • Number of rural women producing artisan crafts. • Number of communities which offer bird- watching tourism services. • Number of chakras with agroecological improvements. • Number of quintals of locally produced cocoa in the value chain. • Number of families engaged in fish farming using local fish species.
Outcome 3: Strengthened institutional capacity and participatory decision making through the promotion of community working groups and conservation agreements at the landscape level.	• Number of Biocorridor Working Groups and Regional Working Groups established. • Number of certified regulations for community organizations. • Number of community incentive proposals developed.

Construction of an aquaculture pond, Santa Rita, COMDEKS Ecuador

Community-Led Landscape Projects

To guide the selection of local projects aimed at contributing to community and landscape resilience, the Landscape Strategy for the Napo River Watershed suggests a number of activities that together would contribute to the Strategy's specified Resilience Outcomes.

Outcome 1: Greater ecological connectivity and improved biodiversity through reforestation activities and protection of watersheds:

- Improve landscape connectivity through the establishment of "Biocorridors for Living Well." This approach seeks to reduce fragmentation of habitats through activities that support conservation and appropriate management of ecosystems, thus alleviating pressure on protected natural areas;
- Increase the recovery capacity of local agroforestry systems;
- Protect and restore local watersheds.

Organic foods workshop, COMDEKS Ecuador

Outcome 2: Sustainable Production Landscapes: Improved local livelihoods through the development of sustainable activities:

- Establish and strengthen capacities for sustainable community-led tourism;
- Develop local capacities to utilize nontimber forest products for income generation, such as Chambira for handicrafts;
- Develop local capacities for bird-watching tourism;
- Diversify local production systems through the management of traditional "chakras," using agroecological principles;
- Improve the cocoa value chain by culturing and marketing "fine aroma" cacao plants grown in local chakras;
- Promote and strengthen capacities for fish farming using native fish species.

Outcome 3: Strengthened institutional capacity and participatory decision making through the promotion of community working groups and conservation agreements at the landscape level:

- Facilitate community agreements to conserve and develop socio-ecological production landscapes;
- Promote and facilitate the development and signing of local community conservation agreements;
- Develop proposals for incentives for environmental services in significant areas of the target landscape.

Landscape Project Portfolio

Five proposed projects in the biocorridors Yaku Samay and Akllak Sacha were identified during the consultation process to be funded through COMDEKS. In keeping with the suggested activities above, the five COMDEKS projects support agroecological and agroforestry practices to diversify household production, conserve important forest ecosystems through reforestation activities and protection of micro watersheds, and promote income generation activities such as the development of sustainable tourism and farming of native fish. These COMDEKS projects are expected to generate important lessons about best community practices in order to maintain, rebuild, and revitalize landscapes.

As part of the process of community empowerment, and in order to encourage effective partners to participate in the project work, several federations of local peoples were organized before project work commenced. These federations included: Kijus Association of Kichwa Communities (known as ACOKI); Cotundo Union of Kichwa communities (UNCOKIC); and the Kichwa organizations of Loreto (OKIL), which includes the associations CONAKINO, FAOICIN, and FOCIN.

"It is essential that in these places, where people are living and working, where they have their chakras; biocorridors consolidate and remain over the long term, because these are locations for species connectivity, seed transfer, and especially for ancestral knowledge maintenance."

Rocío Paz y Miño, Pashimbi Association

Table E-2 lists the five community-led projects selected as part of COMDEKS Ecuador's project portfolio, with grants ranging from US$40,000 to US$50,000:

Table E-2. COMDEKS Community-Led Projects in the Napo River Watershed, Ecuador

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
"Jatun Anzu" - The Great Anzu River	Center for Development and Research on Social Movements Ecuador US$39,254	Outcomes 1, 2, 3	Conserve tropical forest margins in the Great Anzu River area, and create a community reserve. Design and manage municipal practices and legal regulations for local natural resource management. Promote local products made from non-timber forest resources to create local employment. Promote the empowerment of communities through partnership for the conservation and sustainable use of natural resources, creating strategic alliances with universities, for example.
Conservation, Management and Sustainable Production in the Communities of Arajuno and Curaray	Dwellers Association Arajuno - AMA US$45,874	Outcomes 1, 2, 3	Conserve and manage natural resources of the rainforest and watershed communities formed by the association of AMA and AMKACE, a purpose that goes hand in hand with the strengthening of the cultural identity of the Kichwa Nationality in Arajuno and Curaray. Restore the forest and watershed through reforestation. Increase the production of cocoa through an agroforestry system under the local chakra system or in combination with the cultivation of cassava, plantain, corn, and other forest products used for making crafts.
"Bosques, Agua y Comunidades"- Forests, Water and Communities	Agroproductive Association Pashimbi US$50,000	Outcomes 1, 2, 3	Promote sustainable livelihoods, such as small-scale farming in agroecological chakras, fish farming, and establishing wayusa plantations. Establish financial incentives for local conservation through "Socio Bosque," a payment for ecosystem services (PES) program run by the Ministry of Environment in which authorities provide a small payment for each hectare of forest that is conserved.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
"Sinchi Warmikuna" - Strong Women	Kichwa Community Santa Rita US$50,000	Outcomes 1, 2, 3	Promote equality, social and territorial cohesion, and integration within the Yaku Samay Biocorridor community. The project seeks to conserve the banks of the Rumi Jicama and Puni rivers, located in the watershed of the river Calmitoyacu. It also seeks to strengthen the management processes of the ancient chakra in the communities of Santa Rita, Wambula and Manduro Yacu by strengthening the capacities of local women's organizations. Reforestation with native species in the area will also be prioritized.
"Tsatsayaku Cacao" - Tsatsayaku Cocoa	Fine Aroma Cocoa Producers Association of Carlos Julio Arosemena Tola US$50,000	Outcomes 1, 2, 3	Contribute to the conservation of biocorridor Akllak Sacha through conserving natural resources, and improving the quality of locally grown cocoa, thereby contributing to increased incomes of cocoa producers. In collaboration with partner communities, the Fine Aroma Cocoa Producers Association will contribute to the conservation of the Llanganates buffer zone of the National Park and conduct reforestation activities.

Drying process for "Fine Aroma Cocoa" in the Napo River watershed, COMDEKS Ecuador

Achievements and Impacts to Date

- **Negotiating community conservation agreements and preserving communal land tenure:** COMDEKS projects have resulted in the negotiation of four community conservation agreements involving 7 different communities and some 96 families. These voluntary agreements, which commit communities to preserve the local forest in an undeveloped state, have resulted in the conservation of 577 ha of tropical rainforest. These agreements are particularly important because they insure that the land in the indigenous communities involved will remain as communal property, rather than be converted to private property. This ensures that important conservation areas are not fragmented in indigenous territories and encourages the traditional practice of preserving sacred sites and protecting lands for future generations, ensuring community participation to achieve a common goal. COMDEKS has been particularly effective in helping to bring about these community conservation agreements. Out of the 12 community conservation agreements signed in the Ecuadorian Amazon territory, four came from COMDEKS projects. This is a significant achievement, because community organizations first had to lead a process of community sensitization and socialization about the importance of preserving landscapes and reforesting degraded sites. Finally, they achieved ratification of these community agreements during an assembly of community delegations.

- **Restoring degraded forests and conserving watersheds:** Communities reforested 34 ha of degraded forest using native tree species. They also carried out conservation activities in seven microwatersheds. The communities of Arajuno and Curaray also developed and implemented a management plan for the local watershed.

Restoring the traditional Kichwa chakra family farming system, COMDEKS Ecuador

- **Reviving and enhancing the "Kichwa chakra system":** COMDEKS Ecuador has made the revival and expansion of the use of the traditional "Kichwa chakra system" a central theme in its work to encourage sustainable agriculture and improve local food security. This traditional planting system, in which a family cultivates an array of different crops in a single field, had been largely displaced in many communities by less sustainable single-crop systems. In the chakras, which are mainly the domain of indigenous women, short-cycle crops such as corn, peanuts, naranjilla, yucca and rice are grown together. Perennial crops such as coffee, cocoa and bananas are grown in terraces from 440-1,250 m elevation. These are the most important crops because they generate income for growers; these varieties are grown in all seasons and there are seasonal harvests, which are sold on the local market. Banana and yucca are also used for family consumption and maize is used as poultry feed. Reviving and expanding this chakra system has resulted in restoration of local knowledge, income generation for local people and conservation of the tropical forest. Through COMDEKS projects, the area under the chakra system was expanded by 152 ha, involving 226 families from 26 communities. Most of the additional production in these expanded chakras is used for local consumption, in order to enhance food security.

- **Promoting sustainable fish farming, organic cocoa cultivation, and other livelihood alternatives:** Under four different COMDEKS projects, sustainable fish-farming was established in the target landscape with the participation of 127 families in 26 communities. Previous fish-farming methods in the area had involved planting tilapia—a nonindigenous fish—directly in the rivers in netted sections, a practice highly damaging to native fish species. The fish farming promoted through COMDEKS uses cachama (Piaractus brachypomun), a native fish, raised in 98 fish rearing ponds constructed around the region, rather than in the river. Harvested fish are sold at local markets for income. Cultivation and marketing of a locally adapted organic cacao (called fine aroma cocoa) that is grown in the chakra system is another alternative source of income promoted through COMDEKS. Technical and marketing assistance and equipment provided to the Fine Aroma Cocoa Producers Association of Carlos Julio Arosemena Tola has been invaluable in the effort to market this local cocoa as a specialty product with added value. Yet another alternative income source promoted through COMDEKS has been cultivation of guayusa, whose caffeinated leaves are used to make a stimulant tea.

- **Creating financial incentives for forest protection:** Recognizing the benefits of COMDEKS initiatives, the Ministry of the Environment in Ecuador, through the "Socio Bosque" project, has successfully implemented a forest protection program in the community of Santa Rita, located in the Yaku Samay Biocorridor. Through the Socio Bosque program, the Ministry of the Environment (MAE) enters into conservation agreements with landholders, in which landholders receive a small PES (payment for ecosystem services) payment in exchange for protecting local forest cover. The purpose of the project is to create a system linking incomes to environmental services, creating an alternative to unsustainable exploitation of forest resources for livelihoods.

- **Entering a partnership with Colonso Chalupas Ecological Reserve:** In 2014, as COMDEKS projects were underway, the Ministry of the Environment designated a new protected area in the target landscape called Colonso Chalupas Ecological Reserve. In response, the Association Pashimbi, representing communities near the Reserve, drafted a management plan that ensures the preservation of the buffer zone of the new Ecological Reserve. This was done as a way to avoid conflicts, share information with the Reserve about local people, and to become an active rather than passive partner with the Reserve. This management plan now positions the community as one of the key partners for the Ministry of Environment, demonstrating the project's political impact in the target landscape.

- **Encouraging CBO networks to maximize impacts:** Cooperative work on the biocorridors in the target landscape has brought benefits beyond improving landscape connectivity. It has also shown local community organizations the benefits of joining together in partnerships and networks with the aim of maximizing their impact on environmental management, economic development and participation in policy-making using a collaborative approach.

Progress at the Landscape Level

COMDEKS projects in the Napo River watershed empower communities to conserve important ecosystems through community agreements, forest restoration and protection of microwatersheds. Communities contribute to strengthening the sustainability of production systems through agroecological and agroforestry practices in so-called "Kichwa chakra systems," farming of native fish, and development of products with a local identity such as cocoa and guayusa, which also generate family income. Resilience in socio-ecological production landscapes in the Napo watershed is evident when communities disseminate ancestral knowledge—such as the chakra system—and strengthen their capacities to implement sustainable activities through local associations and federations that link producers across the landscape.

As a foundation for these achievements, COMDEKS Ecuador benefited from its close association with the SGP-supported Biocorridors for Good Living program, which was based on a landscape approach and was entirely consistent with COMDEKS principles and landscape planning practices. Much community organizing for the Biocorridors had already been accomplished at the outset of COMDEKS, and the ideas of landscape connectivity, sustainable production landscapes, and community partnerships—the three elements that define the Biocorridors for Good Living approach and also underpin the COMDEKS landscape approach—had already been introduced to many communities in the target landscape. In addition, local and national government actors were supportive of the Biocorridors and of the COMDEKS approach.

One of the practical effects of the area's history with the Biocorridors program is that stakeholders were accustomed to meeting together in multistakeholder and multicommunity groups for the purpose of landscape-level governance and project planning. In fact, a Biocorridor Working Group had already been established for the two biocorridors in the target landscape, and the participants in COMDEKS projects attended these meetings as well. The net effect of these factors is that the maturation of a landscape community in the Napo River watershed is already well underway, although sustaining this community once COMDEKS projects are complete will require continued effort from all parties.

Lessons Learned

- Community conservation agreements in the Napo watershed are powerful tools that demonstrate the commitment to conserve ecosystems in the target landscape. During the process of forging these agreements it was essential to raise awareness of the importance of ecosystems and to define management plans for the use of lands among community members. After projects are finished, it will be necessary to constantly monitor the implementation of these agreements.
- Local knowledge dissemination was highly important to increase ecological resilience in this landscape. This dissemination was necessary to revive and spread the Kichwa chakra practices, which help to maintain and enrich local biodiversity. However, now there is a need to create a marketing strategy for chakra products in and around the biocorridor, and to support the creation of a brand identity around these local products.
- The value of local biodiversity products can be increased with simple processes and low-cost technology; for instance, chocolate can be produced from locally grown "fine aroma" cocoa without major investments. Products with "local identity" were developed to reinforce local production and generate additional family income.

- Fish-farming with native fish species represents an innovative and important sustainable practice in this region. This activity challenged communities because technical methods were required. But the result was greater food security for communities without disrupting river ecology.
- Participation and agreements among communities, local governments, NGOs, universities and other relevant local stakeholders can be an important platform for the achievement of conservation goals as well as community empowerment, as demonstrated by the management plan developed by Pashimbi Association for the community lands in the buffer zone of the newly created Colonso Chalupas Ecological Reserve. The agreement showed that flexibilty and responsiveness by communities to new land use challenges can allow communities to be players in local landscape governance and help them protect their community interests.
- Local knowledge and practices are being lost over generations. Nevertheless, it is possible to link men, women, young and elders to sustainable activities that can maintain cultural and generational manifestations. COMDEKS activities were able to encourage communities to value their land, their language and their ancestral practices. The revitalization of the chakra system was perhaps the best example of how ancestral knowledge can play an important role in addressing modern development challenges in the Amazon Basin.

Harvests from community-established fish farms raise incomes and enhance local food security, COMDEKS Ecuador

EL SALVADOR
JIQUILISCO BAY - BAJO LEMPA - JALTEPEQUE ESTUARY

1. The Landscape

Geography

The target landscape for COMDEKS activities in El Salvador, the Conservation Area Jiquilisco Bay - Bajo Lempa - Jaltepeque Estuary, is located on the central Pacific coast of El Salvador between the coastal departments of La Paz, San Vicente and Usulutan. Jiquilisco Bay and the Jaltepeque Estuary are the country's most important ecological corridors. Together, they occupy an area of 112,454 ha. Bajo Lempa is a coastal plain—one of the four geomorphological regions (namely, the northern mountain range, interior valley, quaternary volcanic range, and Pacific coastline) found in El Salvador.

This geomorphological region is composed of four isolated bands, which collectively cover about 13 percent of the country and are mainly characterized by flat relief with an average decline of 1 percent. It is located on the plain

at the center of the country, bordered to the east by the Sierra del Balsamo, to the west by the Sierra de Jucuarán, and to the north along the foot of the volcanoes of San Vicente, Stool, Usulutan and San Miguel. The Jiboa and Lempa rivers are the major contributors to movement of sediment in the plain. Jiquilisco and Jaltepeque lie at the mouth of the Bajo Lempa delta flowing into the Pacific, and comprise wetlands, coastal plain estuaries, intertidal mud and sand, sandy beaches, mangroves, seasonally saturated forests in Escuintla, Taura and Nancuchiname, as well as shallow marshes in and around El Aguaje.

The Lempa River flows through Guatemala, Honduras and El Salvador. Consequently, land use requires international agreement and compliance with the agreements relating to the utilization of international river basins. The demands on water resources in El Salvador are multiple, hence the complexity of its water management for direct consumption, irrigation, industrial use and even hydropower generation through reservoir regulation.

Biological Resources and Land Use

The target landscape is composed of a diverse mosaic of ecosystems, including agro-, coastal, marine, and natural forest ecosystems that extend some 10 km inland. Land use ranges from the conservation and sustainable use of mangroves in the coastal area to the production of shrimp, coconuts, sugarcane, livestock (on a small scale), fruit, basic grains, and vegetables in some of the wetlands.

Due to their vulnerability and because they are an important nesting area for many endangered bird species, the Jiquilisco Bay and the Jaltepeque Estuary were declared as protected sites by the Convention on Wetlands of International Importance (Ramsar). In 2007, Jiquilisco Bay was further declared a UNESCO biosphere reserve (the Biosphere Reserve Xirihualtique). It is estimated that along its 37 km of beaches can be found nearly half of the 300 Carey tortoises known to live between Mexico and Peru. This area also hosts the largest abundance of coastal and marine birds in El Salvador, including a number of threatened or endangered species. More than 80 species of migratory birds visit this area to feed on Jiquilisco Bay's plentiful fish, which include species such as red snapper, snook, and corvina.

The target landscape comprises a considerable number of scenic spots and historical sites of special ecological value with high tourist and recreational potential, particularly in the Bajo Lempa River Basin and the western edge of the Biosphere Reserve Xirihualtique - Jiquilisco. Large El Salvadorian forests rich in biodiversity reach into this region, containing a number of species that are difficult to see in other parts of the country. These include crocodiles and resident and migratory shorebirds.

The area further provides multiple ecosystem goods and services, some of which could generate revenue to subsidize the costs of conservation and generate local income. These include rural ecotourism, carbon sequestration, reduction of vulnerability to natural disasters, water production, fisheries and aquaculture, sustainably produced wood and nontimber forest products, and certified sustainable agriculture and biodiversity conservation activities.

Socioeconomic Context

The Conservation Area Jiquilisco Bay - Bajo Lempa - Jaltepeque Estuary has a population of at least 25,000 inhabitants, many of them poor. The Human Development Indices (HDI) in the municipalities of the target landscape are lower than most other areas in El Salvador (0.677 in San Luis La Herradura, 0.685 in Jiquilisco, and 0.717 in San Vicente (2009)).

Most communities' livelihoods depend on subsistence activities. In general, most people do not own the land they live on, but rent it year by year for the cultivation of basic grains, or survive on coastal and marine activities. The size of individual agricultural plots ranges from 0.2-2.8 ha, but some communities have established cooperatives to combine plots into larger fields for the cultivation of sugar cane.

The basic organizational structure in communities in the Conservation Area allows for civil society participation in environmental and natural resource management activities as well as community development. It gives authority to local communities to negotiate rights and responsibilities, and creates a basis for promoting community management of the Conservation Area, indicating a progressive level of local environmental governance. The local population actively promotes interagency coordination based on their historical links as communities, political ideology and shared experiences. They often have a clear vision of community development, including the conservation of natural and cultural heritage of the environment and its inhabitants. In part, this stems from previous involvement with SGP projects in the area. Noteworthy programs on sustainable management of resources in the target landscape include establishment of crab nurseries, community management plans of coastal and marine resources, community policing units and coordinated risk management.

Land use changes, traditional practices of shifting agriculture, pressure on mangrove ecosystems, and pollution of soil and water are some of the factors limiting the quality of life of communities in the area. During the rainy season, the area is affected by floods from overflow of the rivers Lempa and Jiboa that degrade ecosystems and cause riparian forest loss.

Fishing in mangrove forests, COMDEKS El Salvador

2. Key Environmental and Social Challenges

The principal environmental and social vulnerabilities in the target landscape are:

- **Deforestation and biodiversity loss:** High levels of deforestation caused by fires, overgrazing of livestock, agricultural expansion, fuelwood and timber extraction, and illegal occupation of land by migrants from elsewhere in El Salvador have resulted in the loss of significant forest and scrub habitats, affecting local biodiversity. The introduction of crops and tourist infrastructure threatens freshwater supplies and mangrove forests.
- **Loss of aquatic biodiversity:** Exploitation of marine and coastal resources through inappropriate fishing practices of shellfish and Curileo has increased in recent years. Particularly harmful to aquatic biodiversity are the use of trawls.
- **Resource loss and environmental degradation:** The local economy is based on activities that damage natural resources. Subsistence and livestock farming have expanded to lands not suitable for these activities, causing overexploitation and degradation of the soil, which in turn drives people to expand even further into new areas, including protected areas. Furthermore, soil and water contamination by the indiscriminate use of chemical fertilizers and pesticides affects human health and the reproductive cycle of many marine species.
- **Governance issues:** Delayed policy response by governments to local proposals to implement environmental conservation activities is slowing down efforts by local civil society organizations, which are pushing for more involvement in policy formulation. Furthermore, uncertainty over land tenure has already caused conflicts over land and resources within local communities.
- **Financial constraints for environmental management initiatives:** Despite the high demand by local communities to improve environmental and natural resource management, support for conducting studies on the valuation of ecosystems and developing mechanisms to involve users of ecosystem services in their conservation is insufficient.
- **Capacity and infrastructure constraints for developing sustainable tourism services:** Despite a large potential for and interest in ecotourism activities, communities and local industries lack the technical and managerial capacity, experience, and financial resources to implement competitive and sustainable tourism projects. The local population perceives the current industrial tourism developments as a threat to the environment and local socioeconomic conditions for communities. However, infrastructure in rural areas is mostly insufficient to meet visitor expectations, including water and sanitation facilities. Cooperation among tourism entrepreneurs, local governments and civil society will be necessary to establish such infrastructure in a sustainable manner.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

In order to assess baseline conditions in the target landscape and identify opportunities for community action in a participatory manner, Community Consultations with 27 stakeholders were conducted in February 2014. The nine target communities identified for the COMDEKS Baseline Assessment were selected based on the methodological approach used by GEF SGP El Salvador. This approach considers the local use of environmental goods and services provided by different ecosystems, and the potential to improve the local educational level, implement key components for sustainable long-term development, promote human development, strengthen local capacities and promote integration of women and youth in the community development process.

