EMBARGOED FOR RELEASE UNTIL THURSDAY, JUNE 14, 2012 AT 8:01 PM US EASTERN TIME (0001 HOURS GMT ON FRIDAY)

Landscapes for People, Food and Nature

An International Initiative for Dialogue, Learning and Action

Landscapes for People, Food and Nature

The Vision, the Evidence, and Next Steps

Landscapes for People, Food and Nature Initiative

June 2012

EcoAgriculture Partners

EcoAgriculture Partners is an international nonprofit organization based in Washington D.C. dedicated to supporting innovators from the agriculture, conservation, and rural development sectors to strengthen and scale up integrated agricultural management approaches. EcoAgriculture Partners aims to improve understanding and knowledge of ecoagriculture, facilitate collaboration among innovators and practitioners, and mobilize strategic institutional change. Ecoagriculture is a landscape approach to natural resource management that simultaneously pursues three inter-related goals: conservation and sustainable use of biodiversity and ecosystem services, sustained agricultural production, and improved rural livelihoods. EcoAgriculture implements its work through three Programs on Landscapes and Leaders, Research and Policy, and serves are Facilitator for the Landscapes for People, Food and Nature Initiative. Please visit EcoAgriculture Partner's website for more information at http://www.ecoagriculture.org

Landscapes for People, Food and Nature Initiative

The Landscapes for People, Food and Nature Initiative is an international collaborative effort to foster cross-sectoral dialogue, learning and action to support the widespread practice of integrated agricultural landscape approaches. The primary goal of the Initiative is to promote and support the broader adoption and more effective use of integrated landscape approaches to address the full set of needs from the rural land base—including sustainable, climate-resilient production of food and fiber, watershed management, biodiversity conservation, bio-energy, terrestrial climate mitigation, and rural livelihoods. The Initiative does so by bringing together many of the diverse organizations and communities of practice already engaged in integrated landscape initiatives to define and implement a strategy for improving and scaling up the use of such approaches in critical landscapes worldwide. As an "umbrella" global effort, the Landscapes for People, Food and Nature Initiative intends to complement and add value to the many landscape initiatives and networks already underway or in existence. The Initiative is led by a coalition of leading agriculture and environment organizations including: Bioversity International, Conservation International, Food and Agriculture Organization of the United Nations, International Fund for Agricultural Development, Government of the Netherlands Ministry of Economic Affairs, Agriculture and Innovation, United Nations Environment Programme, the United Nations University -- Institute of Advanced Studies, the World Agroforestry Centre, and the World Resources Institute. Please visit the Initiative website for more information at www.landscapes.ecoagriculture.org or the Initiative blog at http://blog.ecoagriculture.org

EcoAgriculture Partners *on behalf of* Landscapes for People, Food and Nature
1100 17th St. N.W. Suite 600
Washington, DC 20036
Telephone: +001 202 393 5315

FOREWORD

In the first half of the 21st century, rising human demands for food, water, energy and land will collide on a global scale unless bold and creative action is taken now. The new reality is one of shared dependency on limited resources. In response, over the past few decades, numerous land managers seeking to address the challenges of food production, ecosystem management and rural development have reached across traditional sectoral boundaries to seek partnerships to solve what are clearly inter-connected problems. Their work reflects a 'whole landscape,' or 'integrated landscape' approach that meets the full range of needs from the land and resource base. They have created coalitions of diverse stakeholders to negotiate more acceptable trade-offs and pursue newly discovered synergies.

However, despite these promising examples and the hundreds of integrated landscape initiatives around the world, total progress does not add up to a response commensurate with the size of the challenge. This Report explains the rationale for the 'whole landscape' approach, describes its main elements, and summarizes the existing evidence on the prevalence and effectiveness of the approach. The analysis highlights recent movements to scale up these approaches, the barriers to doing so, and concludes that action is needed to:

- Expand, improve and widely share best practices for implementing such strategies in different contexts—as well as evidence about the benefits and costs of integrated landscape approaches.
- Vastly expand the network of technical assistance, professional training, and education needed to support the efforts of local "landscape leaders" and policy makers to develop and effectively implement successful landscape initiatives; and
- Shift the enabling environment of policies, incentives, and investment priorities from one that separately pursues distinct sectoral priorities to one that identifies and promotes new sources of synergy in rural landscapes.

In late 2011, our organizations joined forces to launch the Landscapes for People, Food and Nature Initiative (www.landscapes.ecoagriculture.org). Its aim is to strengthen and scale up multi-stakeholder integrated landscape initiatives around the world that are seeking to increase agricultural production, ensure food security, restore and sustain healthy ecosystems, protect biodiversity and guarantee access of local people to water and other resources needed for health and prosperity. We welcome this Report as a stimulus to widespread dialogue and action.

