INTEGRATED LANDSCAPE MANAGEMENT FOR RESILIENCE IN THE HORN OF AFRICA: Refined Problem Statement

Submitted by
the Integrated Landscape Management Team
to the Global Resilience Partnership

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Contents

List of Acronyms

CRV	Central Rift Valley
HoA-REC&N	Horn of Africa Regional Environment Centre and Network
HoA-REN	Horn of Africa Regional Environment Network
ILM	Integrated Landscape Management
KWS TI	Kenya Wildlife Service Training Institute
LPFN	Landscapes for People, Food and Nature initiative
M&E	Monitoring and Evaluation
MSP	Multi-Stakeholder Platform
NGO	Non-Governmental Organization

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Refined Problem Statement

Land and water resources in the arid and semi-arid parts of the Horn of Africa have come increasingly under pressure as a result of different drivers of change. Climate change, population growth, and natural resource-based economic development, together with associated land use change and over-extraction of water are important trends that adversely influence the resilience of landscapes and the communities that live within them in the Horn of Africa. The strong dependence on natural resources, high poverty levels, and related limited capacity of people and institutions to adapt to change, make the region especially vulnerable to shocks and stresses. The key challenge our team aims to address is how to build resilience in food production systems, livelihood strategies, ecosystems and institutions that can buffer the effects of draught, land and resource degradation, food price spikes, livestock disease and other shocks and stresses in ways that sustainably generate productive assets and ensure they are accessible to especially vulnerable populations including women and children.

Addressing resilience from the Global Resilience Partnership's perspective

For guidance in framing the resilience challenge, our team embraces the Global Resilience Partnership's definition that specifies the learning and capacity development required as well as attention to the interconnected dimensions of the challenge, as follows:

> Resilience is the ability of people, households, communities, countries, and systems to mitigate, adapt to, recover from, and thrive and learn in the face of shocks and stresses, in order to reduce chronic vulnerability and enable sustained development, inclusive growth and learning, and transformative capacity. Achieving resilience is a progressive and long-term process that goes beyond humanitarian relief and development investment by addressing a wider set of inherently connected challenges that together hold the most vulnerable communities back.[1]

Our team's *Theoretical Framework for Diagnosing and Building Landscape Resilience* [2] is expanded and enriched by the Global Resilience Partnership's perspective on resilience as well as scoping activity in our three learning landscapes, where we facilitate collaborative learning and the exchange of relevant experience and robust lessons about building landscape resilience. The three learning landscapes are: 1) the city-region of Djibouti, 2) the agro-pastoral county of Laikipia, Kenya, and 3) the Central Rift Valley (CRV) of Ethiopia. The framework rests on the proposition that integrated landscape management (ILM) can enhance resilience at a landscape scale by synergistically building resilience in agroecosystems, ecosystems, livelihoods, and institutions. Integration across the four dimensions is brought about through the process of adaptive collaborative management in multi-stakeholder platforms, and deliberate attention to four cross-cutting strategies that the team has added to the framework: diversity and complementary; gender equity and women's empowerment; knowledge, learning, and technology; and integration and synergy. The team currently is employing an interview guide[3] and strategic sampling strategy we developed from the enhanced framework to deepen our problem analysis in the learning landscapes. Below we highlight preliminary findings from our on-going problem analysis.[4]

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[1] GRP Challenge Source Document_Revised Stage Two Timeline_2March2015

[2] Annex 1, *Theoretical Framework for Diagnosing and Building Landscape Resilience through the Global Resilience Partnership initiative on Integrated Landscape Management for Resilience in the Horn of Africa*

[3] Annex 2, *Interview Guide for Diagnosing Landscape Resilience Gaps and Opportunities*

[4] Further elaboration available in Annex 3, *Preliminary Problem Identification in Three Learning Landscapes*

Problem-situation in three learning landscapes

Agroecosystem vulnerability. Availability, access, and use of increasingly scarce water resources are predominant concerns in the landscapes that affect agricultural opportunity and productivity. Compounding the issue, many producers in the landscapes are not sufficiently knowledgeable about how to practice agriculture under conditions of semi-aridity and climate change and thereby over-stress the soil, land and water resources. Crop production systems often are not adequately diverse to withstand pest and disease pressures and still deliver sufficient yields, while overstocking in livestock systems stresses the resource base as well as animal health.

Ecosystem vulnerability: Forest, soil and water degradation, and the need for their restoration, are apparent throughout the landscapes. Over-stocking and over-grazing in Laikipia combined with extractive charcoal production practices are immediate drivers of grassland and savannah degradation which in turn affect the integrity of wildlife communities. Djibouti suffers from the invasive effects of *Prosopis juliflora,* introduced some years ago, and from soil salinization due to lowering of the water table. Overuse of chemical fertilizers in parts of the CRV leads to pollution of lakes and wetlands, and continuous cropping in the absence of organic amendments contributes to soil fertility decline.

Livelihood vulnerability: Income sources and opportunities for large proportions of the populations in the landscapes are extremely limited, leading to over-dependence on extractive practices. Effort to transition from pastoralism to farming is common and often fraught with risk and failure, while maintaining viable markets for livestock is a widespread challenge. Employment opportunities for some reside in expanding tourism sectors in the three landscapes, while expansion of these industries is vulnerable to ecosystem degradation. The livelihood security of women in the landscapes is especially vulnerable to agroecosystem and ecosystem degradation and scarce employment opportunity.

Institutional vulnerability: While public, private, and civic organizations are active in all of the landscapes to improve agriculture and natural resource management as well as livelihood security and the protection and restoration of ecosystems, their efforts tend to be partial and uncoordinated. Numerous promising initiatives and innovative practices are evident, yet tend not to be taken to scale. Effort appears fragmented with different initiatives sometimes competing for attention and finance, while poor collaboration across sectors masks the multi-functionality and mutual dependence of resource users in the landscapes and their potentials for innovation and transformation.

Cross-cutting gender issues: While gender issues are largely context-specific and require close and sensitive analysis to fully understand, some predominant patterns are evident in the landscapes. The first concerns meaningful access to resources. In agricultural production systems men are responsible for providing inputs while women and girls are principally involved in production processes. Thus, while women interact directly with the productive environment in food cultivation, fuelwood and water gathering they are minimally involved in decision-making about land use and resource allocation and commonly have no legal rights to land resources. When productive resources are degraded or destroyed women and their children become especially vulnerable. A pattern of neglecting youth in natural resource management often drives them to activities that degrade resources, e.g. sand mining in rivers, logging, charcoal burning, and poaching as a form of livelihood. Second, meaningful participation in

decision-making structures is problematic; while the legal status of women is improving, they often lack access to real participation in community or national level decision-making. Youth groups also often lack representation in decision-making. A third issue concerns skill development. Many women and girls lack access to the education necessary for adapting agricultural practices to shifting climates and changing market demands, for example, and for positioning themselves for better employment opportunities in public, private and civic organizations in the landscapes.

Unique Selling Point

Our project's Unique Selling Point is the Integrated Landscape Management Team we have put together to competently facilitate our learning and action approach to developing the innovative practice of integrated landscape management for resilience. Our unique complement of theoretical expertise across a spectrum of key disciplines including extensive experience with landscape approaches to sustainable development, combined with our capacity to implement learning and action with committed partners in specific landscapes and our extensive networks of partners throughout the Horn of Africa and beyond, positions us to successfully undertake the systems approach that is needed to address the complex resilience challenge.