Capacity building workshop for the Youth Monitoring Team , COMDEKS El Salvador

Five workshops, each with 25 participants, were convened, consisting of local leaders and civil society groups. These were facilitated by the National Coordinator of the GEF Small Grants Programme to share the vision and approach of the Satoyama Initiative and outline experiences and best practices from GEF SGP projects in the target landscape in recent years. Participants were able to identify and communicate increased pressures on natural resources affecting their livelihoods. Using the SEPLS indicators, workshop participants evaluated local issues such as protection of ecosystems and preserving biodiversity; agricultural biodiversity; knowledge, learning and innovation; and social equity and infrastructure.

Landscape Strategy

The results from the Community Consultations and workshops for the Baseline Assessment determined the design of the COMDEKS Landscape Strategy for El Salvador. To execute the strategy, local Community Development Associations (ADESCOs) were provided technical assistance and funding to implement projects to improve livelihoods and facilitate community capacity building. The Landscape Strategy aims to strengthen systematization of processes, technology validation and management of natural resources in ADESCO projects, and share successful strategies and methodologies through experience exchange, knowledge fairs and distillation of lessons learned.

Table ES-1 illustrates the four specific Landscape Resilience Outcomes, along with key performance indicators to measure progress toward these Resilience Outcomes.

Table ES-1. Landscape Outcomes and Indicators from the El Salvador Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: The provision of ecosystem services in the landscape is improved through local actions for conservation and sustainable use of natural resources.	• Hectares of marine and terrestrial ecosystems in various stages of regeneration and recovery. • Hectares of marine and terrestrial ecosystems managed using sustainable production practices. • Percentage of local ecosystems managed by individuals, local civil society groups and ADESCOs interested in increasing the resilience of the landscape.
Outcome 2: Agricultural productivity is improved in the target landscape through the promotion of sustainable agricultural practices, resulting in greater food security and income generation.	• Number of hectares protected and conserved through sustainable agricultural practices in watershed recharge areas. • Number of women and men participating in soil improvement practices and sustainable land management.
Outcome 3: Options for alternative livelihoods are promoted within the landscape, increasing access to markets and local financial institutions.	• Number of men and women who benefit from the project activities. • Number of income-generating livelihoods created and percentage of increased household income attributable to project activities. • Number of communities demonstrating sustainable land use practices and good management of natural resources.
Outcome 4: Institutional capacities of local organizations are strengthened, promoting the exchange of knowledge and information on the efficient use of natural resources and facilitating participatory decision making about landscape management.	• Number of policies developed at the community level for the sustainable use of biodiversity resources and the application of best practices for sustainable agriculture. • Number of case studies of best practices developed at the community level. • Share of governance systems effectively managed by individuals, local groups and landscape-level ADESCOs.

Knowledge exchange workshop for farmers in Zonatur, COMDEKS El Salvador

Community-Led Landscape Projects

To achieve these Landscape Resilience Outcomes, the Landscape Strategy offers a number of suggested activities:

Outcome 1: The provision of ecosystem services in the landscapes is improved through local actions for conservation and sustainable use of natural resources:

- Promote the conservation and sustainable use of biodiversity in mangrove ecosystems, wetlands, estuaries, and marine and freshwater bodies;
- Implement alternative community-based subsistence activities to relieve pressure on conservation areas;
- Facilitate integrated management plans for freshwater basins and coastal areas to address the causes and sectorial activities that endanger mangroves, which serve as nurseries for the living resources of the ocean.

Outcome 2: Agricultural productivity is improved in the target landscape through the promotion of sustainable agricultural practices, resulting in greater food security and income generation:

- Promote sustainable management of agroforestry systems through organic farming and conservation, including the introduction of different species of native seeds, green manure practices, and composting for organic fertilizer;
- Improve subsistence farming practices, dairy production, coffee, corn, and fruit processing, as well as cultivation of ornamental plants;
- Promote sustainable use of rangelands by strengthening viable traditional systems; developing mechanisms for resolving conflicts over land use; protection from and management of fires as well as rehabilitation of burned land; and developing groundwater recharge initiatives.

Outcome 3: Options for alternative livelihoods are promoted within the landscape, increasing access to markets and local financial institutions:

- Implement energy efficiency projects, e.g., promoting improved wood and charcoal stoves, contributing to reduced wood consumption, as well as planting hedgerows that can be used for fuelwood production;
- Promote management and recycling of solid waste.

Outcome 4: Institutional capacities of local organizations are strengthened, promoting the exchange of knowledge and information on the efficient use of natural resources, and facilitating participatory decision making about landscape management:

- Provide capacity building and technical assistance to train leaders for sustainable environmental management;
- Facilitate community seed banks to establish and develop a collection of genetic plant resources for recovering traditional crops and sharing these resources with other communities;
- Document local knowledge of traditional and sustainable practices of natural resource use from terrestrial, coastal, and marine ecosystems.

Landscape Project Portfolio

Based on this guidance, nine local projects were selected for El Salvador's portfolio of COMDEKS projects in the target landscape. These projects each focus on a specific subregion and are led by the respective local development associations (ADESCOs) of the different communities. However, all nine projects consist of very similar activities. Proposals were evaluated by the El Salvadorian National Steering Committee of the GEF Small Grants Programme and approved for grants between US$25,000 and US$50,000.

Banana harvest in El Palmo, COMDEKS El Salvador

Table ES-2. Community-Led Projects in the Conservation Area Jiquilisco Bay - Bajo Lempa - Jaltepeque Estuary, El Salvador

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Conservation and Sustainable Livelihoods in the Coastal, Marine, and Terrestrial Ecosystems in La Calzada	Community Development Association of La Calzada US$25,000	Outcomes 1, 2 3, and 4	Restore 40 ha of mangroves and reforest the riverbanks of the Jalponga River to avoid flooding and generate grazing land for livestock. Facilitate continued community monitoring of local biodiversity. Increase agricultural biodiversity for 10 local families through cultivation of native corn and pumpkins. Establish 15 chicken-rearing enclosures to increase income and decrease environmental impacts of livestock. Decrease consumption of firewood through introduction of socially appropriate technologies (SAT), such as Magic Kitchens, Rocket Stoves and solar ovens. Establish wood lots for fuelwood production.
Conservation and Sustainable Livelihoods in the Coastal, Marine and Terrestrial Ecosystems in San Sebastian, El Chingo Canton	Community Development Association San Sebastian El Chingo US$25,000	Outcomes 1, 2, 3 and 4	Conserve and promote the sustainable use of fishery resources, including punche, jaiva, shells, mica, sambo, hilama, guavina, chimbera, catfish, snapper, snook, roncón, pancha, grouper, and shrimp. Build the capacity of 40 families in shellfish aquaculture, establishing 5 nurseries to raise blue crabs. Help local fishers group to acquire 10 fiber canoes. Increase agricultural biodiversity for 5 families through cultivation of traditional crops such as native corn and pumpkins. Strengthen capacities of 10 community members in hammock production. Establish 260 local palm nurseries. Introduce socially appropriate technologies (SAT) to 16 families, with one Magic kitchen and Rocket Stove, as well as solar ovens for each family, while establishing fuelwood lots and decreasing consumption of firewood. Contribute to the restoration of 40 ha of mangrove forest and 3 km of riparian forest along the Jalponga River.

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Conservation and Sustainable Livelihoods in Coastal, Marine and Terrestrial Ecosystems in La Zorra	Community Development Association Colonia Guadalupe Hopes US$30,000	Outcomes 1, 2, 3 and 4	Ensure the protection of local ecosystems and the sustainability of local food security. Establish 20 enclosures for chicken-rearing. Introduce SATs for cooking to 11 families. Promote the sustainable use of local fish and shellfish resources. Assist local fishers to acquire 20 fiber canoes and strengthen capacities of 20 community members to manufacture fishing nets.
Conservation and Sustainable Livelihoods in Coastal, Marine and Terrestrial Ecosystems of the El Salamar Community	Community Development Association Caserío El Salamar Canton San Sebastian El Chingo US$50,000	Outcomes 1, 2, 3 and 4	Restore mangrove and riparian forests in the Jaltepeque Estuary. Establish 10 blue crab nurseries, and establish local fisheries management plans for punche, jaiva, shells, mica, sambo, hilama, guavina, chimbera, catfish, snapper, snook, roncón, pancha, grouper, and shrimp. Establish woodlots for fuelwood production. Cultivate traditional crops such as wild pineapple and creole corn. Establish 10 enclosures for chicken production. Introduce SATs for energy efficient cooking to 10 target families. Improve ecotourism infrastructure to reduce the environmental impact of the tourism industry.
Conservation and Sustainable Livelihoods in Coastal, Marine and Terrestrial Ecosystems of the El Astillero Community	Community Development Association Caserio El Astillero US$25,000	Outcomes 1, 2, 3 and 4	Contribute to the reforestation, preservation, and monitoring of 40 ha of mangrove forest in the Jaltepeque estuary and 3 kilometers of riparian forest along the banks of the Jalponga River. Establish local fisheries management plans for coastal and marine resources, including punche, jaiva, mica, sambo, hilama, guavina, chimbera, catfish, snapper, snook, roncón, pancha, grouper, shrimp. Cultivate traditional crops such as palma, madrecacao, and creole corn. Strengthen capacities in subsistence gardening and handicrafts. Introduce SATs for energy efficient cooking to 10 target families. Establish woodlots for fuel wood.

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Conservation and Sustainable Livelihoods in Coastal, Marine and Terrestrial Ecosystems of the Hamlet Ranchón, Canton La Calzada	Community Development Association Hamlet Ranchón US$25,000	Outcomes 1, 2, 3 and 4	Improve local SEPLS by conserving marine and terrestrial biodiversity. Strengthen local ecotourism infrastructure through formation of a tourism committee and establishment of a location for seafood tasting. Introduce SATs (Magic Kitchens, Rocket Stoves, and solar ovens) for energy-efficient cooking to 22 families. Establish woodlots for fuelwood production. Encourage sustainable agricultural practices.
Conservation and Sustainable Livelihoods in Coastal, Marine and Terrestrial Ecosystems in Colonia Las Camelias	Community Development Association of Colonia Las Camelias US$25,000	Outcomes 1, 2, 3 and 4	Strengthen community capacities to sustainably manage coastal, marine, and terrestrial resources. Contribute to local mangrove restoration by helping 40 families to collect mangrove propagules (chuyas) and establish nurseries for raising them for subsequent planting. Also, promote monitoring and surveillance of mangrove forests. Introduce SATs for energy-efficient cooking to 14 families. Establish woodlots for fuelwood production. Strengthen ecotourism infrastructure.
Conservation and Sustainable Livelihoods in Marine, Coastal and Terrestrial Ecosystems, El Cordoncillo Island	Island Community Development Association El Cordoncillo US$25,000	Outcomes 1, 2, 3 and 4	Improve marine resources management by implementing fishery management plans for coastal species such as jaiva, mica winter, sambo, hilama, guavina, chimbera, catfish, snapper, snook, roncón, pancha, grouper and shrimp. Establish aquaculture facilities to raise shellfish such as Ajalin, Anadara tuberculosa, and Anadara grandis. Cultivate traditional organic crops such as creole corn. Strengthen infrastructure for ecotourism. Strengthen local capacities to produce handicrafts and fishing nets. Introduce SATs for energy-efficient cooking to 11 families, while planting woodlots for fuelwood production.

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Conservation and Sustainable Livelihoods in the Terrestrial Ecosystems of El Palmo Village, Annona Canton	Community Development Association Caserío El Palmo US$25,000	Outcomes 1, 3	Promote sustainable agricultural practices and diversify agricultural products by cultivating traditional crops such as creole corn, vegetables, pineapple, pumpkin, and fruit trees. Help 17 families to decrease their fuelwood consumption and relieve pressure on local forests through the introduction of SATs for energy-efficient cooking, while also planting woodlots for fuelwood production.

Achievements and Impacts to Date

More than 2,460 people (about 492 families) participated in the nine projects in the target landscape. The results of these projects added to and were magnified by other SGP projects supported in the area that were designed to achieve similar sustainable development goals.

- **Conserving and restoring mangroves and gallery forests:** Each of the COMDEKS projects is directly linked to mangrove conservation as a basis for the sustainability of activities in the coastal marine ecosystem. Through planting and restoration activities of some 440 families, the area of mangrove coverage has increased by 760 ha: 400 ha in Jaltepeque Estuary, and 360 ha in Jiquilisco Bay-Bajo Lempa. This has involved collecting mangrove propagules, raising them in nurseries, and planting them out in estuary and shoreline areas. In the area's gallery forests and riverbanks, communities have planted more than 19,000 trees of different native species. Together, these efforts have helped to mitigate the flooding that has plagued neighboring communities during the rainy seasons in the past.

- **Practicing sustainable agriculture, resurrecting traditional crops, and converting to organic agriculture:** Nearly 160 families now use sustainable agricultural practices, including 67 who have converted to organic agriculture. Sustainable practices include planting home gardens, raising poultry in fenced areas, as well as planting traditional crops such as creole corn, pineapple, pumpkin, and a local variety of cacao. Conversion to organic agriculture has started the lengthy process of purging or "decontaminating" local soils of chemical pesticides and fertilizers.

- **Improving local fisheries management:** Through a combination of training in sustainable fishing practices, creation of management plans for local fisheries, establishment of extensive shellfish farming, and purchase of new fishing equipment, fisheries management in the area has greatly improved. As a result, fishery production has risen, with the availability of blue crab, punche, jaiva, shells, mica, sambo, hilama, guavina, chimbera, catfish, snapper, snook, roncón, pancha, grouper, and shrimp increasing considerably. The 45 local fishing families that are participating in these sustainable practices are well aware of the benefits of this behavior change on their livelihoods.

- **Promoting sustainable energy options:** In partnership with the Chilean NGO Canelo Corporation, some 160 families in the area of Jaltepeque Estuary and 90 families in the Jiquilisco Bay-Bajo Lempa area took part in training workshops to build, use and maintain socially appropriate technologies for energy-efficient cooking.

These technologies (Magic Kitchens, Rocket Stoves, and solar ovens) are meant to decrease the amount of fuelwood families use for cooking. In addition, these families also planted hedgerows and woodlots specifically to produce fuelwood, thus creating a more sustainable fuelwood supply. Together, these steps have eased the pressure to overharvest local forests.

- **Strengthening local tourism:** Five communities (54 families) have taken steps to establish tourism as a viable income source in the area by receiving training in providing tourist services such as mangrove tours, lodging, meals, and local crafts. Tourist infrastructure has been improved through the construction of lodgings, docks, and boating facilities. In addition, a Tourism Committee has been established to coordinate infrastructure improvements, tourism training, and to facilitate advertising and service coordination.
- **Developing local handicrafts:** Over 40 families have been trained in production of local handicrafts, including fishing nets and hammocks.
- **Conducting project monitoring and evaluation:** Each of the projects has created a local youth team for M&E. These teams have enabled communities to collect project development information in real time.

Training in the use of Socially Appropriate Technology (SAT) for cooking, COMDEKS El Salvador

Progress at the Landscape Level

COMDEKS projects, and the methodological approach of the Satoyama Initiative, have greatly strengthened the capacities of the local community development associations (ADESCOs) in four key areas: the ability to restore mangrove forests as a primary ecosystem generating many of the livelihoods in the area; the ability to reform local agriculture so that it is both more valuable for subsistence and less polluting and destructive of coastal productivity; the ability to restructure local fisheries management and create new sources of livelihood such as ecotourism and handicraft production; and the ability to preserve local ancestral knowledge related to agriculture and fishing. Since each of these activities was approached on a regional basis, with very similar projects in each community, it presented a good opportunity to develop a landscape community through regular meetings and communication among project representatives. Each community meets once a month to review project activities, and these meetings are frequently the venues for discussing and documenting traditional knowledge as well. Then the leaders of the nine different communities also meet monthly to coordinate and communicate about their projects. The nine communities involved in COMDEKS are also in communication with 10 additional communities in the target area that have received funding for similar projects—using the same general landscape approach—under the GEF SGP STAR program, thus enlarging the size of the landscape community.

Lessons Learned

- Working with a community that has previous experience in project implementation increased the effectiveness and success of COMDEKS activities in the target landscape, facilitating the learning process in other communities. This was the case with ADESCOCASAL, a community development association that had previous experience with the El Salvador SGP Country Program. ADESCOCASAL acted as a local development advisor to COMDEKS communities through the use of a multipurpose center, development of workshops and peer-to-peer capacity building.
- The COMDEKS projects built on the relationships with local community development associations (ADESCOs) that had already begun under previous SGP programming. Working with the leaders and directors of the ADESCOs promoted trust, eased the implementation process, and helped to ensure the equal participation of women, men and youth in all of the project activities. It was also crucial in ensuring the recovery of ancestral knowledge from elders of the communities.
- COMDEKS activities result in a positive social cycle. Continuous capacity building through project activities nurtures the social fabric in communities and improves local governance, while project results reported from the field build confidence in local leaders.

INDONESIA
SEMAU ISLAND

1. The Landscape

Geography

The target area selected as the focus of the COMDEKS project in Indonesia is Semau Island, which is a 265-km^2 island located in the western portion of Kupang District, the Capitol of East Nusa Tenggara Province. Semau Island borders the Sawu Sea in the south, west and north, and the Semau Strait to the east. Administratively, the Island is part of Kupang District and is divided into two areas: the Semau Subdistrict in the north, consisting of eight villages, and the South Semau Subdistrict in the south, consisting of six villages.

Semau Island is a lowland island with the average highest points at 50 m above sea level. It consists of coral and limestone, with a thin layer of soil on the surface. Most soil types found in Semau Island are Mediterranean, latosol, and alluvial with alkali saturation and limited clay content, particularly kaolinite, making it nutrient poor.

For generations, the communities of these 14 villages have survived on the available agricultural and marine resources of the small island. Located in the Wallace bioregion, the island is host to rich marine, terrestrial, and coastal biodiversity. However, given the limited freshwater supply and thin soil layer, both agriculture and biodiversity are increasingly threatened, and the island faces a disproportionate risk from climate change and extreme weather.

Biological Resources and Land Use

Semau Island is a rich ecological habitat hosting monsoon forests, and the surrounding Sawu Sea is home to one of the world's richest coral reef covers. The Sawu Sea is also a critical habitat and migration corridor for 18 sea mammal species, including two endangered species: the blue whale and the sperm whale.

The local monsoon forest consists of tree species shedding their leaves during the dry season and growing new foliage during the rainy season. Some of these species are particularly significant to the lives of the Semau people, as they are used to build houses and boats, and are also sources of food and medicines. In addition to threats from climate change, biodiversity on the island and the surrounding sea is threatened by the excessive use of chemicals in agriculture, which decreases soil fertility and results in chemicals in the soil being carried to the oceans through rainwater. The use of chemicals in agriculture rose in the last two decades and has increased ever since the community was introduced to vegetable seedlings and hybrid corn. Because land cultivation with mechanical equipment is difficult on the karst terrain, farmers rely on herbicides and pesticides to assist with land clearing and weed control. After the land is utilized for farming for 5-6 years, farmers are forced to abandon it with the expectation that the soil fertility will gradually recover. Additionally, deforestation is a serious threat, with trees being cut faster than they can be replenished.

Semau Island coral reefs, COMDEKS Indonesia

Socioeconomic Context

In 2013, the population in Semau Island numbered 11,756, with an average population density of 44 people per square kilometer. The majority of the island's inhabitants belong to two ethnic groups with different cultures and languages: the Helong and the Rote. Until a few years ago, clan leaders governed the distribution of land. Today, the Village Government regulates the utilization of the coast and adjacent shallow waters (extending several hundred meters from the coastline). The people of Semau Island largely depend on farming and fishing for their livelihoods. Seaweed farming, which only started in 2001, has become the main source of income for communities living along the coast. When freshwater from wells is available, short-term cash crops such as fruits and vegetables provide another source of income besides fishing and seaweed farming. Rice and corn, on the other hand, are the community's primary source of food, and these locally grown staple crops are largely kept for family consumption. In addition to farming, raising livestock is important to the people of the island. Fishing occurs throughout the year, except for the rainy season when the monsoon brings high waves and strong winds. Development in Semau Island has been slow, as a number of people believe that the Semau people have magical powers, and prior to 2000, government officials were often reluctant to be sent to Semau Island, resulting in a lack of development initiatives in this region.