Emile Frison, Director-General, Bioversity International
Hans Hoogeveen, Director-General, Ministry for Economic Affairs, Agriculture and Innovation, Government of the Netherlands
Russell Mittermeier, President, Conservation International
Kanayo Nwanze, President, International Fund for Agricultural Development
Sara J. Scherr, President, EcoAgriculture Partners
Tony Simons, Director-General, World Agroforestry Centre
Achim Steiner, UN Under-Secretary General and Executive Director, United Nations Environment Programme
Kazuhiko Takeuchi, Vice-Rector, United Nations University/Institute for Advanced Studies
Ann Tutwiler, Deputy Director-General, Food and Agriculture Organization of the United Nations
Manish Bapna, Interim President, World Resources Institute, Washington, D.C., USA

CONTENTS

FIGURES

ACKNOWLEDGMENTS

This paper was written by Sara J. Scherr, Jeffrey Milder, and Louise Buck of EcoAgriculture Partners, based on preliminary findings of the Global Review for the Landscapes for People, Food and Nature Initiative. We are grateful for comments and inputs from Erik Nielsen. We appreciate the research and editing assistance from Sarah Fiorenza, Abby Hart and Courtney Wallace. Funding for this Report was generously provided by the International Fund for Agricultural Development, the Gordon and Betty Moore Foundation, the Hitz Family Foundation and the Global Environment Facility/United Nations Environment Programme.

1. INTRODUCTION

In the first half of the 21st century, rising human demands for food, water, energy and land will collide on a global scale unless bold and creative action is taken now. Over the past few decades, numerous groups seeking to address the challenges of food production, ecosystem management and rural development have reached across traditional sectoral boundaries to seek partnerships to solve what are clearly inter-connected problems. Their work reflects a 'whole landscape' or 'integrated landscape' approach that seeks to meet the full range of needs from the land and resource base. They have created coalitions of diverse stakeholders to negotiate more acceptable trade-offs and pursue newly discovered synergies. The power of this approach has begun to attract the attention of national and global policymakers. Five years ago the term 'landscape' was rarely seen in policy and program documents. Today it is ubiquitous, as more and more rural communities and organizations despair of narrowly sectoral approaches.

The objective of this paper is to provide evidence on the rationale, prevalence and effectiveness of integrated landscape initiatives. The paper first explains the inter-connected challenges of providing for diverse values of our land and water resources, and the imperative for coordinated management. We then present the integrated landscape approach and its potential value for local people and to meet global needs, then outline key elements comprising the approach. The third section summarizes evidence on the current scope of landscape initiatives and illustrates their positive impacts in diverse contexts. The final section outlines how to overcome the barriers to scaling up these landscape initiatives.

2. THE CHALLENGE: COMPETING DEMANDS FOR LAND AND WATER

Rising global demands for land and water--for food, feed, fiber, energy, raw materials, and industry--face largely fixed planetary limits. While communities around the world have grappled with problems of famine, natural disasters, and environmental degradation for millennia, the magnitude and reach of these challenges is unprecedented in a world where population and global economic linkages have grown exponentially.

The new transnational global reality is one of shared dependency on limited resources. In response to this new situation, challenges related to food security, poverty, climate change, energy and ecosystem degradation have risen to the top of international political and economic agendas. Increasing conflict over land and water is anticipated, and governments consider these issues as key concerns for national security.

The cost of failure to manage our resources efficiently and equitably is already very high. In 2009, the number of chronically malnourished persons reached an all-time high, exceeding one billion.[1] In the same year, the World Food Programme delivered food assistance to over 101.8 million people suffering from an acute shortage of food.[2] Recent food crises have incited political unrest and spurred large-scale agricultural investment in the tropics, often displacing local people and critical ecosystems.[3] At the same time, most global poverty alleviation targets remain unmet, as conventional development models struggle to address stubborn problems of land degradation, disease, limited technical capacity, and poor market linkages. Rural regions, which are economically dependent on agriculture, remain the home to approximately one billion people living in extreme poverty.[4] Despite rapid rates of urbanization, the

total number of rural people is projected to grow in Africa, Oceania and East Asia (outside China), and to remain at about the current level in Latin America and the Caribbean, North America, South Asia and South Central Asia.[5]

To feed a world population that is projected to grow more than 30% by 2050—while reducing food insecurity and accommodating dietary changes—experts estimate the need for 70% more food production worldwide by 2050, and nearly 100% greater production in developing countries.[6] Efforts to reduce food waste and promote plant-based diets could reduce the rise in demand, but increased biofuel production could further increase the demand for agricultural products. Certainly, in most developing countries where populations are still growing rapidly, substantial increases will be required.

Most analysts predict that these increases will need to come from a combination of agricultural land expansion and intensification, with the latter requiring substantial increases in the use of fertilizers and water.[7] Yet, the percent annual increase in crop yields has slowed in recent years, while climate change is predicted to lead to increased climatic variability, more frequent extreme events, and reduced water availability in many areas. In much of the tropics, these changes could decrease maize and wheat yields by 10-25%.[8] Worldwide, up to five million hectares of productive land are lost to agriculture each year due to soil erosion and degradation, while up to 290 million additional hectares are at high risk of degradationn.[9] In sum, a 2009 UNEP report warns that environmental degradation could reduce agricultural productivity by up to one-quarter.[10]

Meanwhile, agricultural landscapes are important sources of freshwater for the world's cities and are key repositories of biodiversity. A major share of the world's watersheds is under significant agricultural use[11] and agricultural lands are the principle habitat for many of the world's threatened and endangered species. Yet food and fiber production continues to compromise biodiversity and life-supporting "ecosystem services," such as clean water availability, at alarming rates. At a global level, agriculture is the chief reason why humanity has already exceeded critical "planetary boundaries," including thresholds related to biodiversity loss and perturbations to the nitrogen cycle.[12] Agriculture is also responsible for about one-third of all greenhouse gas emissions responsible for mankind's contribution to climate change.[13]

Three urgent messages emerge from the above litany of sobering statistics.