Specifically, the team is comprised of a regional network organization and universities in the Horn of Africa, an international civil society organization, and a public research university. All have proven track records in research and implementation, and have established strong links with governments as well as the regional authority in the Horn of Africa, the Intergovernmental Authority on Development (IGAD). The **Horn of Africa Regional Environment Centre and Network (HoA-REC&N)** is the Secretariat of the Horn of Africa Regional Environment Network (HoA-REN) that comprises over 40 endogenous institutions from the region, including Non-Governmental Organizations (NGOs), community-based organizations, research institutions and universities from Djibouti, Ethiopia, Kenya, Somalia, South Sudan and Sudan. HoA-REC&N has landscape management experience in the Ethiopian Central Rift Valley where it has established a Steering Committee for the Sustainable Management of the landscape. The selected HoA-REN country-level partners – **University of Djibouti, Hawassa University, and Kenya Wildlife Service Training Institute (KWS TI)** – are strong research institutions with good links to the government, which will be instrumental to promote a multi-stakeholder process in each landscape that bring a multi-disciplinary, systems-based approach to the complex nature of resilience-building. **EcoAgriculture Partners** is an international NGO specialized in multi-stakeholder partnerships, capacity building and tools development for integrated landscape management around the world. It has ten years of experience working on ILM in East Africa, and team leaders each have more than 30 years of experience in the region. **University of Massachusetts Boston** is a public research university and has long been involved in public service. Recently, it received a $3.1 million Integrative Graduate Research and Training (IGERT) grant from the U.S. National Science Foundation for its Coasts and Communities program, which is designed to train scholars from diverse academic backgrounds to be truly transdisciplinary thinkers capable of effectively addressing the challenges associated with linked human-natural coastal systems.

Theory of Change & Impact Pathway

Our team hypothesizes that shaping the practice of integrated landscape management[5] to address critical needs and vital opportunities in the Horn of Africa stands to transform vulnerable places and populations to resilient landscapes. Employing an analytic framework that distinguishes four interacting dimensions of resilience (agroecological, livelihood, ecological, institutional) to guide the realization of resilient outcomes, and that specifies four cross-cutting strategies that are instrumental in building pathways to resilience (diversity and complementarity, gender equity, knowledge and learning, integration and synergy), we anticipate developing the innovative practice of integrated landscape management for resilience in the region.[6] Investment in social learning[7] and collaborative action will support the co-evolution of the multiple dimensions of integrated landscape management for resilience. The team will facilitate the practice of social learning and collaborative action to advance ILM for resilience by sharing concepts across diverse interests and capacities; building networks of practitioners, professionals and academics around common conceptual frameworks and action strategies; strengthening platforms for cross-sectoral learning and decision-making around common visions of success to foster alignment, coordination and/or integration of stakeholders' innovative practice; developing collective capacity to advance gender equity and women's empowerment; identifying incentives for public, private, civic sector cooperation in such activities as inclusive green market development and sustainable platform financing; improving collective capacity to reduce risk for the most vulnerable; and documenting and communicating the learning.

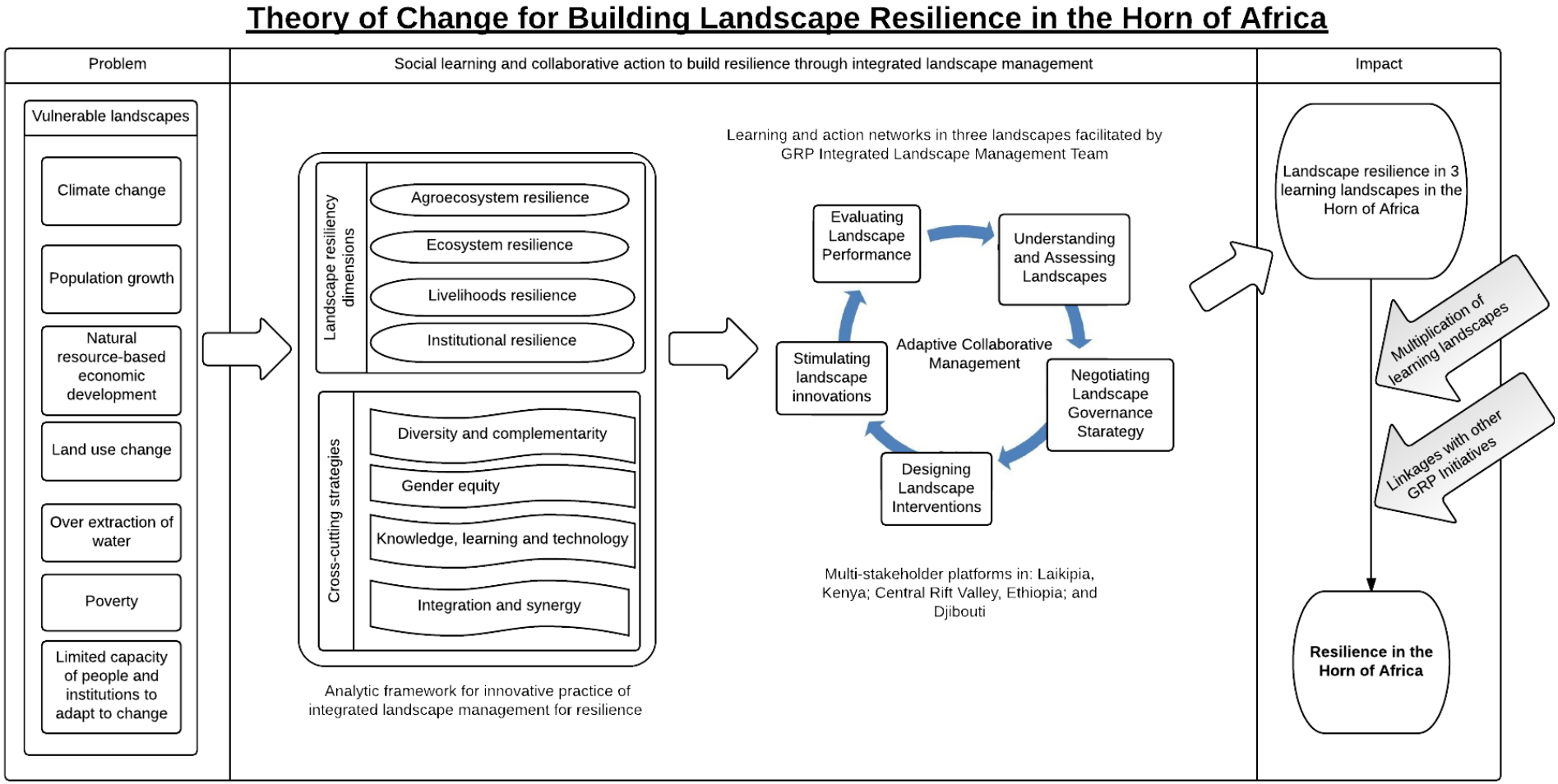
The team will facilitate the initiation and implementation of integrated landscape management for resilience in the city-region of Djibouti; the agro-pastoral county of Laikipia, Kenya; and the commercial flower-producing region of the Central Rift Valley of Ethiopia. The selection of learning landscapes represents a broad spectrum of problem-situations and prospective innovations around which to advance the learning and the practice of ILM for resilience. The landscapes represent also a continuum of familiarity with multi-stakeholder management platforms (MSPs), thus enabling the team to help generate widely applicable lessons in strengthening MSPs for the benefit of prospective landscape resilience initiatives throughout the region. The anticipated multiplication of resilient landscape initiatives throughout the Horn of Africa that is stimulated by investment in the three learning landscapes will be reinforced though their interaction with complementary resilience-building initiatives supported by the Global Resilience Partnership enabling the transformation of vulnerable to resilient landscapes. Diagram 1 graphically depicts our Theory of Change.