2. Key Environmental and Social Challenges

The principal environmental and social vulnerabilities in the target landscape are related to the availability of water and inappropriate agricultural practices and land use. Particular challenges include the following:

- **Limited supply of fresh water for both agricultural and domestic uses:** Rainfall, which is the primary source of water for agriculture, is limited, with an annual precipitation of only 700-1,000 mm. Moreover, there is an insufficient number of wells, which are the primary source of water for drinking and bathing. While the government has constructed dams in several villages, a number of them are malfunctioning or experiencing siltation.
- **Limited knowledge of agricultural practices and extension services:** The District Government has a limited number of agricultural extension staff and rarely conducts any extension services on the island, such as scientific research and dissemination of information on agricultural practices through farmer education. This has resulted in a low level of knowledge on agriculture and sustainable, innovative practices that can increase productivity and income.
- **Soil degradation and pollution due to the inappropriate use of chemicals:** In order to speed the cultivation of farm fields, the community relies heavily on herbicides and pesticides. Unfortunately, the soil types on the island are naturally nutrient poor, and the excessive use of chemicals further degrades soil quality. The result is that farmers are forced to abandon the farmland after 5 to 6 years to let the soil recover. In addition, overuse of chemicals harms local biodiversity, both on land and in the surrounding sea when these chemicals are carried to the ocean in rainwater.
- **Climate change and extreme weather:** The biodiversity and human communities of the island are threatened due to a disproportionate risk from climate change and extreme weather events, which have increased in frequency in recent years.
- **Lack of knowledge and skills to improve livelihoods:** Community groups currently lack the skills and knowledge base to spur local innovation, improve economic activity and increase the local standard of living. Lack of capacity often limits the activity of these groups to constructing basic village infrastructure.

- **Deforestation:** Increasing deforestation in the area, particularly from land clearance for agricultural use, has further threatened biodiversity and sustainable land management.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

On November 14-20, and December 14-17, 2013, the Bingkai Indonesia Foundation conducted a Baseline Survey to determine conditions in the target landscape. Active participation of local communities and other key stakeholders in the Baseline Assessment was assured through literature reviews, field observations, community interviews, and a participatory assessment of community resilience. The Assessment used indicators of socio-ecological production landscapes and seascapes (SEPLS), developed by Bioversity International and the United Nations University, to help measure and understand the resilience of the target landscape. Indicators were adjusted to reflect coastal and sea areas, and one indicator was added to adopt characteristics of small islands and climate risk. Nine small group discussions and six individual interviews with village leaders were initially held. To foster women's empowerment and their effective participation in the planning process, 24 of the participants were women, and two of the small group discussions were attended exclusively by women.

Mapping Semau Island resources and communities during the baseline assessment, COMDEKS Indonesia

A workshop was subsequently held to assess the SEPLS indicators, consisting of 25 participants, five of whom were women. Following this, a second consultation was conducted (33 men, 4 women) to present the results, to discuss key problems and to identify activities that could contribute to the long-term sustainability of the target landscape. Some of the main areas of concern identified were the lack of access to freshwater, the adverse impacts of overuse of chemicals, the need for greater ecosystem protection, and the need for increased agricultural/aquaculture innovation and knowledge.

Landscape Strategy

The Baseline Assessment and Community Consultation gave rise to the COMDEKS Indonesia Landscape and Seascape Strategy, which sets out a slate of four Landscape Outcomes and associated indicators to measure progress toward these outcomes. This long-term plan strives to improve the social and ecological resilience of small island and coastal communities through community-based activities.

Table I-1 lists the four Landscape Outcomes around which the strategy is built, as well as the performance indicators that will be used to measure progress toward these outcomes.

Table I-1. Landscape Outcomes and Indicators from the Indonesia Landscape and Seascape Strategy

Landscape/Seascape Outcomes	Key Performance Indicators
Outcome 1: Preservation of island ecosystem functions through the maintenance of forest cover, as well as coastal, marine, and coral reef systems, and the promotion of sustainable resource use practices.	• Number of hectares of forest land under protection or sustainable use. • Number of hectares of seascape (coastal, marine, coral reef) under protection or sustainable use.
Outcome 2: Enhancement of the resilience of agriculture and mariculture systems through improved and sustainable cultivation practices, diversification of crops, and improved management of water sources.	• Number of community members adopting sustainable agricultural and maricultural management practices, and number of methods implemented. • Number of community organizations managing water resources efficiently and effectively. • Number and variety of new resilient crops and maricultural products promoted.
Outcome 3: Community livelihood improvement through sustainable income generation.	• Number of sustainable livelihoods and income generation opportunities adopted. • Increased household income as a result of supported livelihood activities.
Outcome 4: Creation of institutional governance systems for effective participatory decision making and knowledge sharing at the landscape level.	• Number of community-based institutions created or strengthened that are engaged in integrated seascape/landscape management. • Number and type of policies influenced at the local and landscape levels. • Number of best practices and lessons learned shared among landscape stakeholders.

Yarn dyed with natural colors, COMDEKS Indonesia

Community-Led Landscape Projects

To guide the selection of local projects, the Landscape Strategy for Semau Island suggests a number of activities that would contribute to the accomplishment of each Resilience Outcome:

Outcome 1: Preservation of island ecosystem functions through the maintenance of forest cover, as well as coastal, marine, and coral reef systems, and the promotion of sustainable resource use practices:

- Community education on the benefits of maintaining and conserving clan forests, protected state forests, and coastal and marine ecosystems;
- Introduction to the benefits of coral reefs and fish aggregating devices (FAD) in fishing;
- Training of community groups and village governments on raising and planting artificial coral reefs and using FAD in shallow coastal waters.

Outcome 2: Enhancement of the resilience of agriculture and mariculture systems through improved and sustainable cultivation practices, diversification of crops, and improved management of water sources:

- Training on seed preparation and community education on medicinal plant species and natural plant herbicides;
- Training of village governments on establishing zones for marine aquaculture, fishing, and coastal and marine protection;

- Establishment of a water resources management organization for springs and lakes in and between villages, as well as construction of new water canals or wells;
- Introduction to and demonstration plots for plants that are more resistant to inundations, droughts, high salinity, and extreme weather, as well as for better seaweed cultivation methods;
- Community education on the long-term impacts of chemical fertilizers and pesticides on soil fertility, harvest quality, groundwater, and health;
- Training of community groups on organic fertilizers and pesticides as well as their development and use;
- Facilitating regular experience-sharing sessions and extension services for agriculture and aquaculture in collaboration with experts from the Kupang District Agriculture and Fisheries Extension Agencies;
- Introduction to the benefits of weather and climate forecast information for agriculture, aquaculture and fishing, along with the dissemination of forecasts to the community to make agriculture, aquaculture, and fishing decisions;
- Introduction to and demonstrations of chemical-free land cultivation;
- Development of a study on the ideal land cover, and on water supply and water demand on the Island.

Outcome 3: Community livelihood improvement through sustainable income generation:

- Developing studies and trainings on beekeeping for community groups, as well as increasing awareness on the importance of planting hardwood trees for honey production;
- Training in agriculture and aquaculture product manufacturing, packaging and seed storage methods;

Training workshop on honey processing, COMDEKS Indonesia

- Introduction of sustainable and efficient fishing gear, particularly for seasons of extreme weather, such as the west monsoon period;
- Conducting studies on the opportunities for marketing agriculture and aquaculture commodities from Semau Island on the Kupang and East Nusa Tenggara markets.

Outcome 4: Creation of institutional governance systems for effective participatory decision making and knowledge sharing at the landscape level:

- Promotion of village government regulations or agreements between clan leaders for the maintenance of biodiversity in the target landscape/seascape;
- Lobbying and supporting village governments and clan leaders to make prudent and forwarding-thinking decisions regarding the protection of the remaining clan forests;
- Supporting village governments and clan leaders in the implementation of regulations that prohibit the logging of large trees, as well as with establishing criteria for afforestation.

Landscape Project Portfolio

Based on this guidance, six local projects were chosen as COMDEKS Indonesia's portfolio of landscape initiatives in Semau Island, with grant amounts ranging from US$5,000 to US$50,000.

Table I-2. COMDEKS Community-Led Projects on Semau Island, Indonesia

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Strengthening Sustainability of Drinking Water Access in Semau Island	Perkumpulan Relawan CIS Timor US$40,000	Outcomes 2, 4	Strengthen access to and management of water resources by rehabilitating pipes and wells, establishing agricultural demonstration plots, and conducting workshops and studies on the quality and quantity of water available. Facilitate the establishment of organizations that regulate and manage sustainable water resources in each village.
Strengthening Farmers' Capacity for Organic Farming	Perkumpulan Geng Motor IMUT US$45,000	Outcomes 2, 3, 4	Increase farmers' knowledge of the negative impacts of using non-organic methods of farming. Improve land, water and health quality through sample gardens, planting local food crops and training. Increase the capacity of institutions that practice organic farming through knowledge sharing.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Strengthening Local Governance System for Environmental Protection	Yayasan PIKUL US$50,000	Outcomes 1, 4	Using focus groups, workshops and lobbying, support local community leaders and local governments to develop a vision based on environmental protection. Create model environment protection programs in five villages, and document success stories from these programs.
Strengthening Communities' Capacity to Improve Environmental Conditions	Yayasan Pengembangan Pesisir Dan Laut US$45,000	Outcomes 1, 2, 4	Promote environmental conservation of the seascape and landscape in 5 villages through: workshops; community training; reforestation and revegetation; demonstration plots; cultivation and conservation of sea grass; and increasing local organizational capacity for environmental preservation.
Strengthening Initiatives and Creative Actions of Communities for Semau Island Protection	Koperasi Tapaleuk (KOTAK) US$45,000	Outcomes 1,2,4	Support creative collective action of groups/communities for the protection of seascapes and landscapes through training in sustainable resource management in an accountable and transparent manner. Training focuses on technical and financial reporting, documentation, and sharing of lessons learned.
Menulis Semau (Writing Semau): Training in Documenting Local Experiences and Best Practices	Lopulalan Institute US$5,000	Outcome 4	Collect stories of best practices and experiences of communities in Semau Island by providing writing and documentation training as skills of communication and information dissemination, as well as introducing the concept of island journalism. Lopulalan Institute, based in Bali, is supporting the villagers to write about their COMDEKS-related experiences, including the current situation, challenges and aspirations.

Farming red onions as a climate-resilient crop, COMDEKS Indonesia

Achievements and Impacts to Date

- **Improving water management practices and promoting organic agriculture:** COMDEKS interventions have brought improved agricultural practices that increase water access and decrease the use of agricultural chemicals. These include the establishment of a water conservation area that integrates tree planting with increased access to water by communities and improved irrigation systems. Village water committees have also been formed in each participating village. At the same time, 12 organic agriculture demonstration plots have been established, with crops including bananas, eggplant, capsicum, tomatoes, watermelon, sorghum, and red onions. A concerted effort to increase market access for organic crops in off-island markets is also underway. The combination of better irrigation (using both sprinklers and hand-held devices) and organic culture has led to zero chemical inputs, a reduction in time spent irrigating crops, production of two crops per year instead of one, as well as higher prices for organic produce. Adding to the success of these farm interventions has been the introduction of biogas systems in communities, which has resulted in reduced fuelwood use.

- **Improving marine management and seaweed culture:** COMDEKS marine interventions have focused on better management of the shoreline, improvements in seaweed cultivation, and restoration of mangroves, which were heavily cut to expand seaweed farming. One major advance in terms of decreasing environmental impacts has been the imposition of restrictions on the extraction of beach sand, particularly in Batuinan Village, where a portal was installed to limit sand mining. Meanwhile, improvements in the growth and processing of seaweed have led to higher quality and quantity of seaweed for wholesale, and the development of seaweed-related secondary products has added value to the seaweed farming enterprise. Mangrove restoration is just beginning.

Fishing and seaweed farming are the major sources of income in Semau Island, COMDEK Indonesia

- **Establishing new institutions and networks:** A range of new institutions and networks has been established in different Semau Island communities. These, along with environmental education in schools, have acted as a key mechanism to increase local environmental awareness and planning. More importantly, these new institutions have created governance platforms for community members to act on this increased awareness. Perhaps the most important new institutions are local Environmental Forums, which have been formed in seven communities. These forums include participation of customary authorities, community leaders, community groups and government authorities. They were established at the village level to ensure restoration of damaged ecosystems and to build a system for continuing sustainability of these ecosystems. These local forums also participate in inter-village meetings so that issues of broader concern can be discussed and planned for in a collaborative manner. A number of other new partnerships and groups have also been formed in addition to the village Environmental Forums. These include the Springs Management Agency, the Institute of Village Community Empowerment (LPMD), the Village Water Management Institute, organic farming groups, and a women's group focusing on hand weaving. In Uiboa Village, villagers established a nursery group to raise endemic tree seedlings, which will be distributed to families for their home gardens. The producers cooperative KOTAK also expanded its membership.

- **Negotiating new agreements to protect community resources:** The formation of Environmental Forums and other new institutions has resulted in a variety of new environmental commitments by local clan leaders, village governments, and community members. These agreements cover a wide range of activities from watershed protection, to irrigation and agricultural production, to seaweed farming and mangrove restoration. For example, in Batuinan Village, community members have agreed to hold a 3-ha water catchment area as a conservation zone, with the land owners agreeing not to lease this land for other purposes and community members agreeing to limit the number of private wells in the surrounding area in order to raise the water

table. In addition, village members have agreed to plant some 1,650 mahogany trees in their family gardens to regenerate local forest cover. Village churches in Batuinan have even agreed that couples getting married or baptized should each plant two trees in their home gardens. In Uitiuhana Village, villagers established a nursery to raise endemic tree seedlings to be planted on an 11-ha area donated by the clan leader. A draft agreement accompanying this tree-planting effort specifies nursery and forest management rules (trees can't be cut for 20 years) and a monitoring system.

- **Mapping local environmental governance leaders:** Little time has passed since the implementation of COMDEKS projects, so changes in the quality of local environmental governance cannot be assessed yet, although it can be said that the inclusion of women and youth has improved. To help in assessing governance changes, PIKUL (a local NGO) has produced a comprehensive baseline that, among other things, mapped 93 local leaders and social innovators (69 men and 24 women), including landowners, clan leaders, community leaders, community groups and government. The map provides an important overview of the ecosystem of actors with decision-making power regarding the utilization of resources in villages, gardens, forests, water, coasts and marine areas and will support a future assessment of changes in governance quality.

Progress at the Landscape Level

The establishment of so many local environment-focused community groups and the forging of a considerable number of formal, written environmental commitments at the village level is evidence of a strong participatory trend among Semau Island communities in environmental governance. As yet, this interest is mostly confined to local village matters, and is also mostly segregated into clan and ethnic groups. To date there has been little mixing

Community briefing on the SEPLS concept, COMDEKS Indonesia

among the two different ethnic groups, who tend to live in different areas and work in different enterprises. This is also true of COMDEKS projects, which tend to be focused within one ethnic group or the other. On the other hand, the seven different Environmental Forums have established a mechanism for inter-village meetings to discuss issues that reach beyond the village level, which could be considered the beginning of an island-wide landscape community. In addition, COMDEKS groups have also met to share lessons among themselves, and there has been robust support from government and clan leaders of all COMDEKS projects, creating a fertile environment for future collaboration.

Lessons Learned

- Some terminology used in the baseline assessment does not have any similar terms in the Indonesian language, which caused communication issues. Other terms, such as "ecological link" and "environmental service," do have similar terms, but are not familiar to the local community. Thus, preparing pictures and illustrations was helpful for explaining such unfamiliar terms. Also, presenting the SEPLS table on large-scale paper was useful in facilitating communication and discussion, particularly when it was not possible to project slides due to a lack of electricity.
- With regard to the scoring mechanism for SEPLS Resilience Indicators, facilitators (and participants) had difficulties in assigning scores when questions had more than one subject to be scored. Therefore, some questions that contain more than one subject to be scored should be separated into two (or more) questions. Similarly, when assessing landscapes and seascapes together, questions and indicators should be kept separate between 'land' and 'coastal-marine.' Dividing the indicators and criteria helps participants to differentiate between subjects for scoring.
- The Baseline Assessment highlighted that addressing current problems seemed more important to the local community than anticipating future risk. Farmers were more eager when describing their current situation than assessing SEPLS indicators.
- Discussions with individuals and groups were more dynamic than assessing SEPLS scores. Scoring seemed to distract people from participation as they were spending considerable time trying to understand the purpose, the terms and the process.
- When presenting the results of the Baseline Assessment, participants expected more quantitative data on natural resources (such as coverage area of coral reefs and mangroves, as well as distribution and types) and more detailed economic and livelihoods data, as compared to the conventional survey. Such requests were voiced by the National Steering Committee.
- Assigning facilitators from grantee NGOs and CSOs to small groups, and arranging individual and group discussions throughout project implementation, significantly helps with the collection of data, which can be used as supporting elements to facilitate SEPLS resilience assessment.
- For monitoring and evaluation in the future, baseline data should be collected for every activity of the project. For example, a project related to increasing the number of honeybee farms requires information on the number of existing honeybee farms in every village for monitoring and evaluation. The Baseline Assessment of the current project does not provide such detailed quantitative information.
- Actor mapping to understand responsibilities and roles of stakeholders in the target landscape significantly contributes to successful project design and implementation.

Corn is a local staple crop, Semau Island, COMDEKS Indonesia

KYRGYZSTAN
LAKE ISSYK-KUL

1. The Landscape

Geography

The target landscape selected as the focus of COMDEKS activities in Kyrgyzstan is a coastal strip around Lake Issyk-Kul, located in Issyk-Kul Province. Lake Issyk-Kul is the largest lake in Kyrgyzstan; it is one of the 25 largest lakes in the world and the seventh deepest. It is located in the northeastern part of the country between the mountain ranges of the Northern Tien Shan at an altitude of 1,609 m above sea level. Lake Issyk-Kul extends from west to east for 182 km, and from north to south for 58 km, with a surface area of 6,236 km^2. Being an inland lake, there are up to 80 tributaries running into it. The lake water is slightly salty, with a salinity of 0.59 percent. The maximum lake depth is 702 m, with the average depth being 278 m. Issyk–Kul is the second most transparent lake in the world after Lake Baikal.

The COMDEKS target area is a coastal strip that extends for 688 km, limited on one side by the surf line of the lake and on the other by a highway and several mountain areas nearby which are part of the local nature protection territories Issyk-Kul State Reserve and Sarychat-Ertash State Reserve. Known for its beauty and historic character, the area faces pressure from the influx of tourists in summer, which can at times exceed the carrying capacity of local ecosystems, making protection of this pristine ecosystem increasingly important.

Biological Resources and Land Use

Known for its inimitable beauty, Lake Issyk-Kul is rich in natural resources and biodiversity, with a number of areas under the protection of the Issyk-Kul State Reserve and wetlands protected under the Ramsar Convention. However, over the last 50 years, the ecosystem has suffered significantly, partly through tree felling and the inappropriate uprooting and burning of local sea buckthorn thickets. Experts estimate that the degradation of some coastal ecosystems has reached a critical stage, and without urgent protection and restoration measures, this environmental degradation may become irreversible in the near future. Poorly regulated fish farming puts an additional strain on the target landscape, as predatory fish species make their way from nursery ponds into the lake, threatening the natural endemic fish population. Studies have shown that Lake Issyk-Kul is vulnerable to the industrial-scale use of its fish resources and that only recreational fishing is advisable here.

With the collapse of the Soviet Union and the transition from a collective to a private property system, much of the land was abandoned and withdrawn from economic use, leaving many of the irrigation wells nonfunctional today. Moreover, the condition of pastures in the lake's coastal zone has deteriorated through uncontrolled grazing, which has led to replacement of valuable forage grasses with prickly and poisonous plants. For this reason, large areas of formerly productive land in the target area are currently unused. Regaining use of this land as a productive landscape once again will require a number of measures, including rehabilitating wells, introducing drip irrigation systems, reducing cattle grazing, reviving traditional knowledge of plant cultivation, and developing greenhouse farms, among other actions. In addition, it is necessary to protect and restore natural ecosystems adjacent to the productive land areas.

Constructing a nursery pond for the red-listed Central Asian Frog in Kuturgy village, COMDEKS Kyrgyzstan

Socioeconomic Context

Issyk-Kul Province has a population of over 400,000 people, mostly employed in the tourism and agriculture sectors. Livestock production is a critical aspect of the local farm economy, and many people are also involved in fishing activities. In spite of an increasing focus on agricultural production, the local population strongly depends on food imports from nearby Kazakhstan, Russia, and China.

Due to a heavy dependence on livestock production, overgrazing has led to the replacement of forage grasses with poisonous plants, threatening human and livestock health. Furthermore, the growing agricultural sector relies heavily on the use of chemical fertilizers and pesticides, with the potential of polluting the lake ecosystem. While on average lower than the national level, poverty rates in certain districts around the lake are high, with up to 75 percent of the population living in poverty in some areas. As a result, communities are highly dependent on the local ecosystem for resources, leading to excessive use, soil erosion, water pollution, deforestation and subsequent land degradation.