First, the world's future agricultural systems must not only produce more with less; they must do so in an increasingly challenging environment. **Existing approaches to agricultural management are inadequate to meet our current and future needs.**

Second, society in the twenty-first century will expect a large and diverse set of outcomes and benefits from the world's rural land base and water resources. In addition to providing greatly expanded food production, such lands will be expected to conserve biodiversity and ecosystem services, reduce greenhouse gas emissions, produce energy, and support economic development and resilient rural livelihoods. Increasingly, **agriculture is expected to be "multi-functional"** by contributing food production as well as environmental, social, and cultural benefits at multiple scales.[14]

Third, the mandate of moving to multi-functional agriculture and agricultural landscapes is not merely a luxury for developed countries; nor does it ask us merely to act incrementally to improve crop yields or reduce the environmental impacts of agriculture. Rather, **this mandate is fundamental to sustainable development in the 21st century**. Without new strategies to increase the multi-functionality of rural lands, society will fail to meet some or all of the major global targets related to food security, poverty reduction, reductions in the rate of species loss, climate change mitigation, water quality and availability, energy and the reversal of land degradation and desertification. Thus agricultural systems must be re-shaped to serve as a key component of the new 'green economy,' of local and

global efforts to mitigate and adapt to climate change, of efforts to conserve threatened forests and habitats, and efforts to restore degraded watersheds and conserve water supplies. The Response: Landscapes for People, Food and Nature

Rationale for the Whole Landscape Approach

At the level of individual farms, there are numerous opportunities to increase the sustainability and multi-functionality of agriculture; the same is true of forests and grasslands. It is thus understandable that most organizations focus their energies on particular parts of the landscape where their knowledge and skills are greatest.

However, sustainable farming systems, by themselves, will not provide the full complement of societal benefits expected from rural landscapes. Nor does plot-by-plot and farm-by-farm management offer the most efficient or effective way to meet the goals of many landowners or society at large. Instead, a landscape view is needed to address the dynamics, synergies, and tradeoffs among multiple objectives, land units, and stakeholder interests; and manage or overcome conflicts. For instance:

- **Agribusiness and the food industry** increasingly consider farm- and landscape-scale management of environmental inputs and impacts as part of corporate strategies related to risk management, supply chain reliability, regulatory compliance, and public image. International food companies have begun to extend their interests beyond the farm to the larger watershed and landscape. CocaCola has begun to support watershed management programs;[15] Mars has established cocoa sustainability and biodiversity conservation programs.[16]
- **Users of natural resources in increasing demand** such as forests, grazing lands, inland fisheries, and irrigation water understand that the supply and management of these resources often transcend local communities and jurisdictions, and requires coordination and negotiation among institutions and stakeholders at a broader level. Major national and transboundary watershed programs, from Ethiopia to El Salvador to China to Germany are establishing platforms for collaborative planning.
- **Conservation of biological diversity** and key ecosystem services, such as pollination, depends on the configuration of farms and non-farmed areas at landscape scale. Where such services have been diminished, farmers and other resource users may suffer reduced productivity or be forced to spend money on technological alternatives. Meanwhile, the effectiveness of fragmented protected areas is highly influenced by how easily wildlife can use and move through the agricultural production areas in the land use matrix. Thus major conservation organizations like Conservation International, The Nature Conservancy and African Wildlife Foundation are investing heavily in landscape partnership with farmers, ranchers and forest managers.
- **Those depending on highly degraded ecosystems**--landowners, governments and resource users--are finding that ecosystem restoration is critical to increasing agricultural production, assuring continued access to key resources like water and forests to local communities and businesses, and to economic growth. Thus large-scale programs of agricultural, forest and watershed land restoration are being established, such as national programs in India and China, that are shifting to a landscape framework to address the full range of factors contributing to sustainable land management.
- **Humanitarian organizations**, such as the World Food Programme, World Vision and CARE International, which seek to ensure resilient livelihoods for the rural poor in the face of environmental changes (i.e., climate change adaptation) are recognizing the need to consider the full portfolio of agricultural and natural resources utilized by at risk people, in ordinary as well as in

crises caused by disaster, famine and conflict. Reducing vulnerability requires actions at household, community and landscape scales.

For these reasons and others, communities, land managers, governments, private business, and other stakeholders around the world have begun adopting integrated landscape management strategies that work deliberately to increase synergies between food production, ecosystem conservation, and rural livelihoods. Different approaches to establishing "landscapes for people, food and nature" have emerged throughout the world, with many different motivations, in many different forms. In fact, a recent review identified more than 70 approaches to integrated landscape management in active use.[17] These include ecoagriculture, forest landscape restoration, territorial development, model forests, socioecological production landscapes, foodsheds, participatory watershed management, community-based natural resource management, biological corridors, Landcare, evergreen agriculture and many others.