[5] Scherr, Sara J., Seth Shames, and Rachel Friedman. 2013. *Defining Integrated Landscape Management for Policy Makers*. No. 10. *Ecoagriculture Policy Focus*. Vol. No. 10. Ecoagriculture Policy Focus. Washington, DC: EcoAgriculture Partners.

[6] Buck, Louise E. and Ian D. Bailey. 2014. Managing for resilience: framing an integrated landscape approach for overcoming chronic and acute food insecurity. Washington, DC: EcoAgriculture Partners on behalf of the Landscapes for People, Food and Nature Initiative.

[7] Schusler, T., Decker, D. J., & Pfeffer, M. J. (2003). Social Learning for Collaborative Natural Resource Management. Society and Natural Resources. 15:309-326.

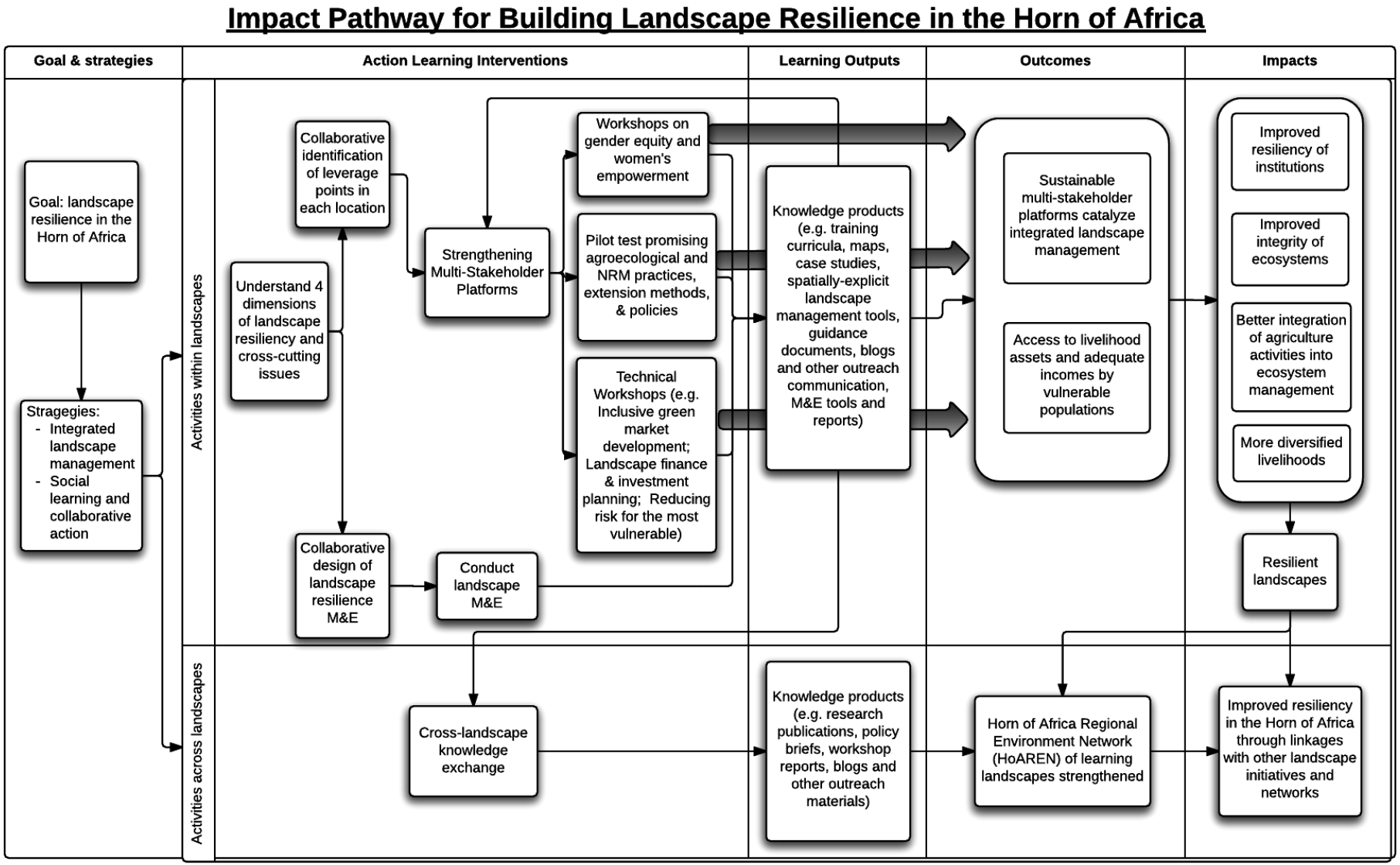
Diagram 1 - Theory of Change



Our team will operationalize the Theory of Change through the Impact Pathway depicted in Diagram 2. To realize the goal of landscape resilience through a social learning and collaborative action strategy we are working with partners in the three learning landscapes to deepen understanding of resilience challenges and opportunities. The diagnostic assessment will lead to the specification of strategic interventions in each landscape that are designed to leverage existing or emergent innovations in the respective resilience domains and to capture ripe opportunities for rapid adoption and scaling. The assessment will lead also to the design of an M&E system for each learning landscape and for the ILM initiative as a whole (see Measuring Resilience section). The team will invest in strengthening capacities for multi-stakeholder platform management in each learning landscape, and promote collaborative, evidence-based decision-making on the platforms. Capacity building around landscape-specific interventions will ensure that gender equity and other key strategies are promoted in each. Cross-landscape knowledge exchanges will be designed around thematic topics and capacity needs where value addition is evident. Strategic documentation of the learning landscape activity will generate knowledge products for diverse audiences of practitioners and policy makers. Knowledge synthesized by the team will

be socialized throughout the learning landscapes, the HoA-REN, the Global Resilience Partnership, the Landscapes for People, Food and Nature (LPFN) initiative, the Global Landscapes Forum, and other communication networks to stimulate further local and external investment in innovative action and learning. The accelerated ILM practice and learning will lead first to strengthened capacities fundamental to managing landscapes for resilience outcomes, and in turn to the desired impacts in the learning landscapes, and beyond, assuming on-going investment and learning from action.

Diagram 2 - Impact Pathway



Environmental and Social Safeguards

This project directly considers both environmental and social safeguards, as they are built into the project's theoretical framework, primarily within the Ecosystem Resiliency and Livelihoods Resiliency dimensions, respectively, and also within the Agroecosystem Resiliency and Institutional Resiliency dimensions. At this point in the project's development it is not yet known what exact interventions will be decided and implemented. For proposed project interventions a "Do No Harm" analysis will be conducted to identify possible negative effects on the environment, social, economic and institutional structure of the communities. Mitigation techniques will then be considered as safeguards and the risk of implementing said activity will be assessed.