2. Key Environmental and Social Challenges

The overall challenge faced in the target landscape is the deterioration of natural ecosystems due to the improper use of natural resources and the increased development of tourism. In particular, this includes:

- **Deforestation and removal of sea buckthorn:** Over the past 50 years, the area under flood plain forests has shrunk due to rapid deforestation from tree felling and the uprooting and burning of sea buckthorn, a shrubby plant that plays an important role in the purification of the lake's surface and ground water. Due to agricultural development of the coastal area, sea buckthorn thickets now cover only a few thousand hectares—only about one third of the sea buckthorn cover that existed on the north shore of Lake Issyk-Kul 20 years ago.
- **Overgrazing and reduced public health:** Uncontrolled grazing has led to the replacement of valuable forage grasses with prickly and poisonous plants, deteriorating the condition of pastures and threatening human and animal life. According to local observations, pasture conditions have deteriorated substantially over the last 50 years. In addition, livestock is a source of a number of transmissible diseases, so livestock grazing on the shoreline poses a threat to human health and damages further tourism development in Issyk-Kul.
- **Uncontrolled fish farming:** Uncontrolled fish farming has resulted in farmed predatory fish species migrating into the lake, thus threatening several endemic fish species.
- **Increased use of chemicals in agriculture:** The increasing use of fertilizers and pesticides poses a significant threat to the lakeside environment, as these substances can be discharged into the lake and impact water quality and ecosystems in and around the lake.
- **Increased tourism:** The development of tourism infrastructure and services has resulted in a significant increase in the number of tourists in recent years. The rapid increase in the number of visitors to Issyk-Kul (which has grown to about 1,000,000 annually) has strained local ecosystems, making the decline in ecological conditions more acute. In addition, the unregulated and largely unplanned development of tourism and agriculture in the area has led to poor land use decisions and increased environmental pressures.
- **Poverty rates:** While lower than the national average, poverty rates are quite high in some areas, with up to 60-70 percent of the population living in poverty.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

In October 2013, a Baseline Assessment was carried out by the American University of Central Asia to understand the current state of the landscape and to identify potential interventions to develop sustainable livelihood activities in the context of sound biodiversity management. A group of experts in various disciplines, such as biodiversity, ecosystem productivity, sustainable agriculture, sociology, irrigation, and renewable energy, visited over 50 communities surrounding Lake Issyk-Kul to involve them in the assessment process. Over 20 presentations and small workshops were conducted and over 280 community members participated in the Baseline Assessment workshop, following which the resilience indicators were scored by 18 community delegates, both men and women. Based on results of the workshop, expert studies, and recommendations proposed, a Landscape Strategy was developed with the long-term goal of enhancing the resilience of the socio-ecological production landscape.

Landscape Strategy

The overall objective of the COMDEKS Country Programme Landscape Strategy in Kyrgyzstan is to protect natural ecosystems and enhance the resilience of the local socio-ecological production landscape through community-based activities.

Table K-1 details the four Landscape Outcomes around which the Landscape Strategy has been built, along with Key Performance Indicators used to measure progress toward these Outcomes.

Degraded land threatens lakeside ecosystems near Balykchy Bay, COMDEKS Kyrgyzstan

Table K-1. Landscape Outcomes and Indicators from the Kyrgyzstan Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: Restoration of degraded landscapes and coastal ecosystems, along with their sustainable management, to ensure a continued provision of ecosystem services.	• Number of hectares (area) and types of degraded ecosystems in the landscape that have been restored. • Number of hectares (area) of degraded ecosystems in the landscape brought under sustainable land/resource management. • Number of people within the landscape communities participating in biodiversity conservation and sustainable land management activities funded by COMDEKS (disaggregated by gender).
Outcome 2: Sustainable agricultural practices implemented across the landscape to enhance and revive traditional conservation and production practices, and the adoption of eco-innovative technologies.	• Number of hectares where more sustainable land use and agricultural practices are implemented, by type (i.e. traditional and innovative practices). • Number of communities participating in sustainable agricultural practices promoted by COMDEKS.
Outcome 3: Livelihood and wellbeing of target social groups sustained and enhanced through the development of livelihood enterprises in line with local traditions and cultures.	• Increase in household income and assets as a result of supported activities. • Number and type of livelihood enterprises or alternative income sources established and sustained.
Outcome 4: Strengthened institutional capacity at the landscape level to integrate conservation and production in the management of the target landscape.	• Number of institutions (or participatory governance mechanisms) created or strengthened that are engaged in integrated landscape management. • Number and type of plans and decisions relevant to the target landscape that are agreed and implemented. • Number of COMDEKS lessons learned and best practices captured at the program level.

Community-Led Landscape Projects

The Landscape Strategy sets out strategic guidelines for selecting community-led projects for each of the four Resilience Outcomes. The guidelines include suggested project activities such as:

Outcome 1: Restoration of degraded landscapes and coastal ecosystems, along with their sustainable management, to ensure a continued provision of ecosystem services:

- Restoration of degraded land in the coastal zone of the lake, taking into account climate change adaptation measures;
- Forest restoration activities (protection and restoration of riparian tugai forests and bushes) to enhance landscape connectivity and increase landscape resilience;
- Revegetation in drylands;

- Restoration of wetlands near the lake;
- Zoning of coastal areas and the creation of ecological corridors and community coastal ecosystem reserves to enhance landscape connectivity;
- Creation of nurseries of wild endemic and Red Book plant species;
- Restoring populations of animal and plant species in the coastal zone that are listed in the Red Book of Kyrgyzstan.

Outcome 2: Sustainable agricultural practices implemented across the landscape to enhance and revive traditional conservation and production practices and the adoption of eco-innovative technologies:

- Development of sustainable agricultural applications of permaculture and bioorganic farming in areas bordering the coastal ecosystems;
- Sustainable pasture management in the coastal zone of the lake;
- Protecting and enhancing ecosystem services, such as water flows and water quality, through restoration of forest patches and soil/water retention infrastructure;
- Diversification of agricultural landscapes (such as through agroforestry);
- Low-input agriculture, soil conservation, improved water management and water efficiency (through mulching, cover crops, revegetation, fallow, intercropping, crop rotation);
- Creation of demonstration zones for water-efficient technologies, including drip irrigation and rainwater harvesting;
- Changes in crop and herd management.

A spirulina algae farm in Tamchy village, COMDEKS Kyrgyzstan

Outcome 3: Livelihood and wellbeing of target social groups sustained and enhanced through the development of livelihood enterprises in line with local traditions and cultures:

- Promotion of innovative practices at pond farms, such as hydroponics and the restoration of Red Book fish species, to mitigate the strain on Lake Issyk-Kul;
- Development of sustainable farming practices as an alternative to animal husbandry, including beekeeping, cultivation of medicinal herbs, energy-efficient greenhouses, ecotourism;
- Planting of fast-growing tree species to protect local natural forests from deforestation;
- Use of renewable energy sources to reduce the felling of coastal thickets and to restore land productivity.

Outcome 4: Strengthened institutional capacity at the landscape level to integrate conservation and production in the management of the target landscape:

- Development of cost-valuation maps for climate change adaptation measures in the coastal zone;
- Capacity building of local communities and raising the quality of environmental education in schools (knowledge and skills in using the scientific method of bio-indication, restoration of ecosystems in practice, drip irrigation, use of renewable energy, ecotourism, etc.);
- Creation of an exhibition on the biodiversity of Lake Issyk-Kul and its conservation;
- Issuing publications on the lake's biodiversity and sustainable agricultural methods;
- Documentation of traditional knowledge concerning sustainable management of natural resources;
- Establishment of a school for sustainable farming and appropriate networking.

Water saving measures in Jenish village, COMDEKS Kyrgyzstan

Landscape Project Portfolio

The COMDEKS Kyrgyzstan Country Strategy has a portfolio of 15 local projects, supported by small grants of US$10,000 to US$50,000 (see Table K-2).

Table K-2. COMDEKS Community-Led Projects in Lake Issyk-Kul, Kyrgyzstan

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Community of 'Kara-Oi' Village Saves Endemic Tree Species in Local Dendrological Park	Kar-Oibagy (PF BOB) US$21,820	Outcomes 1, 2, 3, 4	Conservation of the "Kara-Oi" dendrological park in the north beach area of Lake Issyk-Kul, through the introduction of drip irrigation and the creation of nurseries to raise endemic species of trees and bushes, including sea buckthorn.
Conservation of the Whooper Swan in the Balykchy Bay of Lake Issyk-Kul	EneJurogu (PF EJ) US$10,750	Outcomes 1, 4	Conservation of the habitat of the whooper swan (Cygnus cygnus) and other wetland bird species, through the bio-remediation of petroleum-contaminated soils in the area of Balykchy Bay and development of bird-watching tourism.
Establishment of a School of Sustainable Farming and Households in Issyk-Kul Province	Jamaat School of Sustainable Development and Households (JSSDH) US$32,500	Outcomes 2, 3, 4	Conservation of the coastal ecosystem in Irdyk Bay by setting up a specialized outdoor educational zone for demonstration of non-waste agriculture and dissemination of sustainable farming practices among local farmers.
Saving Agrobiodiversity of Local Fruits and Restoration of Degraded Lands in Kara-Bulun Bay of Lake Issyk-Kul	Jamaat Kainar-Bulagy CBO (JKB) US$22,000	Outcomes 2, 3, 4	Restoration of 100 ha of degraded lands in the Kara-Bulun Bay and conservation of endemic species of fruit and berry plants through the introduction of drip irrigation and dissemination of sustainable farming practices among local farmers.
Preservation of the Central Asian Frog in a Community Wildlife Reserve in Kuturgu Village	Jamaat 'Topol' (Topol) US$15,980	Outcomes 1, 2, 3, 4	Establishment of a community wildlife reserve for preservation of the habitat of the Central Asian frog (Rana asiatica) in the village of Kuturgu, Tup Rayon, in Issyk-Kul Province, and development of ecotourism infrastructure and services.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Issyk-Kul Fishermen Save Endemic Species of Fish in the Lake	Foundation of Biodiversity Conservation (PF FBC) US$26,500	Outcomes 1, 2, 3, 4	Preservation of the Lake Issyk-Kul ecosystem through the restoration of endemic fish populations, using the grounds of the biological research station in Cholpon-Ata town for rearing ponds. Renewable energy technologies will be used during the fish-rearing process.
Creation of a Community Micro-Reserve for Protection of Wetland Birds in the Coastal Zone of Lake Issyk-Kul near Chon-Sary-Oi Village	Dialog of Cultures and Civilizations (PA DCC) US$25,000	Outcomes 1, 2, 3, 4	Preservation of the biodiversity of wetland birds in a coastal zone of the village Chon-Sary-Oi, through the creation of a community micro-reserve on 2.5 hectares of degraded lands, and through the development of ecotourism infrastructure and services.
Community of Zhenish Village Saves Local Wild Berries and Revives Traditional Fruit-Growing	Jamaat Dastan (JD) US$25,000	Outcomes 1, 2, 3, 4	Preservation of endemic sea buckthorn-barberry thickets on 6.7 ha in the Zhenish village coastal zone through the creation of a community micro-reserve and the restoration of 16 ha of degraded lands through organic fruit cultivation.
Women's Group from Ak-Dobo Establishes "Golden Bee Farm" Near Issyk-Kul State Reserve	Jamaat Altyn Aary (JAA) US$15,000	Outcomes 1, 2, 3, 4	Preservation of biodiversity in the "Kokui-Kol" site of the Issyk-Kul State Reserve buffer zone, through the strengthening of women's leadership, establishment of a social enterprise for beekeeping, and development of ecotourism services in Ak-dobo village in Issyk-Kul Province.
Knowledge for Preservation of Issyk-Kul's Biodiversity for Everyone	Union of the Photo Journalists (PA UPJ) US$35,500	Outcomes 1, 3, 4	Conducting widespread information campaigns for the population of Issyk-Kul Province, and the creation of a natural history museum of the "Issyk-Kul Biosphere" territory in the town of Balykchy.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Building of a Partnership Platform for Preservation of Red-Listed Mammals in Issyk-Kul Biosphere Territory	Zhashyl Bilik (PFZB) US$50,000	Outcomes 1, 3, 4	Strengthen the cooperation between protected areas of Issyk-Kul Province and the local communities in their buffer zones in order to preserve red-listed mammals. Development of ecotourism infrastructure to reduce the environmental impact of tourism in the target landscape.
Protection of Issyk-Kul's Agrobiodiversity by Strengthening the Rules and Regulations on Biosafety	CSR Central Asia (PA CSRCA) US$35,000	Outcomes 2, 3, 4	Preservation of local agrobiodiversity in Issyk-Kul Province by strengthening the legislative framework on biosafety and conducting an information campaign to promote organic agriculture and inform the public on the risks of using GMO products.
Community of Lipenka Village Saves "Alive Silver" of Lake Issyk-Kul	Issyk-Kul Pond (PA IKP) US$31,000	Outcomes 1, 2, 3, 4	Preservation of the biodiversity of Lake Issyk-Kul through establishment of a fish farm in Lipenka village and restoration of endemic fish species such as Marinka (Schizothorax) and Osman (Diptychus). Special breeding conditions are created through the use of renewable energy in rearing ponds. An information campaign for the local population and the development of ecotourism near the fish farm are important elements of the project.
Growing of Sea Buckthorn and Cultivation of Medicinal Herbs by an Elderly Women's Group in Grigorievka Village	Intuition (PAI) US$34,000	Outcomes 1, 2, 3, 4	Preservation of medicinal plants growing in Issyk-Kul Province by an elderly women's group in Grigorievka village, in cooperation with the Permaculture Center. Special greenhouses equipped with solar heating collectors will be used for cultivation of medicinal herbs, mushrooms and special types of sea buckthorn.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Community in Tamchi Village Uses Advanced Technologies on Cultivation of Waterweed	Dialogue of Cultures - One World (PF DCOW) US$50,000	Outcomes 1, 2, 3, 4	Establishment of a social enterprise in Tamchi village for cultivation of waterweed (Spirulina), which is used as a high-calorie and medicinal food additive for cattle. This will allow a reduction in the total volume of forage required for local cattle and protect local pastures from overgrazing. The community will use a special phyto-bioreactor powered by renewable energy and use water from a local mineral spring.

Community greenhouse at the site of a hot mineral spring in Kyzyl-Suu village, COMDEKS Kyrgyzstan

Achievements and Impacts to Date

- **Conserving local biodiversity through micro-reserves and policy coordination:** Several COMDEKS projects resulted in significant steps to preserve local threatened plant and animal species. To protect 35 ha of the Kara Oi Dendrological Park (home to an endemic tree species), a detailed plan on restoring the park's irrigation system was developed, a drip irrigation system was purchased, and a tree nursery for growing endemic species was created. In the village of Kuturgu, a community wildlife reserve was created to preserve the habitat of the Central Asian frog, while in Chon-Sary-Oi village, a micro-reserve was created for wetland birds on 2.5 ha of degraded land. To help protect the Snow Leopard—an IUCN Red List species—one COMDEKS project provided technical and expert support in establishing a Snow Leopard Secretariat to ensure conservation cooperation among 12 countries in the Snow Leopard's range. In the Balykchy Bay area, bio-remediation of oil-contaminated soils was used to restore lakeside habitat of the whooper swan. (See Table K-3 for a complete list of lake areas restored, protected, or brought under sustainable management.)

- **Enhancing the performance of state protected areas in both lakeside and mountain habitats:** Several COMDEKS projects have improved the functioning of local protected areas, such as Sary-Chat-Ertash State Reserve and Issyk-Kul State Reserve, which together encompass nearly 100,000 ha of lakeside and mountain habitat. COMDEKS activities in and around these reserves gained the attention of both the government and the public, which led to accumulation of funds and subsequent improvements in infrastructure and management. For instance, one COMDEKS project provided the necessary technical and expert support to formulate a Management Plan for Sary-Chat Ertash Reserve. One result has been installation of solar photovoltaic panels at the guard post, providing lighting at night and improved working conditions. In Ak-Dobo village, another COMDEKS project created a bee farm as a community enterprise on the border of Issyk-Kul State Reserve, which created the conditions for development of ecotourism, and prompted the State to allocate funds for renovation of the local guard post and other infrastructure to better serve tourists.

- **Demonstrating drip irrigation, endemic fruit trees, and other sustainable agricultural practices:** Several demonstration zones for drip irrigation have been established, with the one in Kyzyl Suu village being the largest (30 ha) such demonstration in the country. In addition, a demonstration zone for organic agriculture was set up in the Irdyk Bay area. Other sustainable farming approaches promoted were the growing of endemic pear, apple, cherry, and apricot trees, and the culture of a thornless variety of the local endemic oblepiha berry. One COMDEKS project contributed to protection of the native barberry bushes growing along the lake and established a small enterprise built around barberry fruit products such as jams and dried berries. Together, these practices will help reduce anthropogenic pressure on the coastal ecosystem.

- **Restoring endemic fish populations.** Two social enterprises in Lipenka village have been started by local communities to restore populations of two endemic fish species (Marinka and Osman). Rearing tanks are heated with solar energy. At the moment, these two are the only such fish farms in Kyrgyzstan run on ecological principles. Cultivation of endemic fishes is expected to have a positive influence on the 10,000 ha of the lake's littoral (near-shore) zone–the habitat of the endemic and other species of fish.

- **Supplying sustainable livelihood alternatives.** COMDEKS projects created 18 opportunities for income generation in 14 communities. One notable example is the cultivation of waterweed (spirulina) for cattle feed, using a special bioreactor powered by solar energy. The high-calorie cattle food, which is currently used by some 100 farmers, helps to relieve grazing pressure on local overgrazed pastures. Another example is the cultivation of medicinal herbs in solar greenhouses, an effort employing about 117 people seasonally. Still another is the establishment of a beekeeping enterprise called the "Golden Bee Farm."

- **Creating and promoting an ecotourism infrastructure.** COMDEKS projects contributed to the development of local ecotourism in several places around the lake. For example, the Issyl-Kul Natural History Museum was built in the city of Balykchy through a cooperative arrangement with the Kyrgyzstan Agency on Nature Protection and Forestry. The museum was created as a tourist attraction and to address the lack of public knowledge about local ecosystem conditions and the possibilities for more sustainable practices. The museum, which opened in May 2016, has displays on local biodiversity and conservation practices. It also serves as a place to collect and analyze traditional knowledge on sustainable management of the local landscape. It is expected to attract some 80,000 people annually, as it is located right at the entrance to the city. In another example, the Golden Bee Farm in Ak-dobo village was designed with tourists in mind, and gives tours on "the life of the bee hive" for children and adults. Tourist infrastructure and opportunities were also created at bird-watching areas in Sary-Oi village and Balykchy City, and the fish farm in Lipenka Village has a learning and demonstration area as well.

- **Disseminating educational materials and lessons learned.** A student manual called "Learning from Nature" will be made available to local schools, while 4-color posters encapsulating project learning ("Lessons on Sustainable Irrigation," "Drip Irrigation" and "Renewable Sources of Energy") will be circulated locally. Project fact sheets on all COMDEKS projects are also available on the GEF website and for local use.

- **Affecting policy at the national level.** Some COMDEKS projects had direct effects on national policy, particularly the project to strengthen the national law on biosafety and the regulation of GMO products. At a more general level, COMDEKS projects contributed to the implementation of the objectives of the National Strategy for Sustainable Development of Kyrgyzstan for the period of 2013-2017, in which sustainable agricultural development is defined as a national priority. This contribution was acknowledged by the advisor of the Ministry of Economy and the vice-premier. The portfolio of COMDEKS projects will further contribute to generating necessary conditions for local organic production and eco-certification in Issyk-Kul. In addition, steps were taken to widely replicate and promote COMDEKS project experiences all over the country, with the GEF SGP Office organizing several educational seminars for communities and farmers in six other oblasts (Chui, Talas, Naryn, Osh, Jalalabad and Batken).

COMDEKS grantees exchange their experiences at a workshop in Karakol City, COMDEKS Kyrgyzstan

Table K-3. COMDEKS Landscape Management Outcomes in Lake Issyk-Kul, Kyrgyzstan

Place	Hectares Protected or Restored	Hectares Sustainably Managed	Beneficiaries (Approximate)	Ecosystem Type
Kyzyl-Suu Village, Kara-Bulun Peninsula	100 ha	100 ha	1000	Stony subdesert near southern shore of Lake Issyk-Kul
Balykchy Bay	5000 ha	2 ha	43,000	Stony desert in western coastal area of Lake Issyk-Kul
Kara Oi Dendrological Park	35 ha	35 ha	100	Flood plain forest near north shore of Lake Issyk-Kul
Yrdyk Bay	5000 ha	0.56 ha	1000	Subdesert in the eastern coastal area of Lake Issyk-Kul
Biological station in Cholpon Ata	--	4.36 ha	100	Littoral zone of Lake Issyk-Kul
Grigorievka Village	--	6 ha	100	Stony subdesert in the northern coastal area of Lake Issyk-Kul
Jenish Village	9.7 ha	22.7 ha	400	Stony subdesert in the southern coastal area of Lake Issyk-Kul
Kuturgu Village	13.2 ha	13.2 ha	100	Wetlands along the northern shore of Lake Issyk-Kul
Ak-Dobo Village	2,320 ha	1 ha	100	Wetlands along the southern shore of Lake Issyk-Kul
Lipenka Village	--	3.1 ha	100	Wetlands along the southern shore of Lake Issyk-Kul
Sary-Oi Village	2.5 ha	0 ha	100	Wetlands along the southern shore of Lake Issyk-Kul
Tamchy Village	--	1 ha	100	Stony subdesert in the southern coastal area of Lake Issyk-Kul

Progress at the Landscape Level

The planning and implementation process for the 15 projects in the Kyrgyzstan COMDEKS portfolio brought together a wide range of government officials, local civil society groups, and business associations, creating a solid foundation for future collaboration in landscape governance. This included 15 NGOs/CBOs, 14 local authorities in different jurisdictions around the lake, the Governor of Issyk-Kul Province, officials from all local Protected Areas, the Ministry of Economic Development, fruit-growers and beekeepers associations, Issyk-Kul State University, the National Academy of Science, and the State agency on nature protection and forestry. Special efforts have been made to continue the collaboration, particularly among local civil society groups in the landscape, with the creation of a network of COMDEKS NGOs/CBOs, with several workshops and knowledge fairs already conducted.