While diverse in their specifics, all of these landscape approaches have five features in common:[18]

1) Land and natural resources are managed to achieve goals at landscape scale;[19]
2) Diverse land uses are managed for multiple objectives, including food and fiber production, conservation of biodiversity and ecosystem services, and human wellbeing;
3) Stakeholders in different sectors (e.g., agriculture, forestry, health, water) and at different scales (e.g., villages, districts, regions) work together to coordinate, align, or reduce conflict among their respective activities, policies, and investments, to help achieve greater synergies among multiple landscape objectives;
4) Participatory, democratic processes and institutions support integrated management through evidence-based, multi-stakeholder decision-making; and
5) Stakeholders take a long-term perspective to sustainable development by planning for change, monitoring and adapting to new conditions, and building local capacity to manage multi-functional landscapes.

Figure 1 illustrates how integrated landscapes combine sustainable farming systems (upper left) with complementary management of non-agricultural land uses (upper right) in ways that enhance synergies and reduce tradeoffs for multiple landscape objectives. Participatory management processes help negotiate locally-adapted solutions that yield greater "total bottom line" outcomes for food security, poverty reduction, ecosystem conservation, and other values. The "landscape' is defined around a specific set of challenges or opportunities (e.g., watershed management, natural resource conflict, urban foodsheds, or agricultural market clusters) and the key affected stakeholders who seek to address them.

How the Whole Landscape Approach Works

At a practical level, integrated landscape management involves strategic combinations of activities, investments, and policies by land and resource managers at multiple levels. Unlike some models of regional planning and integrated rural development from the 1970's and 1980's with a lead organization devising and financing a 'top-down' plan within a defined project period, landscape initiatives are led by local stakeholders (even if supported by outsiders), moving towards a shared longer-term vision, under 'distributed' leadership.

Three factors explain the rise of this approach over the past two decades: the development of new eco-friendly agricultural and forest production systems; new landscape science enabling more systematic assessment and management at landscape scale; and new methods to facilitate stakeholder cooperation.

Eco-friendly production: The building blocks of the whole landscape approach are various types of eco-friendly farming and forest practices.[20] Precision methods for fertilizer application, irrigation, land leveling, crop protection and other agronomic techniques are helping farmers produce more food with fewer inputs and less pollution.[21] But cutting-edge research and farmer innovation are also identifying complementary and alternative systems that rely on clever management of ecological processes to increase production while contributing ecosystem services like watershed protection and wildlife habitat. Agriculture based on ecological management of soil, water, plants, micro-organisms and animals, and using a much wider range of agricultural biodiversity, has been shown to increase agricultural yields, improve livelihoods, and benefit the environment in a wide range of contexts.[22] Many of these sustainable farming systems incorporate advanced modern technology, while others are based on ancient tradition and deep local knowledge; some incorporate both. Research centers, like the World Agroforestry Centre (ICRAF) and Bioversity International and many national programs, are helping to build an understanding of the scientific principles and processes underlying these systems, and ways to improve their management. Networks of innovative farmers are advancing and adapting practices on the ground. Such agroecological systems include conservation agriculture, agroforestry, evergreen

Figure 1. Components of integrated landscape initiatives

agriculture, holistic range management, integrated pest management, and various systems that integrate crop and livestock production, among others.[23] For example, in Kenya, conservation agriculture practices increased crop yields 60% while nearly eliminating surface water runoff and soil loss. Agroforestry increased maize yields by 280 percent in Malawi, while increasing supply of fuelwood, mitigating climate change and sustaining hundreds of native plant species. Integrated crop-livestock systems have increased farm productivity and income by 100 percent in Zimbabwe and yields of millet and groundnut by as much as 195 percent in Senegal, while improving water infiltration and efficiency, reducing runoff and storing carbon.[24]

Landscape science: Scientific advances in remote sensing, resource monitoring, and spatial analysis provide a powerful new set of tools and methods for conducting evidence-based management of rural landscapes.[25] A proliferation of spatial data sources, many of them available online as open-access resources, allow for much more precise assessments of the condition, use, and changes in resources across the landscape.[26] Paired with new modeling and decision-support tools, these data enable landscape managers and stakeholder groups to evaluate and predict the effects of alternative courses of action, select the most suitable approaches, and monitor the impacts.

Most significantly, these tools and technologies are being used to integrate information related to agriculture, ecosystems, water, socioeconomic conditions, and financial costs and benefits, to identify new solutions that reduce tradeoffs and increase synergies.[27] This is often accomplished through precise location and targeting of activities, investments, and policies across a landscape. For instance, landscape science is being used to target the most critical land parcels for environmental conservation measures, protection of wild pollinators of agricultural crops, or maintenance of wildlife corridors. Combined with data on economic activities and opportunity costs, these approaches are helping to identify cost-effective strategies that return positive economic benefits to public and private sector groups.