A cross-cutting component considered within each resiliency dimension is Gender and Women's Empowerment, which helps us understand how and why different members of the communities have unequal access to resources and decision-making. In this way, our project focuses on positive contributions to the environment and the society in each of the three landscapes, and the theoretical framework guides stakeholders in the landscape in selecting viable interventions and implementing sustainable solutions. Our team will help facilitate their assessment of environmental and social risks of interventions from their diverse perspectives through conversations about the resilience challenges and opportunities suggested by the framework.

Risk Matrix and Mitigation

Column A Risk	Column B Impact	Column C Probability	Column D Mitigation Proposed
Multiple landscape-level sub-teams within the overall team leads to confusion and negatively impacts project implementation	Medium	Medium	Identify clear overall team leader and leadership roles; clear definition of roles & responsibility for each team member; schedule regular team meetings.
Stakeholders in a particular landscape(s) are left out of process and/or do not have ownership over process	Medium	Medium	Extra efforts during solution development phase to identify and involve stakeholders in project planning (including multi-stakeholder workshop) and implementation.
Country or local government react negatively to project and/or obstruct implementation	High	Low	Partners, including government offices, take key leadership roles in each landscape; all relevant levels of government involved as key stakeholders in project. Awareness-raising at project inception workshop and specific training on leadership roles for key stakeholders. Align with government strategies.

Column A Risk	Column B Impact	Column C Probability	Column D Mitigation Proposed
Team member or organization unable to continue participation in project	High	Medium	Team review of all partners' schedules, existing project timelines, and potential staff changes before (and during) project implementation. Establish a means of early communication among all the stakeholders.
Project resources are spread too thin and project interventions are ineffective	High	Medium	Stakeholders will identify ongoing interventions in the landscapes and identify the best way to apply the funds to add value.
Money given by lead organization to sub grantees is misused	High	Low	Many expected sub grantees are trusted partners of lead organization; all sub grantees subject to financial oversight and reporting requirements. We will have clear legally binding sub-grant agreements with each partner.
Overall project becomes disjointed into three individual projects	Medium	Medium	Project lead will have an overview of the different projects and regularly communicate with the country focal points. Cross landscape learning activities will help maintain focus on all three landscapes.
Staff turnover in partner organizations	Medium	High	Partner organizations will establish clear working relationships in writing, so replacement staff can easily begin work on this project.
Multi-stakeholder platforms in which project invests do not perform adequately	High	Medium	Team and respective landscape partners work hand in hand with designated platform leadership to align incentives and priorities.
Multi-stakeholder platforms do not align with government priorities	High	Low	Team includes the government as key stakeholder in the landscape platforms, including representatives from multiple offices/ agencies to ensure adequate sectoral representation and alignment.
Inability to meet compliance requirements of government agencies	Medium	Low	By including the government as a key stakeholder on our multi-stakeholder platforms, we will mitigate this risk. Also, we will conduct social and environmental impact assessments on activities we implement.

Measuring Resilience

Our team's approach to monitoring and evaluation (M&E) of ILM for resilience is integral to the evidence-based decision-making that will characterize the adaptive collaborative management of the landscape. We shall interact with the multi-stakeholder partnership platforms to be developed and/or strengthened in the three learning landscapes (Laikipia County, Central Rift Valley, and Djibouti) to choose a suite of indicators of resilience and means of measuring them that are cost effective. The stakeholders' selection of outcome indicators will be derived from conversations about the project's landscape resilience framework to ensure that agroecological, livelihood, ecological and institutional dimensions are encompassed in each learning landscape's measurement plan. Their choice of progress indicators will be informed by conversations about the cross-cutting strategies in the framework that are anticipated to influence the process of building resilience across the four dimensions (diversity and complementarity, gender equity and women's empowerment, knowledge, learning and technology, and integration and synergy).

Our team will facilitate a multi-stakeholder workshop in each learning landscape during the preparation of the Global Resilience Partnership solution statement to stimulate appreciation for the useful role of collaborative M&E in integrated landscape management for resilience and to make an initial selection of outcome and progress indicators. Workshop participants also will consider ways that stakeholders can engage in measuring the key resilience indicators to foster joint learning and help ensure the cost-effectiveness of the landscape M&E system over time. The final selection of indicators and their use to establish a baseline will be conducted at commencement of full project implementation.

The development of robust M&E systems in our learning landscapes will be informed by the 'landscape measures' approach to management and decision-making in ILM as the analytic framework and conceptual foundation for advancing M&E and impact assessment methodology and practice.[8] We will help stakeholders utilize the practical guidance offered by the web-based Landscape Measures Resource Center in choosing and measuring indicators as well as assessing progress toward the realization of the respective landscapes' goals and objectives in building resilience and eventually evaluating impact.[9]

Our approach will stress the cost-effectiveness and value-addition in using 'integrative indicators' that generate evidence and insight into multiple dimensions of landscape resilience, and demonstrate synergies that are possible by co-investment and coordinated action. For example, changes in land use/land cover can be indicative of livelihood, agroecological, and ecological status. Complementary methods for measuring such change may include ground based photo-monitoring that can productively engage local communities and stakeholders in tracking change in the landscape features and characteristics that they consider important[10], combined with various possible remote sensing tools. An

[8] Buck, L.E., Milder, J.A., Gavin, T.A. and I. Mukherjee. 2006. Understanding Ecoagriculture: A Framework for Measuring Landscape Performance. Discussion Paper No. 2, Ecoagriculture Partners, Washington, DC.
[9] Landscape Measures Resource Center (LMRC) is an on-line tool to support M&E in ILM, offering guidance for operationalizing the landscape measures approach.
[10] Lassoie, J.P., L. Myron, and L.E. Buck. Ground-Based Photo-Monitoring of Landscape Changes Arising from Sustainable Land Management Practices: A User's Guide. Washington, DC: EcoAgriculture Partners.

integral part of our team's 'value for money' approach to M&E involves coordination with Planet Labs to ensure that the three learning landscapes make optimal use of the remote sensing resources they are able to make available through the Global Resilience Partnership. We aim to derive ways of exhibiting data and information derived from M&E activity in spatially informative formats that are appealing to stakeholders from diverse sectors and backgrounds.

Our approach to M&E will stress also the importance of developing stakeholder capacity to measure 'leverage indicators' that provide insight into ways that a change in one key variable can leverage changes in others. We will demonstrate how tracking change in soil organic matter in strategically selected locations, for example, can generate insight into the status of agroecological productivity as well as livelihood and nutritional security, and ecosystem service delivery.

Gender equity is multi-faceted and several of its dimensions can be difficult to quantify. We approach this challenge from an interdisciplinary perspective. For example, some of our indicators include hours spent in work outside the home setting (quantitative) and how women and youth feel about their position in decision-structures (qualitative). Our team expects to collaborate with gender specialists associated with the Water, Land and Ecosystems (WLE) CGIAR Research Program, as available through the Global Resilience Partnership, to assist stakeholders in the learning landscapes to select or design optimal indicators and means of measuring changes in gender equity and women's empowerment in the context of building resilient landscapes.

M&E is an integral element of integrated landscape management for resilience including the engagement of stakeholders in measuring and assessing change in strategically selected indicators of resilience; learning to measure landscape resilience will strengthen the management of resilient landscapes. Accordingly, our team will document and learn from the inherent challenges. As such, M&E will be treated as an innovation domain within our social learning and action approach. We shall help partners and stakeholders improve knowledge and capacities for assessing landscapes along multiple dimensions, to be spatially explicit, to consider interactions among land uses and users, and to report on performance in ways that are meaningful to multiple stakeholders and enhance evidence-based decision making in multi-stakeholder platforms.