The Kyrgyzstan COMDEKS Programme has also been active in disseminating its work to government officials so that it can affect governance policy throughout the Lake region and beyond. The GEF SGP Office closely cooper-

ated with the administration of Issyk-Kul Oblast, informing the Governor and his team of the positive examples and lessons learned during the implementation of the initiative. The best practices of COMDEKS projects were offered as examples for wider dissemination and integration into the development plans of Issyk-Kul Oblast, as well as the Strategic Plan for the Development of the Issyk-Kul Biosphere Territory.

Two innovative demo-zones (an "eco-household" with a bio-cleaning system for cattle manure and a fish farm operating on solar energy) were created in cooperation with the Ministry of Economy of Kyrgyzstan, which is going to widely share related experiences in Kyrgyzstan. Advanced studies on soil bioremediation methods–the first in Kyrgyzstan–were also continued.

In cooperation with the National Centre of Climate Change, the COMDEKS project in Kyrgyzstan also contributed to the development of the Issyk-Kul Oblast's landscape forecasting maps reflecting climatic changes; a map of climate change adaptation costs has been compiled already along with practical recommendations regarding locally appropriate adaptation and mitigation.

Lessons Learned

- Realization of the Landscape Strategy is only possible if strong multi-stakeholder partnerships are built. To achieve this under the pilot initiatives of the COMDEKS project, numerous informational and educational meetings with local stakeholders were held. These included representatives of local authorities, community leaders, farmers' and water users' associations, pasture committees, women's and youth groups, etc.

- A specialized electronic mailing system for NGOs in Issyk-Kul Oblast that was created as part of COMDEKS activities proved very useful in ensuring a widespread and timely dissemination of news and information on COMDEKS projects to the public.

- Cross-project activities are very effective. For example, the grantees from all COMDEKS projects collaborated to create the exhibits in the Issyk-Kul Natural History Museum in the city of Balykchy. The result is that all the best practices from the individual projects are presented there, as well as traditional knowledge of sustainable landscape management in Issyk-Kul. All the participants are encouraged and proud of their joint efforts.

- If projects align with current efforts already underway in the government, it can increase their policy influence at the local and national levels. For instance, Kyrgyzstan now is joining the Eurasian Customs Union and is therefore focusing on development of the agricultural sector, making COMDEKS efforts well-aligned with government efforts and well-timed to capture the interest of policymakers.

- Cooperation with scientific institutions is very important, as it helps to avoid some of the risks associated with introducing technical innovations, such as the soil decontamination, spirulina cattle feed supplement, and other innovations COMDEKS projects have promoted.

- Innovation in the use of technology was a key element in achieving many project results. For example, bioremediation was used for the first time in Kyrgyzstan to restore wetland habitat for whooper swans. Elsewhere, a bio-cleaning system to process cattle waste was deployed in cooperation with the Ministry of Economy. In addition, solar energy was used in several instances to warm fish ponds and nurseries. These examples show that eco-innovations can greatly aid the success of local projects if deployed intelligently, and can help these successes become more noticeable and widely disseminated.

Solar panels provide power for "sustainable irrigation" of endemic tree species in Kara-Oi village, COMDEKS Kyrgyzstan

MONGOLIA
CENTRAL SELENGE

1. The Landscape

Geography

The target landscape selected as the focus for COMDEKS projects in Mongolia is the Central Selenge area. Located in Central Mongolia, the landscape stretches from the southeast towards the north, covering 628,856 ha of mostly forest steppe and mountain territories, as well as cultivated lands. Administratively, the area extends into seven different soums (rural districts). Lying in a transitional zone between the boreal forests of Siberia and the Mongolian steppe, Selenge is one of the main crop and vegetable growing areas in the country and is home to a large animal and plant biodiversity. The region's forest steppe and mountain ecosystems border two state protected areas, the Khan Khentii Strictly Protected Area and Tujiin Nars National Park, and contain a considerable number of community-protected forest areas as well.

Biological Resources and Land Use

The target landscape is home to diverse ecosystems, including considerable wildlife such as bears, lynxes, foxes and wolves, along with various species of birds and fish. Forests cover approximately one third of the landscape, with pine and larch being the predominant trees. Pine nuts and various types of mushrooms are widely available, and the area is rich in wild fruits such as strawberry, red currant, black currant, blueberry, blackberry, black cherry, sea buckthorn and raspberry.

Composed of well-developed river systems, protected areas and community forests, the area has a relatively high number of community forestry groups compared to other regions in the country. These groups receive only administrative support from the local government. As in other areas in Mongolia, land in the target area is state-owned, with the exception of land in and around settlement areas that is slowly being privatized. Pastures are free for use everywhere in the country, and cropland is rented to farmers for up to 60 years.

Due to its natural forest cover and topography, the target area holds great potential for agroforestry development. However, environmental stability in the region is currently at risk due to several factors, including forest and water depletion, climate change and environmental pollution.

Socioeconomic Context

With a population of about 42,500 originating from the major Mongolian ethnic khalkh group, the Central Selenge region has strong social networks. Unemployment rates are low, ranging between 6 and 14 percent, with crop farming, animal husbandry and mining being the primary economic activities. Cropland covers 88,437 ha, of which 56,625 ha are cultivated with wheat, 3,483 ha with potato and vegetables, 3,819 ha with fodder crops, 310 ha with fruits and 24,200 ha lie fallow. Livestock includes horses, cattle, sheep, goats and a small number of camels. The total number of livestock in the target landscape averages 600,000 animals, but this number fluctuates from year to year and also throughout the year.

In the region, the primary socioeconomic concern is widespread poverty coupled with increasing inequality. Poverty is a recent phenomenon in Mongolia. Until about 1990, there was virtually no poverty in rural areas. The government and rural collectives made sure that everyone was supplied with basic goods and access to a full range of public services. Poverty is a direct consequence of the transition to a market economy in the 1990s, after the collapse of the Soviet Union and Mongolia's centrally planned economy. Benefits and assistance dried up with the privatization of industry and state farms. Incomes shrank, inflation devoured purchasing power, and people had to bear the cost of health and education services. Presently, one in three people in Mongolia are poor, and the number of poor people grows as the income gap widens. Poverty is becoming entrenched not only in urban centers but also in rural areas, where about half of the country's poor people live.

Additionally, over the last 20 years, there has been an increase in the migration of rural herders towards settlement areas. Three towns are situated in the target landscape, namely Darkhan, Sukhbaatar and Zuunkharaa. As rural people lose livestock and crops due to environmental degradation and the heightened frequency of natural disasters—such as droughts and worsening climate change effects—they can no longer survive on agriculture, and move to urban areas seeking employment.

2. Key Environmental and Social Challenges

The principal environmental and social vulnerabilities in the target area center around environmental and ecosystem degradation, which are further exacerbated by climate change. Since the region is crippled by widespread poverty, environmental deterioration has disproportionately serious consequences for the local population.

Key environmental and social challenges include:

- **Forest depletion:** The forestry sector suffers from a lack of investment, an inadequately trained workforce, obsolete machinery and unclear institutional responsibilities.
- **Illegal logging and timber extraction:** There are considerable human influences on forest ecosystems in the region, including timber cutting, overgrazing and forest fires. Due to industrial development, wood consumption has increased, leading to unsustainable timber removal, with about 60 percent of the total harvest being illegal.
- **Weakened institutional structures:** Until recently, forest degradation was exacerbated by the absence of strong community-based forest management organizations, corruption at all levels of management and inefficient financial management. In this respect, the institutionalization of participatory forestry management is another challenge in the near future.
- **Overgrazing and depleted pastures:** Within the last two decades, pastures have degraded at an increasing rate due to harsh weather conditions and an increase in the concentration of livestock and people. Grazing pressure by livestock has the most significant impact on pasture in the target area, contributing to its rapid depletion.

Perimeter trees protect crops from wind damage in Selenge Province, COMDEKS Mongolia

- **Climate change and extreme weather events:** Over the last six decades, Mongolia has experienced a 1.8°C increase in annual mean temperatures, changes in the duration of heat and cold waves and changes in the pattern and predictability of rainfall. Extreme weather events such as drought and dzud (an extremely cold and snowy winter) have also increased in frequency and intensity. All of these phenomena are attributable to or aggravated by climate change, and will put a further strain on ecosystem services and the agriculture sector in the future.
- **Water source depletion:** High mountain glaciers are melting at a rapid rate and permafrost is degrading significantly. The groundwater level is falling and land degradation and desertification have worsened as a result of water shortages and the lack of precipitation.
- **Loss of biodiversity:** The target area possesses a number of internationally threatened animal and plant species. These biological resources have faced an increasing threat from illegal hunting, land degradation, water shortages and climate change, combined with urbanization and industrial expansion and a growing population. Moreover, poor governance and law enforcement, along with the rapid development of urban settlements, have greatly contributed to the loss of biodiversity in the area.
- **Poverty and inequality:** Poverty is a widespread issue in Mongolia, with the poverty rate stable at 36 percent since the early 1990s. Poverty is higher in rural areas than in urban areas (43.4 percent vs. 28.6 percent), with an increasing gap between the rich and poor.
- **Migration:** Over the last 20 years, the migration of rural herders to settlement areas has become a widespread phenomenon. Being employed in the agricultural sector increases the chances of being poor, due to the loss of livestock caused by environmental deterioration and frequent natural disasters like dzud, in which livestock are unable to find fodder through the snow cover.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

The Baseline Assessment conducted by the Sustainable Development-Environment Foundation in 2013 included the participation of a range of community groups, government representatives, civil society organizations, and other local stakeholders in the Central Selenge target area. Several workshops involving 36 participants were held, both with stakeholders and community groups, where participants gave scores to SEPL indicators using the Resilience Indicator Scorecard. Community members and other stakeholders outlined several types of projects that addressed some of the problems faced by the region, with activities ranging from diversification of agricultural landscapes and agroforestry systems, to constructing local dams and ponds, and the promotion of ecotourism and agrotourism in the region.

Landscape Strategy

The Baseline Assessment and Community Consultation led to the COMDEKS Landscape Strategy for Mongolia, which identifies four main outcomes along with their respective impact indicators to measure progress towards these outcomes. The overall objective of the Mongolia Landscape Strategy is to improve ecosystem resilience and the resilience of production systems through the development of sound biodiversity management and sustainable livelihood activities with local communities to maintain, rebuild and revitalize socio-ecological production landscapes. This goal is broken down into four Landscape Outcomes along with Key Performance Indicators, as detailed in the Table M-1 below.

Table M-1. Landscape Outcomes and Indicators from the Mongolia Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: Biodiversity conservation strengthened and ecosystem services restored, by linking or cohering advanced farming and traditional livelihood practices with protection of and conservation measures in community protected areas.	• Number of hectares within the landscape protected for their ecological and cultural importance.
Outcome 2: Food security in the target landscape enhanced by increasing productivity and sustainability of agroecosystems through agroforestry, watershed restoration, agrobiodiversity management and farming practice diversification.	• Type and number of resilience-enhancing agricultural practices introduced to promote food security. • Number of hectares within the target landscape where innovative practices in agricultural biodiversity management are promoted. • Percent of local population that is under-nourished.
Outcome 3: Livelihoods of communities enhanced through diversification of agricultural products, income-generating activities and development of community livelihood enterprises.	• Increase in household income and assets as a result of supported activities. • Number of alternative income sources created through livelihood diversification. • Number of people practicing sustainable land use management and other eco-friendly nonagricultural activities
Outcome 4: Institutional governance systems created and/or strengthened through participatory decision making processes and knowledge sharing at the landscape level.	• Number of community groups established or strengthened that are engaged in integrated landscape management. • Number and type of policies influenced at the local, landscape, and national levels. • Number of best practices and lessons learned shared among landscape stakeholders.

Processing green fodder for cattle feed during cold weather, Selenge Province, COMDEKS Mongolia

Community-Led Landscape Projects

To guide the selection of local projects, the Landscape Strategy identifies key areas of focus and suggests a number of projects along with project selection criteria to help guide the development of project proposals. Key focus areas are projects that promote the diversification of agricultural landscapes and agroforestry systems, as well as forest and ecosystem restoration activities that will enhance landscape resilience and connectivity. The landscape strategy suggests activities to achieve the individual outcomes, such as:

Outcome 1: Biodiversity conservation strengthened and ecosystem services restored, by linking or cohering advanced farming and traditional livelihood practices with protection of and conservation measures in community protected areas:

- Forest and ecosystem restoration activities that also enhance landscape connectivity and increase landscape resilience;
- Restoration of river water flows and water quality by protecting and enhancing forest ecosystem services;
- Promotion of multipurpose and multi-tree plantations to improve ecosystem resilience as well as to support local livelihoods;
- Promotion of eco- and agrotourism and establishment of visitor centers.

Outcome 2: Food security in the target landscape enhanced by increasing productivity and sustainability of agroecosystems through agroforestry, watershed restoration, agrobiodiversity management and farming practice diversification:

- Community garden development in areas under a community forestry scheme;
- Restoration of riparian areas, wetlands and watersheds;
- Support for initiatives on crop diversification, livestock production and crop-livestock-trees integration.

Outcome 3: Livelihoods of communities enhanced through diversification of agricultural products, income-generating activities and development of community livelihood enterprises.

- Construction of community ponds/dams to accumulate and regulate small stream and spring flows to use for restoration, conservation and livelihood improvement purposes;
- Diversification of agricultural landscapes and agroforestry systems, including silvo-pastures, windbreaks, shelterbelts, riparian forest buffers and integration of crops, livestock and trees in the context of climate change adaptation;
- Support for beekeeping activities and strengthening existing beekeeping associations;
- Activities supporting diversification of livelihoods and income generation connected to biodiversity conservation;
- Support for handicraft production;
- Promotion of fertilizer production using livestock manure;
- Introduction and use of community wood-saving and wood-replacing technologies.

Outcome 4: Institutional governance systems created and/or strengthened through participatory decision making processes and knowledge sharing at the landscape level.

- Capacity building for local governance on issues related to landscape problems and opportunities through policy dialogue, etc.;
- Establishment of participatory decision-making and planning processes/mechanisms and knowledge sharing;
- Establishment of local working groups, networks or associations of community organizations;
- Improvement of access to credit and markets through development of appropriate business plans.

Landscape Project Portfolio

Based on this guidance, 20 projects were selected as part of COMDEKS Mongolia's portfolio of landscape projects, with grants ranging from US$12,580 to US$32,401 (see Table M-2).

Local CBO members explore new avenues for marketing their products, COMDEKS Mongolia

Table M-2. COMDEKS Community-Led Projects in Central Selenge, Mongolia

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Community Development Integrated With the Management of Tujiin Nars Protected Area	Bayanchatsargana Khos Bayankhangai US$25,377	Outcomes 1, 2, 4	Establish a collectively managed green zone to increase community resilience, reduce overgrazing and combat land degradation by assisting communities to introduce new conservation and livelihoods enhancement practices, which in turn contribute to improved capacities and knowledge of community members to promote sustainable farming and environmental consciousness. Activities include growing fodder and vegetables, setting up greenhouses and enriching soil in order to improve livelihoods and sustainability.
Riparian Area Development and Grazing Management Near Baruunharaa Village	Tod Kharaa, Kharaagyn Khishig, Devshil US$30,316	Outcomes 1, 3, 4	Develop adaptive community management of the riparian area by demonstrating their ability to conduct combined protective and livelihood enhancing activities, like adaptive pasture management, that will ultimately contribute to the rehabilitation of land and pastures on the river bank.
Developing Production Landscapes Adjacent to Community Protected Areas	Teregt, DH Oyu, Eden and Baigali Eej Mungulung ur (SGP supported) US$21,014	Outcomes 1, 3	Increase the productivity of pastures and landscapes by coordinating conservation activities and strengthening the collaborative support of community protected areas. Create new income-generating activities by establishing community fruit gardens, beekeeping activities, and reforestation initiatives and by making handicrafts.
Protecting and Enhancing Forest Ecosystem Services by Practicing Nature-Supporting and Income-Generating Activities	Eviin Khuch, Urun Baigal, Ulaan Biluut, Bat US$36,471	Outcomes 1, 3, 4	Enhance forest ecosystem services by raising seedlings for afforestation, planting willow trees along springs and small streams and fruit trees in community gardens located in community forestry practice areas, and by developing ecotourism in the area. Enhance governance of community forests through collective management of community conserved areas (CCAs). Generate income through production of nontraditional products such as tomato, buckwheat, potato, barley, wild onion and garlic.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Strengthening Orhon Beekeeping Communities and Community Garden Development to Advance and Educate Communities	Erdenet Zogii US$ 25,449	Outcome 3, 4	Strengthen local beekeeping communities by building capacities, increasing product yields and improving the packaging of honey. Establish community gardens to educate, train and support beekeepers in planting and raising honey plants and bees.
Introduction of Wood-Saving/Soil Bag Construction Technology and Initiation of Agrotourism	Clean Energy US$29,059	Outcome 3	Introduce a "soil bag construction technology," where soil bags replace wooden materials used to construct walls. Activities involve training in the use of this technology and the construction of four small "soil bag houses" as demonstration sites. These houses will be used to accommodate tourists who wish to stay with the community, thus building a foundation for the development of eco- and agrotourism in the region.
Handcrafting and Capacity Building for Knowledge Management	Duuren Sanaa US$32,401	Outcome 3	Provide training in the production of souvenirs and handicrafts from beeswax, wood, wool and nontimber forest resources to improve income-generating capacities of communities.
Community-Based Riparian Ecosystem Protection Initiative	Nutag Action Research Institute US$22,074	Outcome 2	Rehabilitate 10 km of the Kharaa river banks near Tunkhel village in Selenge Province in close cooperation with local community groups by establishing a river protection/sanitary zone along the river, restoring pasture land on both river banks, planting fast-growing trees and setting up recreation facilities for both locals and tourists.
Knowledge and Technology Transfer Centre for Local Communities	Clean Energy US$23,260	Outcome 3	Set up a "Satoyama Initiative" community technology transfer center built with soil bag construction technology to provide consultancy services on a range of rural environmental issues and challenges, conduct trainings, transfer community-applicable technology and spread knowledge and lessons learned to communities.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Strengthening COMDEKS Communities' Capacity in Institutional Development and Participation in Governance	Fund for Citizen's Ecological Education US$26,289	Outcome 4	Establish a "Green Wave" Satoyama Initiative Promotion Center in Tunkhel village to continue assisting COMDEKS communities in Mongolia. The Center will spread the spirit of the Satoyama Initiative, including the COMDEKS landscape resilience approach, to neighboring communities as well as to other regions. It will conduct regular activities, including adaptive management trainings and consultancies to achieve continuing progress toward the four COMDEKS landscape outcomes.
On-Line Selling and Intermediary Services for Biodiversity Products of Communities Experiencing Satoyama Initiative	Center for Nomadic Mongol US$17,580	Outcome 3	Assist COMDEKS and SGP grantees in accessing markets with their biodiversity and agrobiodiversity products by designing and running an on-line trade fair (e-commerce platform), which will be a principally new channel for selling ecologically clean products in the country.
Community Seed Banks	Great Roots Seedling Raisers' Association US$ 16,702	Outcomes 1, 3	Initiate community seed collection to promote community seed libraries or banks to improve food security and income generation, conserve genetic diversity of crops and make use of a wider range of genes, species and ecosystems by collecting and preserving native seeds.
Mandal's Future: Agrotourism	Mandakh-Enerelt US$ 12,580	Outcomes 1, 3	Promote community-based agrotourism combined with ecotourism conducted in community protected areas around Tunkhel village as an innovative approach towards sustainable agriculture and tourism in the target landscape.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Mongolian New Satoyama Groups: Community Participatory Landscape Planning for Biodiversity Conservation, Ecosystem Resilience and Sustainability.	Cradle of Intellect US$30,263	Outcome 4	Conduct a participatory landscape planning exercise for four distinct locations in the COMDEKS target area to identify activities to be followed over the next few years to further ensure biodiversity conservation, ecosystem resilience and sustainability in the target landscape with initial activities such as field studies, data collection, processing and analyzing, and ultimately collaborative planning with all stakeholders, based on current achievements and results of implementation of a number of COMDEKS grants in the target area.
Supporting Community Forestry Groups by Providing Consultancy Services on Drying Vegetables and Producing Food Additives for Local Markets	Metastori US$13,830	Outcome 3	Assist COMDEKS communities in redesigning and improving traditional dairy products as well as in producing new biodiversity products. Includes introduction of a drying technology to increase food production during summer time, when communities usually forego many opportunities to produce food due to lack of cool storage.
Creating Green Jobs and Livelihood Income Sources with Agro-Ecological and Agro-Biological Measures	Rich Fertilizer US$14,052	Outcomes 2, 3	Promote community enterprises to produce organic fertilizers by composting livestock manure as an agroecological measure to improve soil structure and fertility, thereby decreasing the use of chemical/ mineral fertilizers, creating green jobs with alternative income sources and promoting low-input agriculture.
Bio-Fertilizer	Green Guard Center US$15,862	Outcomes 2, 3	Introduce a vermicomposting practice among 23 community groups as a principally new activity to produce bio-fertilizer or organic fertilizer. This practice could make use of the annual 3 million tons of livestock manure. Mongolia overall counts 50-55 million head of livestock, emphasizing the large national potential for vermicomposting for organic fertilizer.