Stakeholder cooperation: At the center of most landscape initiatives are efforts to assist land managers such as farmers, grazers, forest owners, conservation managers, and private industry to adopt new and more sustainable farming and resource management practices. These practices are designed and implemented through collaborative action to address challenges and opportunities that cannot be addressed by any one group acting alone. Thus, the third key to success in whole landscape approaches is the application and improvement of methods for communication, negotiation and conflict management among stakeholders that help them move away from entrenched positions toward common interests.[28]

Landscape-level dialogue facilitates cross-agency planning, knowledge-sharing, and programming, while policies reflect locally-crafted land use rules. Many initiatives include market-based incentives that support landscape goals, such as consumer or wholesaler commitments to purchase from sustainably produced local sources, or payments to farmers for conserving key ecosystem services.[29] Local policies and norms, such as community by-laws and land tenure arrangements, may be instituted to reduce conflict and encourage synergies among multiple activities in the landscape. And at the sub-national and national level, policies and investments from different sectors may be coordinated, integrated, and linked to locally identified priorities.

3. EMERGING EVIDENCE

For the first time, systematic efforts are underway to document the scope and scale of whole landscape initiatives around the world, the history and details of individual initiatives, and the on-the-ground impacts of these efforts on agricultural production, ecosystems and human well-being.[30] New evidence

illustrates both the unanticipated breadth and number of such initiatives, and also their potential to have transformative impacts for sustainable development and to reduce conflict.

Scope and Scale of Landscape Initiatives

Until now, experience with landscape initiatives has been widely scattered, under more than 70 different names and within separate "communities of practice." These experiences are now being brought together to reveal not only the broad impact and potential of landscape initiatives, but also a coherent set of lessons about the ways in which landscape approaches can serve as a mainstream strategy for sustainable development.

Research has already identified 109 active or recent inter-sectoral landscape initiatives[31] in Latin America.[32] In Africa, nearly 150 such initiatives have been identified.[33] In Asia and the Middle East, research has documented 21 longstanding landscape management systems where humans have developed integrated strategies for maintaining agricultural productivity and rich natural ecosystems, in the face of significant challenges such as drought, severe erosion, rapid and population growth.[34] Many of these are in places where high levels of poverty coincide with critical conservation priorities. Meanwhile, in North America, Europe, Australia and Japan, integrated landscape approaches are being developed particularly to meet challenges of water quality, manage water conflict, and to manage commercial agriculture in environmentally sensitive areas, and to sustain cultural aspects of rural landscapes.

Some landscape initiatives are led by farmer or community groups who band together to solve problems that transcend the purview of single organizations. Others are organized through government initiatives, programs of non-governmental organizations (NGOs), or new market initiatives. Landscape approaches have been applied by many of the world's leading international organizations, funding agencies, and NGOs dedicated to agriculture, rural development, watershed management and ecosystem conservation. For instance, in Africa, the continent-wide TerrAfrica program[35] is harnessing significant government support, donor funding, and high-level political commitments to apply landscape approaches that restore ecosystems, lift communities out of poverty, and push back the creeping sands of the Sahara Desert. Several networks have emerged to help support and share information among landscape initiatives. The Ibero-American Model Forest network supports 25 landscapes in Latin America[36.] Landcare is faciliating farmer groups in Australia, Africa and Asia to integrate agricultural production, water and wildlife management. The International Partnership for Satoyama Initiative is supporting community-managed landscapes; drawing inspiration from traditional Japanese landscape approaches.[37] FAO's program of Globally Important Agricultural Heritage Systems supports 19 socioecological landscapes developed by traditional societies to be sustained and meet new challenges.[38]

Annex 1 illustrates the broad spectrum of organizations and initiatives that are pursuing integrated landscape objectives.[39]

Illustrative Cases with Evidence of Impacts

Despite the large number of landscape initiatives that have begun to form, tracking and analyzing impacts has been a major challenge and few have been rigorously evaluated in terms of production, human well-being and ecosystem benefits.[40] Methodologies for comparing results of integrated landscape approaches with sectoral strategies are just being developed. In many places, the 'landscape approach' is reflected more in the vision of their leaders than in the actual scale or mode of operations. Nonetheless, some documentation has been done on dozens of landscape cases, illustrating the potential for major impacts. A summary of reports from 23 diverse cases that have evidence of significant benefits across production, ecosystems and livelihoods has been produced as a companion document.[41] Many more examples of successful landscape initiatives from around the world are being compiled and shared on the "Landscape

of the Week" section of the Landscapes for People, Food and Nature blog (http://blog.ecoagriculture.org).

Below we briefly describe nine cases: four initially motivated by threats from watershed degradation (from India, Kenya, Australia and China) and five by conflicts over threatened biodiversity (from Zambia, Brazil, Kenya, Costa Rica and United States). In all cases, though, collaborative action went well beyond the initial entry point to generate a broad set of benefits.