Annex 1: Theoretical Framework

Theoretical Framework for Diagnosing and Building Landscape Resilience through the Global Resilience Partnership initiative on Integrated Landscape Management for Resilience in the Horn of Africa[11]

Proposition: Integrated landscape management (ILM) can enhance resilience at a landscape scale by synergistically improving resilience in four key domains—agroecosystem resilience, ecosystem resilience, livelihood resilience, and institutional resilience.

Definitions:

- Landscape: Conceptually, a landscape is a socio-ecological system defined by stakeholders and comprised of mosaics of coupled human-modified and natural ecosystems, with a characteristic configuration of topography, vegetation, land use, and settlement. The interactions between the landscape's ecological, historical, economic and cultural processes influence the distribution of land cover and use types, such as agricultural lands, native vegetation, and urban areas, contributing to the overall character of a landscape.
- Resilience: Capacity of a system to overcome shocks and stresses by anticipating, avoiding, adapting to and/or recovering from them.
- Integrated Landscape Management (ILM): ILM is the long-term collaboration among different groups of land managers and stakeholders to achieve the multiple objectives desired from their landscape. These objectives, set by the multi-stakeholder group, may include agricultural production, provision of ecosystem services and protection of biodiversity, local livelihood security, and institutional capacity for realizing the desired outcomes. ILM utilizes an adaptive collaborative management process for planning, implementing, and evaluating multi-stakeholder landscape activities and outcomes (see Diagram below). Five key elements of ILM include:
    - Shared or agreed management objectives that encompass multiple benefits (the full range of goods and services needed) from the landscape (agreed through negotiated governance strategy, below);
    - Field, farm and forest practices designed to contribute to multiple objectives, including human well-being, food and fiber production, climate change mitigation, and conservation of biodiversity and ecosystem services;
    - Ecological, social, and economic interactions among different parts of the landscape managed to realize positive synergies among interests and actors or to mitigate negative trade-offs;

[11] For foundations of the framework please refer to Buck, L.E. and I.D. Bailey. 2014. *Managing for Resilience: Framing an integrated landscape approach for overcoming chronic food insecurity.* EcoAgriculture Partners on behalf of the Landscapes for People, Food and Nature initiative. Washington, DC. The framework is further informed by the Global Resilience Partnership regional workshop on the global resilience challenge held in Nairobi, Kenya, March 17-20, 2015.

    - Collaborative, community-engaged processes for dialogue, planning, negotiating and monitoring decisions in place; and
    - Markets and public policies shaped to achieve the diverse set of landscape objectives and institutional requirements.
- Adaptive collaborative management: This is a multi-stakeholder management process for identifying, planning, implementing, and evaluating landscape activities and innovations. This process includes: understanding and assessing landscapes; negotiating a landscape governance strategy; designing landscape interventions; implementing landscape management activities; and evaluating landscape performance.

- Multi-stakeholder platform (MSP): This is an institutional setting for the adaptive collaborative management of landscapes. The concept originated in participatory watershed management and has been expanded to apply to the management of resources and regions where multi-sector stakeholder groups need to be involved to stimulate socially acceptable, economically viable and politically feasible solutions to complex problems. The composition and organization of MSPs is variable and subject to design. MSP design is an innovation domain in integrated landscape management (ILM). In ILM, a key task of multi-stakeholder platforms is to help stakeholders improve multi-functionality through 'alignment' of actors own work around a common agreed vision or strategy, perhaps within a particular location of the landscape; 'coordination' of their work, perhaps to meet multiple objectives from a particular investment; and/or 'integration' of their work, perhaps by designing innovations from other sectors into a particular sectoral investment program.
- Landscape Resilience: Landscape resilience, in the context of chronic water and food insecurity, requires synergy across four interrelated domains: 1) agro-ecological resilience of food production systems; 2) ecosystem resilience underpinning food production (e.g. flow and quality of water resources,); 3) livelihood resilience for households and communities; and 4) institutional resilience to respond effectively to shocks and stresses and enable multi-stakeholder management.

- Landscape Resilience Dimensions: The four dimensions of landscape resilience (Agroecosystem Resilience, Ecosystem Resilience, Livelihood Resilience, and Institutional Resilience) are presented as conceptually distinct components of management for analytical purposes, while in practice all four dimensions are implemented concurrently in an integrated fashion to maximize their synergies and limit tradeoffs. Therefore, in examining each dimension it is important to analyze four cross-cutting components that affect resilience outcomes throughout the four dimensions: diversity and redundancy; gender and women's empowerment; knowledge, learning, and technology; and integration and synergy, described below.
- Cross-cutting strategies required to realize the desired outcomes in each resilience dimension:
    - Diversity and Complementarity: Diversity, including diversity of crops, ecosystem services, livelihoods, and institutions, is integral to a landscape's resilience. In a general sense, increasing the number of options available to actors improves their ability to adapt to unexpected shocks or stresses. Diversity also includes coordinated system complementarities which help to boost landscape functionality and limit the risk of system failure.
    - Gender and Women's Empowerment: Gender refers to visible or otherwise noticeable differences in the bodies of individuals (including sex, size, and age) that impact their access to economic resources, representation in household and political decision-making, and social capital. Building a stronger resource base for women is an important element in enhancing the resilience of households, communities, and societies. It is important to ensure women's access to resources and to improve their decision-making

over these resources. It is also important to recognize that gender is not just a synonym for women. Gender analysis helps us understand how and why different members of the communities have unequal access to resources and decision-making.

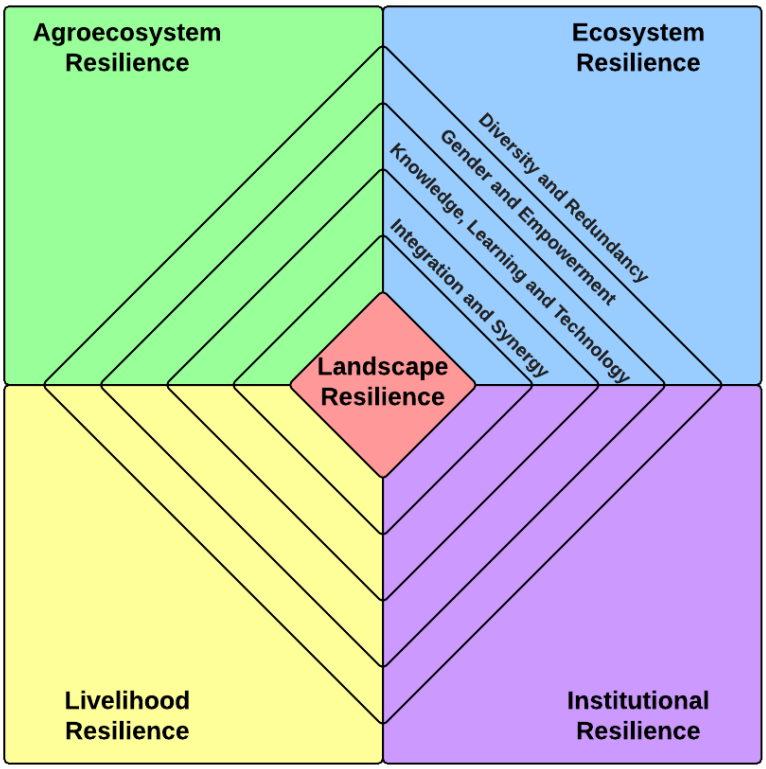
- Knowledge, Learning, and Technology: Understanding existing sources of knowledge is critical to building all four dimensions of resilient landscapes. This includes cultural practices, technical knowledge, traditional knowledge, and more. Understanding learning processes and networks, as well as other forms of knowledge-sharing, helps actors to identify pathways for spreading knowledge, implementing identified activities and providing feedback so the system can adapt as change and learning occur. Existing and potential technologies can be critical to enhancing resilience across the four dimensions, provided the technologies are appropriately utilized and actors have the technical capacity to use and maintain them.
- Integration and Synergy: Addressing cross-cutting challenges (such as those presented by climate change or other major systemic shocks), requires integrated and cross-cutting responses. Integrating activities within a cohesive governance structure provides opportunities to build synergies between related activities, often in different sectors, and among networks of actors in the landscape.