Project	Grantee (NGO/Civic Association)	Contribution to Landscape Resilience Outcomes	Description
Kharaa River Willow Grove	Munkhtsetseg Tal US$20,726	Outcome 2	Support local community efforts to protect and rehabilitate the Kharaa riverbanks, an important ecosystem keeping the river alive. Activities include fencing the riparian protection zones of the river and planting over 4,000 willow trees within the fence boundary.
Improvement of Farming Systems to Support Ecosystem Services in Satoyama Landscape	Women Environment and Development US$17,047	Outcomes 1, 2	Encourage and assist smallholder crop and vegetable farmer communities to implement agroecological measures. These include creation of green belts around crop and vegetable fields, and promotion of organic fertilizers to improve soil quality and increase yields at the same time.
A Baseline Landscape Evaluation After the Implementation of the Community Development and Knowledge Management for the Satoyama Initiative (COMDEKS) Project	Fruit Mother Garden US$24,990	Outcome 4	Conduct ex-post baseline assessments to evaluate the implementation of the COMDEKS Landscape Strategy in Mongolia as well as to further promote an adaptive management process among COMDEKS communities. This includes producing case study material, conducting community consultations and acquiring information about the current state of the landscape to adjust goals and approaches, if necessary, and to ultimately inform new planning and action.

Greenhouses extend cultivation periods in cold climates, COMDEKS Mongolia

Achievements and Impacts to Date

- **Transforming community views of the landscape and encouraging joint action:** The new concepts of the landscape brought by COMDEKS along with its new measurement approach using "indicators of resilience" have changed the way local people think about their pastures, forests, and fields. Communities are now well aware of the Satoyama concept and understand the importance of production landscapes to environmental protection and overall ecosystem functioning. The significance of joint action or activities directed at an ecosystem level is now well recognized by communities. As COMDEKS' integrated approach has been applied, cooperation among community groups as well as different community members has increased and strengthened. In fact, COMDEKS' landscape projects have helped activate and socialize communities, ensuring broader participation, and also strengthening the local organizations leading these projects. The net effect is that communities are more prepared now to work together to achieve landscape-level benefits.

- **Practicing better pasture management:** Pasture conditions and soil quality have been improved through better management of cattle in pasture areas. One key strategy in this effort is the growing of two types of green fodder to ease pressure on pastures during winter, fall, and spring. Using this approach, animals are kept in shelters and fed green fodders during the cool seasons that have been reserved for that purpose, thereby keeping pastures from being overgrazed. Herders report that livestock kept this way are fitter and more productive than those pastured year round. Due to its success, communities such as Altanbulag that have piloted this approach are now ready to allocate additional land to growing green fodder.

- **Instituting agroecology practices to reduce agricultural impacts:** Communities have taken steps to reduce the environmental impact of their farms and increase their production through sustainable practices. One such practice is planting green belts around their vegetable and crop fields, which function as wind breaks and erosion control barriers. Some 300,000 tree seedlings have been planted so far around smallholder farmer fields. Another practice is the manufacture of organic bio-fertilizers by composting animal dung to enrich soil fertility and improve soil structure, as well as to decrease the use of chemical fertilizers. Sixteen communities have begun manure composting, producing some 30 tons of bio-fertilizer in the first year. In a related effort, 23 communities have instituted a vermicomposting practice, in which earthworms produce compost from animal dung. Dung is widely available in the area due to the large number of livestock raised locally.

- **Creating community seed banks:** In an attempt to conserve genetic diversity of local food crops and improve food security, communities are in the process of creating local seed banks of native foods. After receiving training last year on seed collecting, communities are now embarking on organized seed collection campaigns as the basis for local seed banks.

- **Restoring river riparian areas:** Two COMDEKS projects have rehabilitated degraded sections of riverbank along the Kharaa River and protected river riparian zones through fencing, pasture management, and revegetating the riverside area by planting over 4,000 willows and other fast-growing trees within the fenced protection zone. Since farming communities tend to locate near the river, riparian management has become a high priority. Greenhouses have been set up to raise willow and other seedlings, both for use in the restoration work and for income generation. In addition to riverbank restoration, recreational facilities were also constructed along the river for the use of both tourists and local people along a 10-km river section near Tunkhel village.

- **Planting community fruit gardens and mixed vegetable gardens:** Six community fruit gardens have been established and planted with some 8,000 fruit trees that will begin bringing in revenue in 2017. In addition, eight existing community gardens have been strengthened and expanded with COMDEKS assistance. These gardens have not only added to local food security, but have become important social gathering places and centers of local development. Another contribution to local food security has been the introduction and field testing of a solar drying technology which allows preservation of local dairy and vegetable products that formerly could not be preserved during summer months due to lack of refrigeration.

- **Developing alternative income sources:** A number of new income-generating activities have been piloted and promoted in the Central Selenge area through COMDEKS projects. Local beekeeping has been strengthened with the addition of new hives and capacity building to increase product yields and improve honey packaging. Efforts were also made to train beekeepers in raising plants in community gardens that promote honey production. Over the last two years, about nine tons of honey have been produced, yielding over US$80,000 in revenue. Handicraft production has also been promoted, with 64 community members receiving training in crafting products of wool, wood, and beeswax. Some 2,000 woolen items have already been produced; a local trade fair and on-line sales (through a recently designed e-commerce platform) have been organized to provide outlets for these products. Fruit and ornamental tree seedlings are also being mass produced now for sale, with the 600,000 raised so far netting some US$187,000.

- **Creating a tourism infrastructure and training tourism skills:** Seven communities in Mandal soum were assisted with identifying tourism products and establishing hiking and walking routes in community protected areas. They also received training in basic tourism services. At the same time, an innovative construction technology using soil-filled bags to form walls was used to construct three houses to provide tourist lodgings in the area. The soil bag construction technique, developed at the Hiroshima University of Japan, reduces expense and replaces the use of wood for structural stability. Ecotourism and agrotourism will commence in summer 2016.

COMDEKS landscape projects in Central Selenge have strengthened local organizations and broadened community participation, COMDEKS Mongolia

Progress at the Landscape Level

Prior to COMDEKS projects, community groups in the target landscape primarily acted individually and separately. The COMDEKS landscape approach has brought communities together to act collaboratively at the landscape level, calling for collective action and joint activities to achieve common goals and integrated objectives. It has had the effect of mobilizing communities at a larger scale, along with removing financial and technical barriers faced by community groups. It has also supported increased transparency and accountability of community activities. At the same time, local authorities have developed a positive attitude toward communities involved in COMDEKS projects due to their strengthened capacity and well-organized nature. This has had the effect of creating a much more dynamic and interactive atmosphere among the 20 local CBOs and associations that have participated directly in COMDEKS in the target landscape. These local organizations have formed an association, called Mongol Satoyama Group, to unite and coordinate their future work. In 2015, they built a community development center in Tunkhel Village where, beginning in 2016, they will convene community dialogues, meetings, special trainings and adaptive management seminars, and landscape planning sessions to carry on the COMDEKS work. Already, the group has participated in a landscape planning exercise as a follow-on to the COMDEKS projects, in which activities in four distinct places in the COMDEKS target area were identified to be carried out over the next few years to continue the work on biodiversity conservation, ecosystem resilience and sustainability begun under the COMDEKS Programme. The Mongol Satoyama Group thus has the potential to form the backbone of a true landscape community. It could even become a regional institution to raise awareness and lead landscape activities in the future, not only in the Central Selenge, but in the whole country. A new SGP grant has been approved to support the development of the Mongol Satoyama Group into this kind of participatory decision-making and knowledge-sharing body, and to provide technical assistance.

Lessons Learned

- Prior to COMDEKS activities in the target landscape, communities were indifferent towards taking conservation measures in socio-ecological production landscapes, presuming that these landscapes were for farming and industrial activities and would remain so in the future. The COMDEKS Programme has changed this attitude and broadened their understanding of modern environmental protection concepts and perspectives. The use of resilience indicators was a key part of this attitude change. The use of these indicators was valuable not only for community members, but also for government and other stakeholders to better understand the state of the environment, plan relevant activities at the landscape level, and evaluate project results and outcomes.
- While the concept of SEPLS and the Satoyama principles have been powerful ideas in the target landscape, they have also been a challenge to apply to grassland ecosystems, where there seems to be less experience worldwide. To be best oriented for the future application of the landscape approach in Mongolia, the SGP Mongolia team will need to do some additional research and experimentation, including internet searches for best practices in grasslands, as well as a participatory planning exercise among local groups with the clear goal of realizing the Satoyama concept on Mongolian soil.
- There is a traditional proverb in Mongolia which says: better to see once than to listen 100 times. Since we are close to Japan, some grantees have expressed their interest in seeing the original Satoyama lands in order to learn more and gain a deeper understanding, even at their own expense! More video presentations on Satoyama lands would be desirable for communities to view and understand the concept of landscape sustainability.

Local products bring increased income, COMDEKS Mongolia

NAMIBIA
IIPUMBU-YA-TSHILONGO CONSERVANCY

1. The Landscape

Geography

The COMDEKS target landscape for activities in Namibia is the Iipumbu-ya-Tshilongo Conservancy, spreading across 154,800 ha and located in the Otamanzi and Uuvudhiya constituencies of the Oshana and Omusati regions of northern Namibia. With the Etosha National Park at its southern boundary, the Iipumbu-ya-Tshilongo lies within a transboundary wetland shared almost equally by Angola and Namibia. This wetland is called the Cuvelai-Etosha Basin and consists of hundreds of drainage channels (called *iishana*, singular *oshana*) that emerge and diverge hundreds of times. Most *iishana* in the target area are dry for much of the year, and when water flow does occur, it ranges from tiny trickles to broad fronts of flood waters, inundating most parts of the basin. The basin has no

sea outlet, however, when the northern parts of the basin receive a lot of rainfall, water will usually flow into the Etosha Pan via the *iishana*, thereby creating a spectacular ecosystem that supports a diverse array of bird and other animal wildlife.

The rainfall season is generally from November to April and the landscape stretches over two rainfall zones. The northern part of the landscape receives an average of 400-450 mm rainfall per year, while the South receives 350-400 mm. In terms of elevation, the landscape lies between 1,100 and 1,200 meters above sea level. Moving in the east-west direction, the landscape is extremely flat, with little change in altitude or relief. However, there is a gradual reduction in altitude when moving north to east towards the Etosha Pan.

In terms of vegetation and soils, the landscape can be divided into two distinct areas. Vegetation in the southern part of the landscape is predominantly shrublands dominated by the mopane tree. The soil is a mix of alluvial clay and aeolian sandy soils, which are generally salty as a result of high rates of evaporation. The northern part of the landscape is characterized by a combination of deep Kalahari sandy soils on higher ground and water-borne clays in the low-lying channels and plains. The sands and clays are molded and mixed to form fertile soils which can support agriculture. Consequently, the majority of the communities are in this area, and this has led to greater land degradation than in the south.

Biological Resources and Land Use

One of Namibia's most notable characteristics is its extraordinary biodiversity, which consists of a wide range of mammal, bird, amphibian and plant species. Because of the aridity of the country, the distribution of species is often dependent on rainfall patterns. Currently, approximately 50 percent of species in Namibia are of conservation concern, mostly as a result of a history of poaching, or because of habitat loss due to agricultural production. It has been estimated that about ten mammal species have already become locally extinct, and species such as zebras and lions have experienced a 95 percent reduction in number over the past 200 years. Conservation efforts, driven largely by the creation of the system of conservancies, as well as support from governments and NGOs, have helped to restore previously declining populations of lions, cheetahs, black rhinos, and zebras. Currently, in the Iipumbu-ya-Tshilongo Conservancy, there is no structured system for managing wildlife within the conservancy. Animals are able to move fairly freely from the nearby Etosha National park, which can lead to conflict with grazing livestock and farmers. Additionally, increasing freshwater scarcity is a threat to local plants and animals.

Land use in Iipumbu-ya-Tshilongo is divided into three distinctive zones: crop farming, livestock farming, and conservation and tourism. Approximately 75 percent of the land is dedicated to crop and livestock farming, with these land uses predominantly found in the northern part of the landscape. Of all the crops, pearl millet (locally known as Mahangu) is by far the most common and widespread. Small areas of sorghum, maize, and vegetables are grown as well, but mahangu is the favored staple cereal. The vast majority of crops are produced on dryland or rainfed fields.

Livestock farming is predominantly cattle farming, followed by goat farming. There is seasonal grazing of livestock, where livestock are moved between the residences of their owners in densely populated areas and distant grazing lands, called cattle posts. Most movements are within the areas of jurisdiction of the cattle owners' traditional authorities. The 2011 census data shows that the population density of cattle was one per square kilometer, and that, on average, each household owns 10-15 cattle, primarily from the local Ngunis (Bos Taurus) breeds. The remainder of the land in the southern part of the conservancy is dedicated to tourism and conservation efforts.

The largest challenge facing the target landscape across the three zones is scarcity of water. There is lack of availability of permanent and sufficient sources of non-saline water. The landscape, located in a semiarid area with relatively poor soil quality, is very susceptible to drought and flooding, and the majority of the population relies on the *iishana*, which collect water in low areas. However, these are not a reliable source of consistently available, clean water. This scarcity is putting increasing pressure on the ecology of the region, on agricultural production, and on the well-being of local communities in Iipumbu-ya-Tshilongo.

Socioeconomic Context

The total population of the Iipumbu-ya-Tshilongo Conservancy is estimated to be 13,500, with an average population density of just 10-14 people per square kilometer, and the majority settled in the northern part of the conservancy. Although approximately a quarter of the land is set aside for conservation efforts and tourism, the population is highly dependent on agriculture and livestock farming for survival. Due to the lack of available freshwater, the majority of crops produced are using a "low-input, low-output" system to mitigate the risk of crop loss due to inadequate rainfall or pests. As a result, crops are limited mostly to production of staple foods such as pearl millet, although small areas of sorghum, maize, and vegetables are also grown.

Namibian land policy allows communities to proactively address habitat conservation and natural resource protection, resulting in a system of over 70 conservancies. Conservancies are created within existing communal areas, where local community leaders enter into collaborative management agreements with the state. Members of the conservancy are given shared rights to the land, which cannot be entered or occupied without permission from local authorities and the conservancy management.

Mapping exercise during the landscape strategy development, COMDEKS Namibia

A vast majority of community members live on small farms to which they have customary user rights, which are administered by the Uukwaluudhi Traditional Authority. There are approximately 1,500 of these holdings, most of which cover less than 10 ha. Households in the landscape traditionally depend directly on natural resources for most of their needs. These include grazing of grasslands for livestock, poles from trees for fencing and home construction, wild fruits (e.g., marula fruits) for consumption and production of beverages, grass for thatching and production of baskets, and wood for fuel, fish traps and storage containers and many other uses. Poorer households are more dependent on natural resources compared to wealthier households; hence, poorer households are at a severe disadvantage in areas where community land resources have been diminished. Unsustainable use of natural resources as well as deforestation is evident in the landscape.

2. Key Environmental and Social Challenges

The principal environmental and social vulnerabilities in the target landscape are:

- **Reduction in ecosystem services, particularly for livestock farming:** In the 1980s, the changing climate, population growth, and unsustainable utilization of natural resources greatly disrupted the landscape's previously intact ecosystems, resulting in a decrease in carrying capacity of the grazing lands and a shortage of water for farmers and livestock. These impacts led farmers to move further towards Etosha Pan to look for crucial pasture and water sources for their livestock, and better lands for agriculture. Therefore, the trend observed in the area is a decreasing capacity of the landscape's ecosystems to provide services that support livelihoods.

- **Deforestation:** This is primarily driven by tree cutting for fencing, home construction, and household energy requirements. However, community forest initiatives and other efforts, such as encouraging people to switch to bricks for building materials, are gradually yielding results, as is the promotion of alternative energy sources and energy-efficient stoves. The net effect is that woodland areas are slowly increasing in number.

- **Loss of agricultural biodiversity:** Local or indigenous mahangu (pearl millet) varieties in the landscape are disappearing, partly due to the fact that very few community members are growing these local varieties. According to community members, this shift in varietal preference is partly driven by government food security projects that have promoted the use of improved millet varieties at the expense of the local varieties. Unfortunately, the new varieties are not well adapted to the local climatic and soil conditions, thus they do not grow as well as local varieties. If nothing is done to address this loss in agricultural biodiversity, indigenous varieties of mahangu may be lost.

- **Negative impacts of climate change:** The current climate change projections indicate that the inter-annual climate variability (drought and flooding) will become more frequent and intense. Droughts and floods are not new phenomena in the landscape, but in recent years these two hazards have become more severe, according to community members. Climate variability is also affecting the crop production season, particularly for mahangu. Other negative factors are also affecting household food security, including increasing levels of soil degradation, increasing surface water runoff as a consequence of decreased soil permeability; and increasing evapotranspiration. The result of this combination of factors has been livestock losses, reduced milk production (due to reduced grasslands available for foraging) and lower crop production.

- **Lack of appreciation for ecosystems:** Lack of knowledge or awareness of the significance of local ecosystems and their importance to daily life contributes to ecosystem degradation, particularly in the face of pressing survival needs. For instance, household energy and building needs are currently superseding the concern for protecting and preserving the forest. As a result, the landscape exhibits gradual but steadily increasing deforestation.

- **Weak institutions for biodiversity and ecosystem protection:** During the consultative process, it was clear that most stakeholders are aware of the national laws that protect ecosystems and biodiversity such as forests. However, enforcement of these laws at the community level is proving to be difficult due to weak institutions for ecosystem protection. This challenge is compounded by the lack of awareness amongst community members on the importance of protecting ecosystems.
- **Limited access to markets for commodities produced in the landscape:** Markets are important for agricultural growth and sustainable development. Feedback from stakeholders indicates that there is limited market access for various commodities produced locally, such as livestock, crafts and natural plant products. The market access challenge is compounded by poor infrastructure and connectivity that results in higher production and transaction costs.
- **Outward migration of labor:** The reduction in the ability of the landscape to support current livelihoods is partly driving the need to seek alternative livelihood options, which are usually outside the area, thus resulting in migration out of the landscape. Migration rates are usually higher among younger people as compared to older members of the community. This outward migration of labor is negatively affecting household food security.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

The Iipumbu-ya-Tshilongo Conservancy was selected as a COMDEKS pilot landscape primarily due to its biodiversity, sensitive ecosystems, and tourism potential through its proximity to the Etosha National Park. Another selection factor is that this area ranks amongst the most underdeveloped areas worldwide in terms of its social, economic, agricultural and ecological aspects.

In March 2014, a Baseline Assessment was conducted to evaluate the state of the landscape and to identify key issues. Community members were invited to participate in the assessment at a three-day workshop; 38 stakeholders took part, including 15 women and 23 men. The workshop was carried out in English and in Oshiwambo, the local language for most of northern Namibia. During the workshop, the participants, including members from the traditional local authority, community leaders, agricultural and forestry technicians, and members from local conservation groups, engaged in a mapping activity in order to outline the landscape and to identify key resources and areas of concern. Participants further identified and discussed the various land uses, economic activities, and infrastructure within the conservancy. Additionally, community members were invited to rate the current conditions of the Conservancy using the SEPLS Resilience Indicators. The results of these indicators were used to discuss priorities and strategies within the target landscape.

The information collected during this initial stakeholder consultation workshop was used as input for the development of the Landscape Strategy. The major threats with respect to the landscape that were captured during the Community Consultation process include negative impacts of climate change on food security, the lack of ecosystem protection, a reduction in ecosystem services, particularly for livestock farming, loss of agricultural biodiversity, weak institutions for biodiversity and ecosystem protection, limited access to markets, and outward migration from the landscape. At the same time, this process identified the major local opportunities, which emphasized the significant tourism potential due to the landscape's geographical location bordering the Etosha National Park.

Water supply for the Otshiku-tshiithilonde Emerging Community Forest (OCF) nursery, COMDEKS Namibia

Landscape Strategy

The goal of the COMDEKS Namibia Landscape Strategy is to promote the maintenance and rebuilding of the Iipumbu-ya-Tshilongo Socio-Ecological Production Landscape (SEPL), where the use of land and other natural resources are managed for inclusive socio-economic development within the carrying capacity of the landscape, and where the value and importance of local traditions and cultures is recognized.

Table N-1 illustrates the five Landscape Resilience Outcomes around which the strategy is built to achieve its overall objective, as well as the Performance Indicators that will be used to measure these outcomes.

Table N-1. Landscape Outcomes and Indicators from the Iipumbu-ya-Tshilongo Conservancy Landscape Strategy

Landscape Outcomes	Key Performance Indicators
Outcome 1: Enhanced provision of ecosystem services within the target landscapes through conservation activities, sustainable use of natural resources, and the protection of ecosystems and biodiversity.	• Number of hectares of degraded ecosystems in the landscape restored, rehabilitated, or brought under sustainable resource management. • Number of communities demonstrating sustainable land and forest management practices.
Outcome 2: Improved agricultural productivity in the target landscape through the promotion of sound and sustainable agricultural practices, resulting in increased food security and income generation.	• Number of hectares where more sustainable land use practices are implemented, by type. • Number of farm groups/communities and farmers (disaggregated by gender) participating in adoption of appropriate technologies and systems, including crop diversification, use of local/indigenous varieties, conservation farming, low-cost renewable technologies for drying, and energy efficiency technologies, etc. • Percentage increase in yields of major crops due to COMDEKS activities.
Outcome 3: Alternative livelihood options promoted within the landscape to enable access to markets.	• Number of alternative income sources created through livelihood diversification (e.g., sustainable salt harvesting, handicrafts production and ecotourism). • Number of participating community members (gender disaggregated) benefitting from project activities. • Percentage increase in household income as a result of supported activities.
Outcome 4: Strengthened institutional systems as well as multi-stakeholder participatory decision-making for greater landscape resilience.	• Number of community-based institutions created or strengthened that are engaged in integrated landscape management. • Number of policies or plans influenced or created at the national and community levels that reflect decisions negotiated in a participatory manner at the landscape level. • Number and type of networks and support mechanisms created. • Number of community members (gender disaggregated) participating in decision making processes.
Outcome 5: Emergence of a new model for landscape management and its promotion as a best practice for other landscapes or communities to emulate.	• Number of best practices documented in any of the focus areas of the COMDEKS project portfolio.