Arvari Basin, Rajasthan, India

By the 1980's, drought and environmental degradation had severely impaired the livelihood security of local communities within Rajasthan's Arvari Basin. Crop failure, soil erosion and watershed degradation were widespread, with communities facing a continual challenge to meet water needs. Twenty years ago, the Tarun Bharat Sangh – a voluntary organization based in Jaipur – initiated a community-led watershed restoration program. The response was based upon re-instating johads, a traditional indigenous technology. Johads are simple concave mud barriers, built across small, uphill river tributaries to collect water. As water drains through the catchment area, johads encourage groundwater re-charge and improved hillside forest growth, while providing water for irrigation, wildlife, livestock and domestic use. By 2005, over 5000 johads were serving over 1000 villages. Community leadership over watershed management was coordinated through village councils. The transformation in the social, economic and biophysical landscape was evident, most notably in the restoration of the Arvari river, which had not flowed since the 1940s. In turn, enhanced water availability resulted in more sustainable agricultural systems with greater irrigation opportunities, improved livelihood security, increased wildlife populations, and, overall, strengthened emphasis on community-led natural resources management within the region.[42]

Lake Naivasha Basin, Kenya

On the shores of Kenya's scenic Lake Naivasha in the Great Rift Valley, over abstraction of water and land degradation are threatening the lake's unique ecosystem. In addition, farm and livestock production, water quality and availability, and wildlife tourism over the entire region are under stress, engendering tension among different water users. During a drought several years ago, the major river in the basin, the Malewa, ran dry. In response, the Imarisha Naivasha Board was created in 2011 by national level leadership of Kenya to lead and coordinate restoration and the promotion of sustainable development in the basin. The Board is tasked with bringing stakeholders together to develop an integrated basin management plan, and creating an enabling environment. The Board promotes open sharing of information, monitors compliance with laws and regulations, reviews and adopts projects to improve water management, and reports quarterly to the Inter-Ministerial Technical Committee.[43] The Board instituted an effective 'stop-light system' which links water abstraction rights for different groups of users to the water level of the lake. All those groups who use or have an interest in the lake and its catchment, local government, non-governmental organizations, commercial flower growers, small scale farmers, pastoralists, community groups and citizens—are cooperating to restore the catchment and ensure the sustainable use of the lake's ecosystems. Even the commercial flower growers have advocated for more systematic and stringent management of water quantity and quality; they prefer a more restrictive plan that phases in compliance requirements over five years rather than a less restrictive plan that could lead to unpredictable and more arbitrary regulations and behaviours.

Murray-Darling River Basin, Australia

In Australia's Murray-Darling River Basin, another massive and seemingly intractable regional challenge is being addressed through coordinated local action within an integrated landscape management framework. The Murray-Darling basin accounts for nearly $5 billion of Australia's agricultural output, yet salinity problems were threatening this bounty, with associated problems for farmers and rural communities. Water supplies for downstream cities were seriously threatened. Recognizing the primacy

of land management in addressing these challenges, Australia's Landcare program and the Queensland Murray-Darling Committee created frameworks by which farmers could band together to solve productivity challenges on their own land while contributing to a broad-scale solution for the river basin. Across the basin, more than 120 sub-catchment planning groups sprung up to develop local land-use and management plans, while more than 160 Landcare groups were formed to share knowledge and ideas, procure technical assistance, and work together to solve local natural resource issues that crossed property boundary lines. Benefits for water quality, water availability, reduced erosion, and increased productivity are resulting from collective action that marries the dedication and on-the-ground action of local landowners to a clear strategy for diagnosing and solving complex regional challenges.[44] Various innovative approaches using payments for ecosystem services to farmers have been implemented in the landscape.

Turrialba, Costa Rica

Turrialba in central Costa Rica is part of the Talamanca Central Volcanic Biological Corridor and the Reventazon Model Forest. The landscape includes rare virgin cloud forest, active volcanos, several national parks, an important archaeological site, highly populated suburban and industrial areas and extensive agricultural land, an active tourism industry, and watershed critical for hydroelectric energy. Moreover, it is a key region for commercial vegetable growing, livestock and coffee production. To reconcile the recurrent conflicting interests of these different groups, the Corridor initiative set up a multi-stakeholder platform. A grassroots-led strategy coordinates activities among the different groups, promoting forest conservation to enhance ecosystem connectivity, mobilizing community participation and cross-sectoral planning with local environmental organizations. The Corridor facilitators assist in creating social agreements that promote the conservation of biodiversity and the sustainable use of natural resources, while also improving the quality of life of residents in the surrounding areas.[45]

Luangwa Valley, Zambia

Across much of Zambia, small-scale farmers had long suffered from low agricultural productivity and frequent periods of hunger and famine. Without new farming strategies, persistent poverty and dependence on food aid seemed inevitable. Against this backdrop, the government in 1999 began to promote conservation agriculture, an ecologically-based farming system that incorporates no-till practices, crop rotations, mulches, and cover crops to restore soil fertility, conserve moisture, and make more efficient use of labor and other farm inputs. Within twelve years, nearly 30% of Zambia's small-scale farmers had adopted the system, with significant average yield increases.[46] To shore up and extend this success, new landscape initiatives are now incorporating conservation agriculture into integrated landscape plans that reduce human-wildlife conflict (e.g., crop destruction by elephants) and conserve Zambia's wildlife by sustainably intensifying agriculture in suitable areas while reserving adequate space for wildlife, away from human settlements. Conservation organizations have provided technical and marketing assistance to farmers who agree to stop poaching, and the products of farmers involved are sold at a premium in domestic markets with a 'wildlife-friendly' label.[47]