- Learning landscapes: A learning landscape invests in collaborative learning among diverse stakeholders about innovative and optimal ways of managing landscapes for multiple desired outcomes, and in sharing relevant experience and robust lessons with other learning landscapes to enrich and accelerate the learning.

Assumptions:

- To facilitate the development of resilient landscapes, diverse stakeholders must have the capacity to implement adaptive, collaborative management systems.
- Producing outcomes that lead to resilient landscapes requires the integration within and across the four landscape resilience dimensions to create synergies between activities and mitigate potential conflicts or tradeoffs.
- Insights that emerge from linking the four dimensions of landscape resilience with the four cross-cutting factors can be used to diagnose limitations and gaps in a landscape's current propensity for resilience, and to identify opportunities for building resilience through the design and application of strategic interventions.
- Learning landscapes take deliberate measures to facilitate collaborative learning among stakeholders about optimal ways of building landscape resilience and in sharing relevant experience and robust lessons with other learning landscapes by investing in strong knowledge partners.

Framework for Landscape Resilience:



Agroecosystem Resilience: The application of ecological concepts and principles to the design and management of sustainable farming systems, especially through the expanding field of agroecology, guides the management of resilient agroecosystems.

- Diversity and Redundancy: Maintaining, and in some cases enhancing, the diversity of crops, livestock, fisheries, and forests in a landscape is critical to promoting agroecosystem resilience as it helps promote the redundancy needed to protect key functions in the system. Strategies to increase diversity and redundancy in agroecosystems include incorporating genetic diversity, species diversity, crop and grazing rotations, and locale-specific varieties. Diversity and redundancy allow agroecosystems to adapt to diseases, pests, and other challenges, such as abrupt changes in temperature and rainfall that affect crops and livestock.
- Gender and Empowerment: Agricultural practices are often sex and age-specific, so understanding the different roles played by young women, older women, young men, and older men in dominant crop and livestock systems, and how those roles can change in alternative systems, is critical to building equitable landscape resilience. This is also an important consideration in identifying appropriate agricultural technologies and practices.
- Knowledge, Learning, and Technology: Agricultural knowledge comes from traditional practices as well as technical extension systems. Understanding both dimensions of knowledge helps actors access critical knowledge in the face of changing conditions and spread effective technologies and practices.
- Integration and Synergy: Agriculture is directly related to ecosystem functioning, as agricultural productivity depends on ecosystem services such as water, soils, and pollination, and agriculture

shapes ecosystems as through its use of water and impacts on land cover and soil fertility across the landscape. Agriculture is also a major source of income for many households, so it directly affects (and is affected by) livelihood resilience. Additionally, the coordination of farmers' cooperatives, private sector companies, public sector extension agents, government ministries, and other actors through a robust governance system contributes significantly to the management of agroecosystems.

Ecosystem Resilience: The resilience of ecosystems (in tandem with agro-ecosystems) encompasses multiple scales, from watersheds and migratory pathways to soils and microhabitats. Ecosystem resilience is critical for protecting biodiversity and maintaining ecosystem services, such as clean and abundant water and pollination.

- Diversity and Redundancy: Understanding and improving the diversity of ecosystem services and biodiversity in a landscape are critical for promoting its ecosystem resilience. This includes the maintenance and protection of priority conservation areas and species as well as restoration activities to move away from invasive or exotic species.
- Gender and Empowerment: Assessing gender dynamics is critical to understanding how various actors access water and other ecosystem services and resources. Decision-making about land resources and ecosystem services is also often gender-biased, and understanding these processes and developing more equitable systems can improve ecosystem resilience.
- Knowledge, Learning, and Technology: Many types of ecological information are available in a landscape, such as climate dynamics and critical species composition and interactions. This information can aid with the conservation of essential areas and the creation of early warning systems for shocks and disturbances. Additionally, understanding how people access, share, and utilize the landscape is important in assessing ecosystem resilience.
- Integration and Synergy: Ecosystem resilience interconnects with agroecosystem and livelihood resilience by encompassing the broader landscapes in which agroecosystems and livelihood strategies are embedded. Healthy ecosystem functioning provides essential services that help sustain agroecological process and support or complement livelihoods. Such 'environmental flows' within and between ecosystems and agroecosystems can be measured in quantity, extent, and quality of water, forests, woodland, rangeland, and grassland, as well as the population integrity, threatened species protection, and habitat of wild biodiversity.

Livelihood Resilience: Livelihood resilience encompasses a range of social and economic activities that include agricultural producers and their communities. This also includes nutrition and health issues, among others.

- Diversity and Redundancy: A primary goal of livelihood resilience-focused management is the diversification of income sources, including crop diversification and off-farm income-generating strategies, and the establishment of cooperatives and community-based organizations to coordinate the production and sale of household and community products inside and outside the landscape. Such diversification provides added security in meeting household and community needs, and protecting against vulnerabilities associated with climate change and market fluctuations.

- Gender and Empowerment: Livelihood resilience requires the promotion of women and children's social and economic well-being including family nutrition and health. Women should receive an equitable share of the benefits of economic activity, including access to resources and decision-making regarding the use of those resources. Children should be afforded opportunities for education, including the dissemination of local knowledge around cultural and agricultural traditions and practices.
- Knowledge, Learning, and Technology: The ways market and economic information are shared among actors is important to livelihood resilience, as access to information can be a limiting factor to improving livelihoods security. Traditional and new income-generating activities are also important to consider for diversifying income streams. Understanding health, nutrition and extension systems are critical for improving livelihood resilience as well.
- Integration and Synergy: The organization of cooperatives and community-based organizations that contributes to livelihood resilience is also important in promoting institutional resilience. Livelihoods resilience also converges with agroecosystem resilience through employment and possible income-generating activities. Employment also affects, and is affected by, the ecosystem and its services.

Institutional Resilience: Institutional resilience at a landscape scale stems from the capacity of diverse public, private and civic sector organizations to collaborate in pursuing mutually beneficial goals and mitigating trade-offs. Multi-stakeholder platforms can be viable landscape governance mechanisms for withstanding systemic shocks and adaptively managing landscapes. In coming together diverse organizations dialogue, learn, overcome conflict, make decisions to address common problems and pursue innovative solutions. This structurally flexible and organizationally diverse governance system enables institutions to adapt and improve while overcoming or preventing institutional rigidity.