Community-Led Landscape Projects

In order to guide the selection of local projects, the landscape strategy for the Iipumbu-ya-Tshilongo Conservancy suggests the following activities that together would contribute to the specified Resilience Outcomes.

Outcome 1: Enhanced provision of ecosystem services within the target landscape through conservation activities, sustainable use of natural resources and the protection of ecosystems and biodiversity:

- Revitalization and protection of local ecosystems;
- Biological stabilization of the soil, and water conservation through planting and growing appropriate multiple-use species of trees and shrubs;
- Awareness-raising about the importance of protecting the landscape's ecosystems and promotion of traditional values and norms that protect and respect ecosystems;
- Developing and strengthening mechanisms for monitoring natural resource use at the community level;
- Developing and strengthening the mechanisms for enforcing ecosystem protection laws at the community level;
- Stopping deforestation through the establishment of a community forest;
- Establishing community seed banks for local varieties of mahangu.

Uuvuudhiya Agriculture Youth Project (UAYP) members receiving financial management training, COMDEKS Namibia

Outcome 2: Improved agricultural productivity and food security, through the promotion of sound and sustainable agricultural practices:

- Enhancement and strengthening of food security and nutrition at the household level through sustainable and improved agricultural practices;
- Protecting and enhancing ecosystem services such as water flow and water quality through restoration of forest patches and soil water retention infrastructure;
- Sustainable rangeland management through synchronized grazing and herd management;
- Promotion of local and indigenous crop varieties and animal breeds;
- Use of stress-tolerant and fast-maturing mahangu varieties; and
- Documentation of environmentally friendly and traditional agricultural practices.

Outcome 3: Alternative livelihood options promoted within the landscape to enable access to markets:

- Development of small enterprises at the local level, such as handicrafts, horticultural produce supply and tour guiding, as well as creating market linkages;
- Providing support for the development of the local tourism potential; and
- Development of small enterprises to sustainably harvest salt from the three major salt pans that are found in the landscape.

Outcome 4: Strengthened Institutional systems as well as multistakeholder participatory decision-making for greater landscape resilience:

- Fostering cooperation between different sectors and stakeholders at the local level, e.g. local authorities, nonprofit organizations, government departments and individuals in the private sector;
- Creation of cooperation networks and support schemes to improve access and use of information and knowledge;
- Raising environmental awareness and increasing the engagement of people in civic affairs and land use planning;
- Creating partnerships and supporting participatory processes; and
- Mobilizing and engaging marginalized and vulnerable groups in project preparation, implementation and monitoring, and creating enabling environments for their social inclusion at the local level.

Outcome 5: Emergence of a new model for landscape management and its promotion as a best practice for other landscapes or communities to emulate:

- Creating awareness and documenting best practices in the different focus areas of the COMDEKS project.

Landscape Project Portfolio

Based on this guidance, six local projects were selected as part of COMDEKS Namibia's portfolio of landscape interventions in the Iipumbu-ya-Tshilongo Conservancy. Each is led by a different community-based organization, with grants ranging between US$25,000 and US$45,000.

Table I-2. COMDEKS Community-Led Projects in the Iipumbu-ya-Shilongo Conservancy, Namibia

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Iipumbu-ya-Tshilongo Conservancy Landscape Sustainable Livelihoods Diversification Project	Iipumbu-ya-Tshilongo Conservancy US$45,000	Outcome 3	The Conservancy goal is to develop ecologically friendly and sustainable tourism in the landscape through (a) the establishment of a conservancy support base for its resource monitors and administration, and (b) the establishment of a community-based campsite. This Conservancy project also intends to support other community-based livelihood alternatives as well.
Conservation Agriculture Enhanced Via Conservation Tillage	Pandeni Amakutsi Project (OIKE) (PAP) US$45,000	Outcomes 1, 2	The project seeks to improve dryland crop production by promoting sound soil management and sustainable agricultural practices, such as conservation tillage, composting and crop rotation, resulting in increased food security.
Iipumbu-ya-Tshilongo Community Nursery and Micro-Dripping Initiative	Otshiku-Tshiithilonde Emerging Community Forest (OTECON) US$36,454	Outcomes 1, 2, 3	The project targets vulnerable and poor communities, seeking to strengthen their social and skills development with sustainable food production, while promoting reforestation initiatives. Selected households will be trained to set up micro-drip irrigation systems. In addition, the project will establish a Iipumbu-ya-Tshilongo community-based tree planting and distribution center.

Micro-drip irrigation system at the Otshiku-tshiithilonde Emerging Community Forest nursery, COMDEKS Namibia

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Agricultural and Livelihood Diversification Project	Uuvudhiya Agricultural Youth Project US$42,000	Outcomes 1, 2, 3	This youth project aims at establishing vegetable gardens with micro-drip irrigation systems to improve food security and create alternative sources for income generation. In addition, feasibility studies on farming guinea fowl and local chickens, as well as aquaculture, will be conducted. Based on findings and lessons learnt, a small poultry house and seasonal aquaculture operations during the rainy season will be established.
Water Harvesting and Livestock Production Improvement Project	Uuvudhiya Farmers Association US$40,000	1,2,4	This project promotes sound and sustainable livestock management practices to increase livestock production. The project will mitigate water scarcity through the excavation of existing dams and ponds, including the creation of a water channel from Etaka. It will also acquire quality bulls for farmers in the area of Uuvudhiya to improve herd quality.
Building and Strengthening the Capacity of Beneficiary Groups Within the Iipumbu ya Tshilongo Conservancy Landscape COMDEKS Projects	Namibia Development Trust US$25,000	1,2,3,4,5	The project will strengthen the institutional and project management capacity (particularly M&E) of the COMDEKS beneficiary groups, enabling them to more easily achieve their intended project outcomes.

Iipumbu-Ya-Tshilongo Conservancy resource monitoring facility, COMDEKS Namibia

Achievements and Impacts to Date

Due to administrative and planning obstacles, Namibia's community-led projects have developed slowly and are still in the early stages of implementation, with two still yet to commence. As of mid-2016, preliminary achievements include the following:

- **Bringing ecotourism to the Conservancy:** The Conservancy is well on its way to initiating ecotourism services at its newly constructed eco-campsite. After a lengthy review, the government has issued an ecotourism concession license allowing the Conservancy to provide tourist services not only in its own Conservancy territory, but in the adjoining Etosha National Park, which will significantly increase the potential tourism revenue stream. Marketing outreach has already begun, and training in tourism services such as wildlife guiding is scheduled. First visitors are expected in June 2016.

- **Introducing sustainable agricultural practices and expanding agricultural markets:** As a step toward addressing land degradation, 100 farmers have received training in Conservation Agriculture (CA), which, among other techniques, uses conservation tillage to prevent erosion and build soil quality. To date, CA is being employed on some 140 ha of cropland, with plans to expand as more farmers are trained (the project goal is 300 farmers trained). In addition, a new agricultural center has been erected where produce from area farms will be marketed.

- **Providing micro-drip irrigation systems and training to poor families:** Despite some delays, the committee implementing this project has completed preparations to distribute micro-drip irrigation systems and provide seeds and training to 20 poor families in the community to increase their food security and income potential. Each system provides a drip line from a 240-liter water tank to an array of 200 soil-filled polybags that can then be planted with food or cash crops. To date, the drip systems and seeds have been purchased, water hook-ups provided, and a model system set up at a Forestry Department site to demonstrate the technology and train families who will receive the systems.

- **Establishing a tree nursery to support reforestation:** Although still in its initial stages, this project, in collaboration with the Ministry of Agriculture, Water, and Forestry, has already conducted community awareness meetings on the need for reforestation and has established a tree nursery using the same micro-drip irrigation system described above. When fully functional, the nursery will be able to accommodate about 8,000 standard poly bags of tree seedlings, which will be used to reforest some 800 ha of land.

- **Mobilizing youth to create alternative income sources and establish a community youth center:** To serve youth in the target landscape, the Conservancy group and local traditional authorities granted the local youth group a site which it can develop to raise guinea fowl for sale in local markets. A second activity on the site will be aquaculture practiced in seasonal ponds. To date, the site has been cleared and storage facilities erected in preparation for the poultry operation. The funds generated from poultry and aquaculture will fund the construction and operation of a community youth center providing internet and other social services to Conservancy youth, who often have trouble finding local employment.

Progress at the Landscape Level

As mentioned earlier, the different interventions in the landscape are only taking shape now, but already a change has come over the CBO community involved in project implementation. Due to their work together in the community consultation and in putting together and preparing to implement the project portfolio, the different groups involved have begun to act as one body, with a single landscape vision, rather than separate sectoral divisions.

The forest committee heading up the reforestation project now works more in collaboration with conservancy members than it had formerly, and the youth group—which heads up a job diversification project—now sees itself as an active contributor to sustainable livelihoods within the Iipumbu-ya-Tshilongo landscape. Likewise, the group heading up the micro-drip irrigation project, which was previously uninvolved in most Conservancy affairs, is now involved in operations spearheaded by the landscape committee. This newfound collaboration has already resulted in an annual meeting in which all projects reported their progress and plans. Additional technical and social support for this cohesiveness will be provided by two concurrent GEF projects now commencing in the area that will provide on-going assistance with the reforestation and irrigation efforts.

Lessons Learned

- Even though thorough and comprehensive information was captured during the initial stages of the COMDEKS projects through the Baseline Assessment, additional information developed by the government and by GEF for other SGP projects in the area also proved valuable. Such auxiliary information sources can be equally important and must not be neglected.
- Ample time for government involvement in project review must be factored into project schedules. Executing the COMDEKS-generated ecotourism strategy for the target landscape took longer than expected because the government had to approve a tourism concession for the Conservancy, due to the fact that the target landscape borders Etosha National Park to the south.
- Land disputes can create unexpected project obstacles. The project spearheaded by the youth group was brought to an abrupt halt because of a land ownership dispute that only came to the fore after the youth group had already cleared the land and was about to build a center for their different activities. The dispute has since been resolved, but not before delaying the project for months.
- The COMDEKS projects had the support of an NGO partner from the onset, which was very useful. However, it took some time to align the landscape work with the mandate and funding of the support NGO.
- COMDEKS has strengthened the collaboration between government, CBOs, civil society organizations, and traditional authorities, and has empowered the communities to be able to negotiate and implement donor-funded projects and to communicate and negotiate with different service providers.

Rainfed pearl millet and vegetable field, COMDEKS Namibia

NIGER
LAKE TABALAK

1. The Landscape

Georaphy

The target landscape for COMDEKS activities in Niger is the area surrounding Lake Tabalak (La Mere de Tabalak), a natural freshwater lake located in the central southwestern part of the country. It is situated in the climatic transition zone between the Sahara in the north and the Sahel in the south, which also marks the transition zone between the agricultural and the pastoral areas of Niger. As part of the Ader-Doutchi-Maggia plateau, the watershed spreads across 3,557 ha within the Tahoua region and is situated 50 km east of the town of Tahoua. The average altitude of the basin is 395 m, with the highest point reaching 746 m.

Due to its geoclimatic position in the middle of an arid zone, Lake Tabalak is a humid area that plays an important role in maintaining the biological diversity in this region. It also substantially contributes to the socioeconomic

activities of local communities, whose livelihoods depend on agriculture, livestock breeding and fishing. During the wet season (June-September), the lake fills with surface run-off from a vast watershed that covers about 142,000 ha across six different communes. By the end of the wet season, in September, the lake is a thread-shaped reservoir. Due to silting and evaporation, it is usually divided into three separate reservoirs at the end of the dry season in April or May. The surface area of the water body varies according to these seasons, from 50 ha to almost 1,000 ha with an average depth of 2 m. In terms of topography, the basin is composed of a series of plateaus, inland valleys and sand dunes. The ecosystem surrounding Lake Tabalak is a remarkably verdant and beautiful wetland habitat surrounded by an arid landscape. It is one of twelve critical wetland systems in the region, and was registered on the RAMSAR list of Wetlands of International Importance in September 2005.

Figure Ni-1. Satellite Image of Lake Tabalak (GRN study, 2009)

Biological Resources and Land Use

As a wetland in an otherwise arid environment, the area surrounding Lake Tabalak plays a critical role in maintaining biodiversity. It is home to many species of flora and fauna, most notably as a key habitat for hundreds of migratory birds of the Western Palearctic, such as waders, limicolines, and ducks. It is also an important transition area for the black crowned crane (*Blearica pavonina*), a species that is rare even in other parts of the country and which is now endangered largely due to habitat loss. The aquatic fauna is composed of crustaceans, batrachians (salamanders, frogs), and fish, including *Clarias lasera*, *Lates nilotica* and *Tilapia niloticus*.

Mammals in this area mainly comprise small rodents such as rats, squirrels, hedgehogs, mice, and jerboas. The local flora mainly comprises grassy species such as *Cenchrus bifloris*, *Aristida spp*, *Echinochloa spp*, *Solanum nigrum*,

Brachiaria spp, Typha australis, as well as exotic tree species including *Acacia nilotica*, *Acacia raddiana*, *Bauhinia rufescens, Bauhinia reticulatum, Acacia albida, Balanites aegyptiaca, Eucalyptus camaldulensis*, and *Prosopis juliflora*, among others. Deforestation to meet local energy needs, overgrazing by livestock, and land clearance for agriculture, combined with the incidence of drought, is leading to erosion, degradation of soil quality, and the loss of biodiversity in the region.

The landscape is characterized by zones of plateaus, hollows, gentle slopes (glacis), and sand dunes. The plateaus are composed of lateritic soils, which are mainly used for grazing, forestry and exploitation of the lateritic soil itself due to its high content of clay, minerals and ores. Due to strong wind erosion, the sharp sand dunes in the landscape lack woody vegetation, but offer a variety of grassy species that are favored by livestock. The zone between the sand dunes and the valley is referred to as the glacis, on which a number of tree species are found. This zone has been experiencing uncontrolled exploitation of woody vegetation, mainly for firewood and saw logs for local communities. Finally, the zone of hollows comprises the lake, the area directly surrounding the lake, as well as the koris (river valleys, carrying runoff water to the lake). This is the main area used for irrigated farming, fishing and pasture in the target landscape.

Rainfed agriculture is less developed in the target landscape due to low precipitation levels, particularly in recent years. However, agriculture remains the main economic activity. During the wet season, rainfed crops are grown on dune fields, with farmers each cultivating around 6 ha of millet, sorghum and black-eyed peas, which are the primary food crops in the region. As yields from rainfed agriculture barely cover one month of the annual needs of a household, local communities resort to irrigated agriculture from October to April. Farmers tend to cultivate less than 1 ha each. Using concrete wells and catch basins or channels, land is irrigated using water directly from the lake. Crops include sweet potatoes, onions, wheat, capsicum, cassava, garlic, zucchinis, tomatoes, apples, cauliflower, lettuce, peanuts, black-eyed peas, eggplants and peppers. Considering the unpredictability of rainfall, irrigated market gardening is the safest and most common form of agriculture. The use of chemical fertilizers is prohibited by the government. According to the Communal Director of Agriculture, an area of about 954 ha is exploited for market gardening.

Irrigation for crops like onions uses water directly from the lake, COMDEKS Niger

Livestock breeding constitutes the second predominant economic activity after crop agriculture in the target landscape, representing an important source of income for local communities. The basin is home to a wide variety of livestock including cattle, goats, sheep, camels, horses, and donkeys. Before the formation of the lake, it was a migratory herding point and continues to be a preferred destination for migratory herders as well as the indigenous population. Similarly, fishing has become a more common practice through increased support from external parties and the local population. The area now also attracts fishermen from across the Tahoua region and even from abroad.

Socioeconomic Context

The total population within the target landscape is about 42,000 people, mostly comprised of Tuareg and Hausa. Approximately 3,500 people live directly around the lake. Aside from a small and informal local crafts industry comprising shoemakers, sculptors, leather workers, and tailors, the primary socioeconomic activities in the region are focused around fishing, agriculture, and livestock breeding. However, these activities are becoming less reliable as agricultural productivity falls with erosion and drought. Furthermore, poverty is prevalent throughout the region, with 71 percent of the population classified as "poor" or "very poor." The main criteria of wealth include the size of the household, the area of cultivated land, as well as ownership of lands, cattle and agricultural equipment. Based on these criteria, the middle class and the wealthy together represent just 29 percent of the population. There are only a few sanitation systems in place, and garbage and human waste is often disposed of in the open air, leading to considerable health risks.

Different grassy species constitute the basic fodder resource for livestock breeding, and according to local communities, fodder availability has declined considerably in recent years. Causes include the decrease in rainfall, overgrazing, the expansion of invading species not suited for feeding (such as *Sida cordifolia*, and *Pergularia tomentosa*), an increase in land silting, and the reduction of pastoral land in favor of croplands. This competition for land among pastoralists and farmers has already led to cases of nonviolent conflicts, due to livestock invading farmlands, or the encroachment of farmlands on passageways for livestock.

Fishing has also become an important source of income for the communities around the lake and is contributing to improved local food security. The fresh fish is sold in the local markets in Tahoua and Agadez. Due to a lack of refrigeration equipment and infrastructure, fresh fish that cannot be sold are smoked, grilled or dried, to be exported to Nigeria. Local fishermen are organized into cooperatives, which are headed by a central coordination committee. There are nine cooperatives, comprising about 230 official members overall: five in Tabalak, two in Kéhéhé, and one each in Fachi and in Tsaouna. However, there are a few dozen clandestine fishermen without fishing permits, according to the president of the coordination committee.

Currently, this region is facing threats of accelerated degradation due to pressure from unsustainable agricultural practices and increasing variability in climate, and there is a notable decline in plant and animal biodiversity. The subsistence of local communities in the target landscape heavily depends on the state of the lake and the environment. The decrease in rainfall and more frequent and severe drought has reduced the water level of the lake and caused an even faster drying up at the end of the dry season in May, which is accelerated by evaporation, infiltration, farming and the watering of livestock.

2. Key Environmental and Social Challenges

The principal environmental and social vulnerabilities in the target landscape include:

- **Land degradation and deforestation:** The loss of vegetative cover—particularly trees—due to overgrazing, clearing of land for agriculture and pastoralism, and fuelwood use has accelerated in recent years. With this loss of vegetation, erosion is becoming more severe, further exacerbating land degradation and plant biodiversity loss. Furthermore, the availability of multipurpose plant species for fodder, firewood and construction material for local communities is decreasing.
- **Expansion of invasive species:** The spread of invasive species seems to be increasing. Invasive species compete for minerals and water with local species and reduce crop yields. They often also have sharp thorns that are dangerous to humans and livestock and replace grassy species crucial as fodder for livestock.
- **Reduced precipitation and water volume loss:** The decrease in rainfall and more frequent and severe droughts have reduced the water level of the lake and resulted in faster lake depletion at the end of the dry season. Factors such as siltation, invasion of aquatic and thorny plants, and higher temperatures have played a part as well. The result is a loss in water volume in the lake, reducing its overall depth and water quality. This has already impacted fish populations and may impact migratory birds in the near future.
- **Overfishing and decline of fish populations:** Local demand for fish, as well as fish exports to Nigeria, have considerably increased since 2000. Combined with the illegal use of large-scale fishing equipment, this has led to the fishing of juvenile fish, reducing revenues and putting fish populations at risk due to interruption of their reproductive cycles.

3. COMDEKS Activities, Achievements, and Impacts

Community Consultation and Baseline Assessment

A Baseline Assessment, led by the Faculty of Agronomy of the Abdou Moumouni University of Niamey, was conducted to mobilize local community members, stakeholders, and government representatives in evaluating the condition of the target landscape and collaborating on the development of a Landscape Strategy to enhance the resilience of the area surrounding Lake Tabalak. An initial meeting with local leaders was held in October 2013 in the town of Tabalak, and the community was invited to participate in a mapping exercise to identify key components and vulnerabilities of the socio-ecological landscape. More than 150 stakeholders, including community leaders, members of the rural population, and the mayor then participated in 17 workshops, where participants used the SEPLS indicators to identify key environmental and social concerns of the target landscape. A Landscape Strategy was developed based on the results of the focus group discussions and the indicator scoring exercise.

Landscape Strategy

The Baseline Assessment and Community Consultation gave rise to the COMDEKS Landscape Strategy for Niger, which sets out a slate of four Landscape Outcomes and associated indicators to measure progress toward these outcomes (see Table Ni-1).

Herbaceous plants help to rehabilitate degraded land for grazing and reduce siltation of the lake, COMDEKS Niger

Table Ni-1. Landscape Outcomes and Indicators from the Landscape Strategy for Lake Tabalak

Landscape Outcomes	Key Performance Indicators
Outcome 1: Restoration, protection, and sustainable management of the local environment.	• Area of restored lands (plateau, glacis, watershed and dunes). • Area of treated water bodies (weed cutting and treated banks). • Number (%) of people who have adopted sustainable technologies and sustainable ancestral practices.
Outcome 2: An increase in fish diversity and fish production in Lake Tabalak.	• Number of modern methods employed for production and conservation of fish. • Percent of fishermen who have adopted conventional methods of catching fish that avoid catching juvenile fish through larger meshes of nets.
Outcome 3: Improvement in the welfare of the community through the creation and diversification of sustainable income-generating activities.	• Increase in the incomes of vulnerable households (very vulnerable and moderately vulnerable). • Number and type of activities/income-generating enterprises or alternative sources of income introduced and adopted.
Outcome 4: Strengthening of the local institutional capacity for rational and sustainable landscape management.	• Number of organizations (unions, groups, associations, or communes) practicing sustainable landscape management that have been created or made more active. • Number or type of plans, programs, projects or agreements for sustainable landscape management agreed and implemented by the commune. • Number of lessons and good practices generated from local landscape projects.