Atlantic Forest Region, Brazil

More than 90 percent of Brazil's high-biodiversity Atlantic Forest has been lost to urbanization, agricultural intensification and extensive exploitation. Many social and environmental conflicts took place; restrictions on access to the forest were unworkable without alternatives to sustain local people, resulting inindiscriminate extraction and agricultural conversion, with devastating effects. A whole landscape approach has brought about a dramatic turnaround. The Atlantic Forest Restoration Pact was established with the ultimate aim of restoring 15 million hectares of forest by 2050. Three years into the Pact, over 200 organizations have signed on to provide support, resources and funding. More than 56,000 hectares of forest are currently in the recovery process through 103 forest restoration projects around the region, while agroforestry investments and improved practices are increasing forest cover and improving water quality.[48]

Kericho Tea Zone, Kenya

Yet Kericho, in the western highlands of Kenya, is one of the most important tea-growing areas, while also having some of the country's last remaining natural forests and a critically important watershed. conventional tea production, causes soil erosion, deforestation, pollution run-off, depletion of fuelwood supplies, and loss of biodiversity and ecosystem services. Unilever is the largest private buyer of tea grown by Kenyan smallholders. In 1997, Unilever partnered with the non-profit Rainforest Alliance (RA), who is working with tea producers and processors to fulfil RA's criteria for certification. Products that adhere to RA's eco-standards throughout the supply chain—and in particular on ecological and social benefits at the farm-level—are rewarded with a label that leads to an increase in profitability of tea felt by farmers and processors. By 2011, 25% of Unilever's tea purchases were sourced sustainably, and the organization is committed to becoming 100% sustainable by 2020 (Dewees et al 2011; Unilever a). To scale up these efforts, in 2006, Unilever set up a public-private partnership with the Kenya Tea Development Agency (KTDA) to train smallholder farmers in sustainable production through farmer field schools. By 2008, farmer profitability increased along with an average of 5-15% increase in tea yields. By 2009, 38,000 smallholder tea farmers were Rainforest Alliance CertifiedTM.[49]

Loess Plateau, China

In China's northwestern provinces, a large-scale crisis of agricultural and ecosystem collapse demanded a large-scale solution. Centuries of erosion and land degradation had led to a critical condition of widespread poverty and far-reaching environmental impacts, extending hundreds of kilometers to Beijing and the Pacific Ocean. Between 1994 and 2005, the Chinese government, with financing from the World Bank, used landscape planning and spatial targeting tools to apply combinations of practices such as tree planting, terracing, revegetation of denuded grazing lands, and land leveling to the locations where they could yield the greatest benefits at the lowest costs. Local farmer groups and municipal governments adapted and implemented these activities within the broader landscape and regional strategy. Within ten years, per-capita grain output in the region had increased 62% while household income nearly tripled. Meanwhile, as perennial vegetation cover increased from 17% to 34% across the plateau, erosion and dust storms were greatly diminished, while the level of sediment flow into the Yellow River decreased by more than 100 million tons per year.[50]

Arizona-New Mexico Rangelands, USA

The Malpai Borderlands is an 800,000-acre triangle of land that straddles the Arizona-New Mexico border adjacent to Mexico. It is one of the most bio-diverse regions in all of North America, with an estimated 4,000 species of plants, 104 species of mammals, 295 species of birds, 136 species of reptiles and amphibians, and the greatest known diversity of bees in the world. Thirteen species are listed as threatened or endangered under the Endangered Species Act. The exclusion of wildfire from the region over the past century has contributed to a decline in herbaceous plant cover with resulting loss of watershed stability, wildlife habitat, and livestock forage. In early 1990s, stakeholders who had previously been in serious conflict over the future of the range—ranchers, environmentalists, government agencies--came together to form the Malpai Borderlands Group, committed to working together to find solutions. Over the years, they have introduced a new fire regime, improved quality of grazing lands, and established conservation easements on 700,000 acres of private ranchlands. They reduced risks to ranchers through "grassbanking" by which neighboring ranchers who experience serious drought could rest their ranches from grazing by moving their herds to other ranches under reciprocal conservation agreements. Ecological research found that wild prairie dogs, the keystone species of the range, actually benefit livestock, improving the nutrient content and overall abundance of forage, so that ranchers now conserve rather than exterminate them.[51]

The diversity of existing integrated landscape initiatives and models is a sign of the great creativity and innovation that these initiatives have demonstrated in solving key landscape challenges and capitalizing on opportunities. As these examples demonstrate, integrated landscape initiatives have delivered

positive results in regions of environmental sensitivity, resource limitation, poverty, or conflict, where conventional approaches to agriculture, environmental production, and rural development have proven ineffective. As with any sustainable development strategy, it is difficult to draw universal conclusions across a broad diversity of experiences. But evidence indicates that landscape approaches can increase the "total bottom line" outcomes of rural landscapes while improving the sustainability of livelihood gains and the resilience of rural communities.