- Diversity and Redundancy: Institutional resilience is built upon diversity; this means that it is important to ensure that organizations representing diverse sectors and interests are able to interact constructively and collaborate, and that all of the sectors with interests in the outcomes are adequately represented.
- Gender and Empowerment: Institutional resilience requires collaboration; therefore, understanding how gender affects collaboration is important. Public decision-making regarding households and institutions may not take gender issues into account, so actors may need to adapt or develop decision-making processes to reflect gender dynamics and ensure adequate empowerment of women.
- Knowledge, Learning, and Technology: Institutional resilience requires social learning, i.e. the ability of institutions to change in ways that will increase its likelihood of withstanding future disturbances t. It depends also on the transparency and inclusiveness of decision-making processes, especially with regards to marginalized populations.
- Integration and Synergy: The degree to which diverse stakeholders are able to coordinate with each other impacts all of the other dimensions of resilience. Understanding the strengths and limitations of various governance structures in promoting this type of coordination within and between the four resilience domains, is important for assessing a landscape's institutional resilience and developing mechanisms to improve it.

Annex 2: Preliminary Problem Identification in Three Learning Landscapes

Based on our theoretical framework and our team's unique selling point, the landscapes where the project will advance ILM represent the major resilience challenges for food and water security, sustainable livelihoods, and ecosystem integrity in the Horn of Africa. The landscapes were selected based on consultations with partners of HoA-REC&N; the presence of existing multi-stakeholder landscape initiatives whose leaders have expressed interest in collaboration to enhance resilience; and an assessment of where resources are already in place to implement the innovations developed through this project. Below we describe each landscape's preliminary problem statement in the structure of our theoretical framework. The problem statements laid out below are part of an iterative process in defining the problems and solutions within each landscape. Teams in each country are currently conducting interviews with key stakeholders to further develop the problem statements, particularly in regard to the cross-cutting components of each resiliency dimension: diversity and complementarity; gender equity and women's empowerment; knowledge, learning, and technology; and integration and synergy. Through this process and subsequent multi-stakeholder workshops in each landscape, the problem statement will be further refined and the solution statement fully developed.

Djibouti City Region / Gulf of Tadjoura, Djibouti

Djibouti is a small country of only about 800,000, and it is a multiethnic community with Somali and Afar being the two largest ethnic groups. The landscape for this project is in the peri-urban coastal landscape that lies adjacent to the city of Djibouti and the Somalia (Somaliland) border. The city of Djibouti claims the majority of the country's population, at over 600,000 residents. The people of Djibouti have been traditionally nomadic and have limited experience with agriculture. Unemployment is particularly high, with 59.5 percent of the population unemployed and 68.5 percent of the female population unemployed.[12]

Agroecosystem Resilience: Currently, Djibouti imports all its produce from Ethiopia and Yemen, with the country scoring high on the FAO Food Insecurity Index (APC). While Djibouti is beginning to develop some agriculture, there is a perceived lack of knowledge to adapt agriculture to dryland areas while the need increases because communities are shifting from pastoralism to a sedentary lifestyle. In Djibouti, the date palm has been selected to address food security issues, being one of the few species that can grow easily in the climate. Poor water quality and availability, as well as soil infertility, are major limitations to agriculture in Djibouti.

Ecosystem Resilience: Water is a very scarce resource in Djibouti, and energy costs are high to make it available for household and agriculture uses. Resilience of water levels in the coastal regions of Djibouti is very low, due to low regeneration rates and current pressures coming from communities. This is causing a lowering in the water table and intrusion of salty water in the soils. High concentrations of salt

[12] http://www.unicef.org/djibouti/overview_3604.html

are destroying the soil, causing desertification. *Prosopis juliflora* was introduced in the Djibouti landscape by international agencies decades ago. Since then, it has spread very fast, considerably lowering the ground water table and choking out other vegetation. There has been considerable deforestation in Djibouti due to charcoal production. Once the soil is very dry and degraded, no forest or plants can easily grow there. In the wettest month of the year, this can cause flooding as no vegetation is present to hold the soil.

Livelihood Resilience: Traditionally, many people in the landscape relied on pastoralism for their livelihoods. Now some communities are shifting from pastoralism to farming, which requires collective action from the community, particularly in this arid landscape. A lack of opportunities in the rural areas is driving many people, particularly young males, towards the city in search of work. Even within the city, unemployment rates are high. There is also an influx of refugees from Yemen, Ethiopia, and Somalia into Djibouti due to societal unrest in the region. In the coastal communities in the landscape, fishing is also a common livelihood option. However, the scope of the current operations is limited due to lack of infrastructure and training. Also, training young people in the community to take up fishing as a livelihood has largely gone neglected.

Institutional Resilience: Many actors are prevalent in the area, including government agencies, private companies, NGOs, research institutions, and foreign militaries. But there is little cooperation across sectors and institutions, with existing mistrust between communities and NGOs as well as between communities and the government. Communication between the communities is strong, but most of this communication exists through informal means. The concepts of cooperatives and associations are weak in Djibouti. The nomadic background of the Djibouti communities seems to have implications for the building of modern institutions of cooperation and exchange. Institutional connections for sharing technical knowledge and voicing needs are also weak. There is little evidence of existing multi-stakeholder platforms for integrated landscape management at present.

Central Rift Valley, Ethiopia

The Central Rift Valley (CRV) is situated in the administrative regions of Oromia and the Southern Nations Nationalities and Peoples Region (SNNPR). The area covers approximately 10,000 km^2, and the CRV lake basin is defined geographically as a lake basin comprised of Lakes Ziway, Abijata, Langano, and Shalla. Population growth is viewed as a major obstacle for achieving sustainability. A key focal area within the CRV is Lake Ziway and its surrounding communities, as it supplies not only the surrounding residents with fresh water but also the downstream lakes in the landscape. For example, the district that is most reliant on Lake Ziway's has a current population of 185,065 and is growing by three percent annually. Climate change is exacerbating the issues associated with population growth, as natural resources become scarcer and the environment becomes harsher (floods, erratic rainfall and unpredictable seasons). Women tend to feel the brunt of these changes, as their roles involve collecting water and firewood, which are becoming ever scarcer.

Agroecosystem Resilience: Small-scale farming is the predominant agricultural activity in the CRV, with competition for land contributing to smaller farm sizes. The average farm size is between 0.25 and 1.5 ha. The crops produced in the CRV are maize, wheat, teff, sorghum, beans, chickpeas, and field peas. In

addition, horticultural crop production on small-scale irrigated land has been increasing in recent years. Small-scale farmers are inefficient users of water resources, and their consumption has negative effects on ecosystem services within the landscape. To combat soil infertility, farmers often apply inorganic fertilizers and pesticides without complete knowledge of the impact of the chemicals on their crops, environment and health. This has led to run-off into Lake Ziway and other water sources, causing problems for the CRV's environment and other water users. There are also large commercial farms located around Lake Ziway, who are generally more efficient water users, but are still contributing to the water abstraction. Underlying, these issues is the absence of a comprehensive land use plan and a land tenure system that does not encourage farmers to employ sustainable agricultural practices.