Community-Led Landscape Projects

To guide the selection of local projects, the Landscape Strategy for Lake Tabalak suggests a number of potential activities to achieve each Landscape Outcome. These can be summarized as follows:

Outcome 1: Restoration, protection, and sustainable management of the local environment:

- Conservation and restoration of the diverse ecosystems in the target landscape;
- Restoration and protection of lands surrounding the lake through capacity building on practices for restoring degraded lands and waters;
- Improvement of resilience and durability of the landscape in the face of the effects of climate change and human pressures.

Outcome 2: An increase in fish diversity and fish production in Lake Tabalak:

- Conservation of plant and aquatic biodiversity through removal of invasive species and supporting recovery of local fish populations;
- Implementation of sustainable and ecologic practices for the exploitation and the management of natural and exotic resources (invading species) in the lake;
- Capacity building of local communities on sustainable fishing practices.

Lake Tabalak: essential wetland in an arid environment, COMDEKS Niger

Outcome 3: Improvement in the welfare of the community through the creation and diversification of sustainable income-generating activities:

- Diversification of agricultural practices through introduction of agroforestry techniques, mulching, improved seeds, conservation agriculture, and the improvement of rain water management and irrigation;
- Identification and creation of income-generating activities for households, communities and social groups;
- Introduction of techniques for sustainable exploitation of wood and nonwood forest products.

Outcome 4: Strengthening of the local institutional capacity for rational and sustainable landscape management:

- Capacity building of local stakeholders with regard to identification and sustainable management of local environmental challenges;
- Facilitation of partnerships and cooperation between communities, local authorities and development actors.

Landscape Project Portfolio

Based on this guidance, six local projects were selected as part of COMDEKS Niger's portfolio of landscape interventions in the Lake Tabalak region, with grants ranging from US$29,000 to US$42,000. Each is led by a different community-based organization (See Table Ni-2).

Table Ni-2. COMDEKS Community-Led Projects in the Lake Tabalak Region, Niger

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Restoration of Dunes in the Rural Municipality of Tabalak (TATISS site)	SAOUYI US$40,558	Outcomes 1, 3, 4	The project consists of technical assistance in construction of demi-lunes (a micro-catchment technique mainly used for increasing pasture production and rehabilitation of degraded lands) as well as ecological rehabilitation of dunes. This includes the implementation of a sustainable natural resource management mechanism. Restoring sand dunes and implementing sustainable management practices for their resources will be vital to meeting the needs of local communities in the longer term. The project's strategic approach includes the mobilization, participation and effective empowerment of rural communities in the implementation of operations.

Project	Grantee (CBO/NGO)	Contribution to Landscape Resilience Outcomes	Description
Recovery of Degraded Land and Removal of Invasive Plants in the Lake Tabalak region	Youth Group Hadin Kan MATASSA US$38,157	Outcomes 1, 4	The project's goal is to protect the lake to help reduce siltation and eradicate the invasive plant species Typha australis and Ipomoea erecta. The project's main activities are planting trees, removal of invasive plants, facilitation of village meetings, production of a documentary film and the production and distribution of other media.
Restoration of the ICHIRIFAN Dunes	Action Groups for Local Development NGOs (AGDL) US$29,063	Outcomes 1, 4	The project consists of dune restoration and environmental education that can improve living conditions for populations affected by the impacts of climate change. By reforesting 70 ha of treated sand dunes, the lake will be more protected from siltation.
Recovery of Fish Populations and Removal of Invasive Aquatic Plants	Cooperative of Fishermen of Tabalak US$40,782	Outcomes 1 ,2, 3	The strategic approach of this project involves the mobilization, participation and effective empowerment of fishing communities in the project implementation. The lake will be repopulated with species such as Lates niloticus and Bagrus bajad to rehabilitate biodiversity and generate income for fishermen and fishmongers.
Restoration of Degraded Land and Removal of Invasive Species in the Lake Tabalak Region	Solidarity and Local Development (SDL TIKBALANA) US$39,547	Outcomes 1, 3	The project aims to protect the lake against siltation through the restoration of 75 ha of degraded land by building anti-erosion benches, planting trees and cutting weeds of invasive plants such as Typha australis and Ipomoea erecta. The recovery of these lands will also enhance fodder availability and contribute to restoration of vegetation.
Agropastoral Regeneration Support in Biguinibora Through Restoration of Degraded Land	Support to the Development of Community NGOs (ADOC) US$41,963	Outcomes 1, 4	This project involves the rehabilitation of grazing land through construction of demi-lunes, with the active participation of local actors through capacity building. Local supervisors for initiatives and plotters will be trained and 15,000 seedlings for various species of herbaceous plants will be planted to rehabilitate degraded land and create more environmental awareness among the local population.

Monitoring site visit with the SGP National Steering Committee, COMDEKS Niger

Achievements and Impacts to Date

Across all COMDEKS-funded projects, almost 30,000 seedlings were planted to rehabilitate degraded land and sand dunes, with more than 1,850 people directly benefiting. According to testimonies of local communities, project activities generated substantial results with regard to environmental well-being and livelihoods. These include in particular:

- **Stabilizing shifting sand dunes and removing invasive species:** COMDEKS-funded initiatives in the target landscape have successfully supported the rehabilitation of local plant species to stabilize the shifting of sand dunes. In particular, the planting of Euphorbia balsamifera seedlings has reduced the movement of sand dunes impacting the lake. Project activities have enabled the resumption of gardening activities through the clearance of invasive species, thereby increasing the land area for cultivation, and reducing water consumption by the invasive species as well as siltation of the lake. More than 150 ha of farmland and 100 ha of sand dunes have already been rehabilitated through project activities. As a result, local communities have been able to increase their incomes by growing and selling tomatoes and onions.
- **Increasing the availability of pastureland:** Training in dune stabilization techniques, including selective removal of certain invasive species that compromise sand dune stability, as well as planting of the native Leptadania pyrotechnica as a sand dune binding material, have substantially reduced erosion and increased the availability of pastures for livestock.
- **Empowering women and vulnerable groups:** The high participation of vulnerable groups such as women and youth has contributed to increasing food security and improving livelihoods. Women in particular are actively involved in a project to design cooking equipment and the establishment of a revolving fund to

finance alternative income-generating activities. So far, the revolving fund has accumulated working capital of 300,000 FCFA (US$525), which women fishmongers have used to purchase fish frying equipment and accessories for their local businesses.

- **Adopting sustainable fishing practices and restoring local fish stocks:** Locally appropriate training and equipment have allowed 50 fishermen to adopt more sustainable fishing practices that reduce the harvesting of juvenile fish, thereby allowing fish populations to recover without interrupting their reproductive cycles. More than 35 percent of fishermen active at Lake Tabalak have now adopted sustainable fishing practices, and have been informed about national fishing regulations they must abide by. Furthermore, the stocking of the four fish species Clarias sp, Lates niloticus, Bagrus bajad, and Auchenoglanus sp, which had disappeared from Lake Tabalak years ago, has rehabilitated fish populations and improved incomes of fishing communities and fishmongers (particularly women) through increased marketing of fish products. Since restocking of the lake, fish catches have increased from 10-15 tons to 42 tons per year, with individual fish sizes of up to 10 kg. Continuation of sustainable fishery management practices will sustain incomes in the long-term without depleting fish resources. To make sure this comes about, a committee was set up within the fishing cooperative to ensure compliance with sustainable fishing methods and to penalize offenders. In addition, local manufacture of fishing equipment such as nets, longlines, and fish traps during the dry season, when fishing is not possible, has reduced the debts of fishermen who might otherwise acquire high-priced equipment from rogue traders.

Restoration of sand dunes around the lake reduces siltation, COMDEKS Niger

Progress at the Landscape Level

COMDEKS projects have definitely broadened local environmental awareness and shifted how people view their landscape and its potential for restoration and increased productivity. This is true particularly among the area's fishers. Creating awareness of the causes for diminishing fish resources, increasing the understanding of sustaining ecosystem health to ensure future incomes, and training in locally appropriate fishing techniques and sustainable natural resource management has caused fishermen to rethink their practices and adopt more sustainable techniques. By involving fisherman in the decision-making and management of lake resources, the COMDEKS projects have helped to implement more sustainable fishing periods in Lake Tabalak, with the fishing season now starting later and ending earlier in the year, allowing uninterrupted reproduction cycles of fish populations in order to sustain livelihoods in the long-term. The fact that a local monitoring mechanism has been established to ensure compliance with sound fishing practices and fishing seasons is testament to this new commitment to sustainability. In addition to this increased environmental awareness has come a substantial strengthening of the organizational, technical, and financial capacities of local CBOs, as well as their ability to work together. Again, this is strongly evident in the fishers cooperative, which has been greatly strengthened as COMDEKS has proceeded. Local CBOs who once worked in isolation are now able to communicate and cooperate, based on their COMDEKS experience. The government is supporting this CBO emergence through the establishment of a National Directorate of Support for Cooperative Action (DACPOR) to provide CBOs with technical and mentoring support. In addition, CBOs are represented in all major meetings at the national and regional levels—a testament to their increasing profile. Another indication of increasing landscape governance capacity is the formation in some villages of local management committees concerned with local natural resources.

Lessons Learned

- The active participation of local and regional government in COMDEKS projects was an important key to success. Involving departmental and municipal authorities, such as the prefect or mayor, as well as technical services, including the departmental directorate or communal environmental service, significantly contributed to project effectiveness.
- Ensuring accountability of the management committee for the restoration of agroforestry and pastoral areas has been another key to project success. Furthermore, the high level of women's participation (nearly 70 percent of the dune restoration and nursery work was done by women) contributed to this success, since they were heavily involved in raising seedlings and ensuring sustained growth of plants.
- The training of community members on simple techniques of environmental protection, such as selective weed cutting and increasing Leptadania pyrotechnica cover to stabilize the sand dunes mechanically, has helped to increase community awareness of the importance of environmental protection measures to sustain their livelihoods.
- For increased project efficiency and sustained impacts, project activities should be extended to a radius of at least 10 km around the lake, particularly with regard to water and soil conservation, as the environmental health of the surrounding area will be crucial to sustaining project results in the target landscape. Additionally, future project activities should address the issue of gullies, called koris, which are a major problem in the region. Koris flow episodically during rain events, contributing enormously to the silting of the lake and causing serious damage to croplands, woody vegetation and homes.

The Way Forward

The Transition to Broad Application of COMDEKS Insights

As Phase II of the COMDEKS Programme nears completion, it offers the opportunity to reflect on what COMDEKS has achieved, how these insights can be applied both within and beyond UNDP, and the challenges ahead for further application of the COMDEKS community-based landscape management approach.

Celebrating the COMDEKS Accomplishment

COMDEKS' 20 pilot country experiences span a wide range of physical and social geography, economic and cultural circumstances, and governance regimes. The results demonstrated in all 20 target landscapes thus far show the flexibility and effectiveness of the COMDEKS landscape approach and funding model.

- **Acknowledging the strengths and challenges of rural landscapes.** The COMDEKS approach builds on local landscape experience and acknowledges the capacity and empowerment challenges that rural communities face. Knowledge of and dependence on the living landscape is routine for rural communities. The idea of a production landscape is one that rural communities can easily relate to, as it fits with their experience of a mosaic of land uses that serve their subsistence and cash needs. They also have a good idea of the trade-offs and dysfunctions that current land use practices create. But they often lack the local organization, capacity, and finance to plan and mount effective local projects to address their environmental and land use challenges. Just as importantly, they often lack the governance authority and recognition by state and local government of their right and need to do so. Also, they typically lack a landscape perspective, meaning they lack a coherent basis—in knowledge and a shared vision of what a resilient landscape should be—for land use planning that goes beyond strictly local concerns. Yet such a landscape perspective is needed to develop broad-scale and lasting solutions to rural environmental and economic challenges. COMDEKS addresses all these issues in a comprehensive and integrated way through its focus on social and ecological resilience of the production landscape.

- **Delivering knowledge, vision, empowerment, capacity, and finance.** COMDEKS has delivered a format and a process that has allowed rural people, support groups, and government authorities to convene as a landscape community, with the underlying principle being ownership and empowerment of local landscape communities. By emphasizing local voices and validating local information, the Baseline Assessment and resilience indicator scoring has not only produced invaluable data on local conditions, but also a personal understanding on the part of local people of what landscape resilience means. This has been an effective starting point for a visioning process in which environmental, livelihood, and governance goals are set and consensus reached on the local actions needed to attain them. The COMDEKS model has also delivered a community-driven process to implement these actions, rooted in the development of local CBO capacities, and the provision of skills training and other support services. Financing for these local projects is provided through a proven SGP process, with vetting by SGP's National Steering Committees to make sure projects meet high quality standards and are consonant with national planning and programs. The result has been project portfolios generated and owned by communities that have helped restore the functionality of target landscapes, improved the economic and social well-being of community members, and made landscape communities dynamic players in landscape governance. Nor are these static achievements. By design, Landscape Strategies are open-ended and living documents that demand continued engagement, and the adaptive management model COMDEKS employs emphasizes continued learning and improvement through successive project cycles.

Bringing ecotourism to life in Central Selenge, COMDEKS Mongolia

Applying and Extending COMDEKS Insights

These results amount to a substantial body of learning and experience that can enrich development practice both within and outside of UNDP. As COMDEKS Phase II ends, it offers a natural transition point at which COMDEKS processes and lessons can be reconfigured and applied to other community-based programs to improve their integration, scalability, and sustainability.

- **Helping SGP Upgrading Country Programmes transition to a Landscape Approach in OP-6.** One area in which COMDEKS experiences are providing some immediate applicability within UNDP is in the select group of SGP country programmes known as Upgrading Country Programmes. The 15 Upgrading Countries, representing the SGP Country Programmes with the longest experience and most mature country portfolios, are eligible for higher funding levels through the Global Environment Facility (GEF) and more budgetary control and decision-making autonomy in their project portfolio development. Five of the Upgrading Country Programs participated in the COMDEKS program: Brazil, Costa Rica, Ecuador, India and Indonesia. All fifteen of these Country Programmes are now in the process of transitioning to the "Sixth Operational Phase" (OP-6) of GEF funding, in which country project portfolios must be framed around a Landscape Approach building on the COMDEKS experience and lessons learned. COMDEKS' on-the-ground experience with participatory landscape planning, landscape strategies, and landscape-level governance will provide a source of valuable guidance as these Upgrading Countries identify, shape and implement their SGP project portfolios. In many ways, the Upgrading Country Programmes provide an ideal fit with the COMDEKS Programme. Upgrading Countries are typified by specialization of their project portfolios on certain themes and a focus on certain geographic areas within their countries to maximize impact.

In Costa Rica, for example, promotion of ecotourism and cultural tourism has been a focus of SGP projects for a decade, resulting in a well-developed rural tourism sector that honors the nation's biological richness while bringing sustainable livelihoods to remote areas. In Mexico, another Upgrading Country, an emphasis on honey production in the Yucatan has resulted in a well-developed value chain for honey products for export and thus an expanded local economy. In both these cases, well-developed networks of civil society organizations—including producer federations and other second and third-level organizations—are key operators in the successes. This emphasis on geographic concentration, alternative livelihoods, civil society networks, and multistakeholder decision-making mirrors many of the attributes of COMDEKS, and makes many COMDEKS experiences immediately transferable. COMDEKS lessons and guidance on the use and governance of production landscapes, on community consultation and participatory landscape planning, and on the integration of livelihood and environmental projects into local development can offer insights to Upgrading Countries to complement their own hard-won learning. But these countries will also be able to add to and extend the lessons of Phases I and II of COMDEKS, particularly as they work toward greater connectivity and synergy among landscape projects. Indeed, the challenge these countries face in adapting a landscape approach to a large project portfolio over the next years could be considered a kind of "Phase III" of COMDEKS, in which COMDEKS processes and preliminary results are scaled up on a larger landscape "canvas." In turn, the experience these countries gain in OP-6 will act as a source of planning and implementation guidance for other less experienced countries within the larger SGP Global Programme.

- **Providing lessons and evidence to the Global Environment Facility on community-driven landscape planning and management.** Program 4 of the Land Degradation Focal Area Strategy of the GEF—Scaling-up sustainable land management through the Landscape Approach—lists five support activities that form an integral part of the COMDEKS landscape approach, ranging from integrated watershed management to multistakeholder planning, agricultural improvement and community empowerment. COMDEKS can provide lessons regarding, among other things, the methodological approach to community-based landscape planning; multistakeholder landscape level coordination; and knowledge management and policy dialogue platforms at the landscape level.

- **Providing an example to other donors of landscape-level effects.** Beyond its applicability within UNDP, the COMDEKS experience also stands as a model to other donors of the advantages—as well as the mechanics—of working at a landscape level. The landscape management approach demonstrated by COMDEKS complements the experience of other organizations pursuing Integrated Landscape Management, such as Ecoagriculture Partners, the World Agroforestry Centre, IFAD, and others. It offers a flexible mechanism for multiple donors to engage with communities and governments over an extended timeframe to affect landscape-level processes, improve governance at a landscape scale, influence national land use planning, and scale up development gains as called for in the Sustainable Development Goals recently embraced by the international community.

Meeting the Challenges Ahead

While COMDEKS Phases I and II have done much to demonstrate the viability and efficacy of a community-based landscape management approach, it is important to keep in mind that the approach is still young, and substantial challenges remain before the potential of this approach can be fully realized. These include:

- **Maintaining community engagement and donor commitment.** Landscape-level interventions require time and patience: time to adequately plan, organize, gain adequate skills, and execute projects; and patience to allow projects to mature, yield visible results, extract lessons, and apply these for continued progress. In addition, the landscape changes associated with COMDEKS projects are usually incremental rather than immediately spectacular. While signs of landscape restoration, improved agriculture, and alternative

livelihoods may be evident, large-scale change in landscape resilience and local economies is more slow-acting and cumulative. This presents a clear challenge to communities and local CSOs to maintain their interest and commitment to landscape objectives over successive years. Setting moderate and achievable near and mid-term benchmarks and regularly reassessing these goals to maintain their local relevance is one step in this process of sustaining local engagement. Donors are likewise challenged to maintain their commitment to long-term landscape objectives. Assuring funding through many years of the adaptive management cycles as funding philosophies and government budgeting priorities change is difficult, and speaks to the need for coordination among donors in a shared vision of landscape resilience, so that funding gaps can be collectively minimized over the long time horizons required to help communities restore such resilience.

- **Nurturing a vital landscape community.** One of the most potent factors in local landscape success is the existence of a diverse and functioning "landscape community"—a collection of local organizations, activists, government technical representatives, and individuals with knowledge of the landscape, a shared vision of landscape resilience, and the ability to organize and carry out landscape projects. The CSOs, government representatives, and support organizations that collaborate to carry out COMDEKS projects often form the core of such a landscape community that can go beyond village-level planning and sustain a landscape vision. But developing and sustaining this community after the completion of COMDEKS activities is challenging, requiring a commitment to continued meeting and collaboration. Yet only such a multistakeholder and landscape-wide group is likely to continue to monitor landscape-level conditions and to update and continue to act on the Landscape Strategy.

- **Realigning landscape governance structures to empower local actors.** COMDEKS projects empower local communities to manage local land use and help restore landscape resilience—at least within the limits of the project. But these projects typically do not transfer official responsibility for larger landscape governance decisions to local actors. While the local "landscape community" that forms in response to COMDEKS interventions can often act as an ad hoc landscape governance group, there is no assurance that this group's recommendations will be considered in future governance decisions. Embracing multistakeholder platforms that give local civil society groups official standing alongside local and national government representatives is a step still pending in most COMDEKS landscapes.

- **Creating connectivity among local landscape efforts.** While the Landscape Strategy embraced by landscape communities envisions the connections and synergies among local landscape projects, in practice, the linkages among the country portfolio of landscape projects are still weak. As implementation proceeds, the communication and collaboration between local groups undertaking these projects naturally increases, and the group of grantees and support groups begins to share perspectives and to believe in the larger landscape effort. But for this to proceed farther to real connectivity among projects will require development of a wider network of interconnections—within civil society, private sector, and government—and repeated opportunities for shared planning and joint action through multistakeholder platforms built around landscape governance.

- **Incorporating a Landscape Approach into the architecture of the SDGs.** COMDEKS processes and insights undoubtedly have a role in delivering the Sustainable Development Goals (SDGs) recently adopted at the international level. As documented in this report, COMDEKS interventions have helped to define what landscape resilience and environmental sustainability mean in the lives of rural communities, and have offered a proven approach to link social and economic development to land use decisions and landscape stewardship. They have also demonstrated a funding mechanism that can allow the international community to invest in this kind of community-led landscape management. Making sure that these mechanisms and lessons are incorporated into the implementation, monitoring, and funding of the SDGs must be a top priority as the COMDEKS Programme communicates its achievements to the international development community.

Coffee cherries, COMDEKS Costa Rica

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