Ecosystem Resilience: The CRV is a very fragile ecosystem and highly vulnerable to changes in water use regimes and pollution into the sub-basin. Water and land degradation are major challenges in the CRV. They result from poorly managed up streams, mid streams, and lower streams, as well as unregulated water resources use, poorly managed irrigation, and the absence of law enforcement mechanisms. Effects of climate change (e.g. floods and unpredictable weather) have sparked a desire among communities for stabilization mechanisms such as irrigation schemes and dams. Agro-chemical pollution by both commercial farms and small-scale farmers is leading to environmental degradation of the lakes and wetlands, which affects the livelihoods of many people living in the CRV. Other threats to ecosystem resilience of the CRV also include the continued deforestation and results in degradation to ecosystem services that affect buffering and provisioning services of ecosystems.

Livelihood Resilience: The dominant livelihood base is small-mixed rain fed farming. Market linkages for small-scale producers are limited and volatile, and value addition among these producers is also barely visible. The commercial flower farms also provide employment to a large number of residents in the CRV. There is no strong collaboration between small and large scale producers, and, if it exists, it is on a competitive basis. Tourism is another livelihoods source with a high potential for growth given the natural and cultural attractions in the CRV. Within the past few years, eco-tourism cooperatives, as well as, high-end private tourism operations have started business in the area with promising initial success. Fishing, charcoal production and sand abstraction are also common livelihoods that are contributing to environmental degradation.

Institutional Resilience: The CRV is home to a large number of institutions, including those from the public, private, and civic sectors. HoA-REC&N has been involved in establishing and/or supporting several institutions including the CRV Working Group, CRV Steering Committee and the Rift Valley Lakes Basin Authority (RVLBA). These institutions are currently operating at varying degrees of capacity, but, overall, there has been a weakness of finances, human resources, gender imbalance and the ability to enforce their mandates. Communication between organizations and government offices is also weak and should be strengthened to form a cohesive strategy for the CRV landscape. HoA-REC&N is also now working with the Dutch Sustainable Trade Initiative (IDH), through its Initiative for Sustainable Landscapes (ISLA)[13] program, to engage flower companies in a public-private landscape management partnership. From the public sector, there are good policies on land use, environmental regulatory

[13] Initiative for Sustainable Landscapes: http://www.landscapesinitiative.com/

frameworks, and institutional infrastructure, but, as mentioned before, communication between institutions is weak. For example, the upstream communities have not been given priority and connected to the low streams in the lakes basin. There is also a lack of coordination among the local regional administrations within the landscapes for sharing the sub-basins in managing the common resources in a sustainable and responsive manner. At a local level, the most basic decisions affecting the community are made by community leaders, which are traditionally men. For example, decisions that affect women and children, like where to collect firewood from or who goes to school, are made by these community leaders. Government leaders are very involved in the meetings of these community leaders and influence the decision making.

Laikipia County, Kenya

The Laikipia Landscape covers the whole of Laikipia County, an area of 9,462 km^2. The landscape is predominantly pastureland and savanna, but does also include 580 km^2 of indigenous and plantation forests. Wildlife is a major source of conflict between farming and pastoralist communities. The population of Laikipia is 399,277, with a density of 42 people per square kilometer. The County is inhabited by at least 23 ethnic groups.

Agroecosystem resilience: Laikipia is dominated by six land use types: pastoralism, mixed farming, ranching, agro pastoralism, marginal farming and formal employment/trade/business. The average farm size for smallholders is 0.8 hectares while for large scale holders it is eight hectares. Sixty percent of households derive their livelihood from agricultural activities, and the main crops grown include wheat, maize, beans, potatoes and vegetables. Livestock production, predominately cattle, sheep and goats, is dominant in the northern parts of the county. There has been significant competition for land and water use among farmers, pastoralists, and conservationists, among other issues. Droughts have had a significant impact on agriculture in the region. Additionally, increased horticulture activities upstream have led to a decrease in the amount of water available for pastoralists downstream. Current efforts to mitigate the impact of drought and conserve water upstream include the promotion of high value drought resistant crops, conservation agriculture, water harvesting, and fodder conservation. Farmers also need to diversify their crop production to help spread risks. Additionally, overstocking of livestock and deforestation has led to significant vegetation loss.

Ecosystem resilience: Wildlife is a major natural resource, with most of it found in private ranches which occupy 50 percent of the total area of the landscape; the rest of the wildlife is found in group ranches and community conservancies. Major wildlife species include lion, leopard, elephant, buffalo, rhino, and other smaller species. Illegal hunting and trading in wildlife is increasing, and it is a major threat to available natural resources. Human-wildlife conflict a major contributor to poaching as the community, especially the farming community, does not see the value of the wild animals. To address these challenges, several leading conservancies such as Ol Pejeta are implementing wildlife-livestock integration programs, allowing community members to graze their cattle within the conservancies as a way to naturally aerate the soil and encourage grass regeneration, reducing the need for controlled burns in the conservancy and providing critical water and grass to community cattle. Water resources are limited and a cause of conflict among competing users. Water Resource Users Associations (WRUAs) are active in the landscape, maintaining and rehabilitating the rivers and waterways. Forest degradation

occurs mainly through charcoaling and timber logging and is a result of the high level of poverty in the landscape, where forests are seen as an alternative source of livelihood. Forest destruction contributes to water scarcity, as most of the water catchment areas have been destroyed.

Livelihood resilience: 85 percent of the population engages in agriculture (both crop and livestock production), which provides the most important source of household income and livelihood. The transition from pastoralism to farming has been difficult for many in Laikipia. Native people, like the Dorobos, have been pushed from their home areas to new lands and encouraged to take up farming, which is not their cultural livelihood. Additionally, many pastoralists have difficulty finding markets for their livestock. Tourism plays a key role as a source of income, with most of this happening through the large-scale, privately-owned conservancies. Indeed, many of the private conservancies are active in the four main income-generating activities in Laikipia: wildlife tourism, livestock, agriculture (wheat), and high-end real estate. Serious malnutrition exists in Laikipia County, with a Global Acute Malnutrition rate of ten percent. Gender imbalance and equality also remains a challenge in many parts of the county, as women generally lack access to land ownership and have low involvement in decision-making.

Institutional resilience: Government responsibilities and funding in Kenya have recently devolved from the national to the county level. In Laikipia, the county government has taken this opportunity to actively engage in natural resource management and conservation issues. The private sector is well-represented in Laikipia in the forms of large-scale ranches and conservancies. A key multi-stakeholder platform is the Laikipia Wildlife Forum (LWF), a membership led conservation organization supporting, coordinating, and facilitating pan-Laikipia conservation and natural resource management. Membership includes large-scale ranches, community groups, tour operators, individuals, and special interest groups. LWF has worked with the county government to develop several key conservation strategies, including separate strategies for wildlife, water, and forests. Another important multi-stakeholder platform is the Laikipia County Natural Resources Network (LAICONAR), composed of Civil Society Organizations (national and local), Community Based Organizations, the private sector, national and county government organizations, and academia. These multi-stakeholder platforms have engaged with the government in developing the County Integrated Development Plan (CIDP). Despite this plan, poor land planning has resulted in continuous conflicts between diverse land use practices such as small-scale farming, pastoralism, private and group conservancies, and large-scale wheat farming and ranching. The government is pursuing spatial planning, based on the CIDP, to address these issues. There is also a great deal of research activity within Laikipia, with major centers like Mpala Research Center and the Centre for Training and Integrated Research in ASAL Development (CETRAD) studying wildlife, cattle breeds, watersheds, and more. But to date this research has not been well-packaged for use by communities, policy makers, and other actors within the landscape.