Integrated landscape approaches are not a "silver bullet" solution for all agricultural landscapes, food-insecure regions, or areas of natural resource conflict. But investments in landscape initiatives can yield large dividends by unlocking synergies that remain untapped by conventional approaches. As society seeks to feed a growing population and sustain life-giving ecosystem services in an increasingly resource-constrained world, the effectiveness of integrated landscape management relative to conventional approaches is likely to increase.

4. MAINSTREAMING LANDSCAPE APPROACHES FOR SUSTAINABLE DEVELOPMENT

Whole landscape approaches have the potential to reshape land use at a global scale. The knowledge base, institutional models and experienced landscape champions are now in place to enable successful scaling up. Multiplied across dozens of initiatives per country and hundreds of initiatives per continent, they may begin to tackle regional or even global challenges.

Indeed, an unexpected but inspiring shift towards whole landscape development strategies has recently begun, at least in terms of rhetoric and vision. Of the major documents being presented on food, agriculture, forests and climate at the Rio+20 Conference on Sustainable Development, many explicitly discuss or endorse integrated landscape approaches, including those by UN-DESA[52,] UNEP[53] and the CCD[54]. Climate-Smart Agriculture initiatives are framing diverse interventions for climate adaptation and mitigation within a landscape context.The recent "Gaborone Declaration on Sustainability in Africa" endorsed by 10 African Heads of State, highlighted the need for landscape strategies[55]. The World Bank's Department of Sustainable Development is re-orienting its work around a landscape framework.[56] The International Fund for Agricultural Development (IFAD) has developed an approach to climate change adaptation for smallholder farmers that incorporates a landscape approach.[57]

Movement Toward Scaling Up

Landscape initiatives have also begun to be "mainstreamed" in national and regional policies and programs. For example:

- In Rwanda, the President has championed a national landscape restoration strategy as the best—if not only—hope for improving rural livelihoods in this densely-population agricultural country on a heavily degraded land base. Tree cover (much on and around farms) has increased from a low of 10% to over 20% with a goal of achieving 30% cover by 2020.
- In Central America, heads of state for eight countries, including the Dominican Republic, have endorsed and are now implementing in 29 landscapes an area-based approach to rural development that supports participatory regional plans that address agriculture, environment, health, human development, and climate change in an integrated way.[58] This far-reaching program considers that landscape planning paired with coordinated, cross-sectoral investments by central governments, can

provide the best and most cost-effective way to support increased agricultural productivity, human development, and environmental health in rural regions.

- In West Africa, one of the biggest landscape development projects ever attempted is now underway involving a multinational effort to cultivate a forested belt 15 kilometers wide and 7700 kilometers long stretching from Senegal in the west to Djibouti in the east. Dubbed the 'Great Green Wall' of the Sahel, the project is intended to serve as a bulwark against desertification that can restore farmlands and natural ecosystems while lifting communities out of poverty.[59]
- In Tanzania, the President has championed the Southern Agricultural Growth Corridor (SAGCOT) as a public-private partnership with agribusiness to develop the commercial agricultural potential of the region. The development plan is now being enhanced with an "Agricultural Green Growth" strategy to ensure integration and coordination of investments in agriculture, food security, biodiversity, water, forest conservation and climate change.[60]
- The new Global Partnership on Forest Landscape Restoration is aiming to restore 150 million hectares of degraded land, much of it in agricultural landscapes.[61]
- The United Nations Development Programme, with support from the Government of Japan, began in 2011 the UNDP Satoyama Initiative, which is assisting 15 agricultural landscape initiatives in developing countries.[62]

Barriers to Scaling Up

Despite these promising examples of "mainstreaming" and the hundreds of integrated landscape initiatives around the world, total progress does not add up to a response commensurate with the size of the challenge. For every whole landscape success story, there are countless examples where short-term, single-outcome thinking is creating environmental and social havoc and long-term food insecurity, whether expansion of high-production agriculture into environmentally sensitive Cerrado grasslands in Brazil, or draconian restrictions on smallholder farming in China for large-scale reforestation schemes.

In most places, agricultural practices and policies continue to favor short-term production without due regard for social equity, environmental impacts, or even the future viability of the soil, water, plants, and animals on which continued farm productivity depends. Land use tends to reflect investment driven by short-term market incentives, often resulting in spatial land patterns and use of management practices that cause severe tradeoffs between economic, human, and ecosystem values. Alignment and integration across scales and sectors are the exception, not the norm, while conflicts are addressed in a reactive mode that often lacks any guiding vision of present and future needs. Most places lack functioning systems or institutions for productive landscape planning, negotiation, and problem-solving. Without these, the prognosis for increasing the "multiple-bottom-line" landscape outcomes is dim.

Moreover, the whole landscape approach runs counter to the way in which institutions have conventionally been organized. Businesses think in terms of market supply chains; farmers think in terms of their own lands; governments have managed environmental concerns mainly through regulation or setting aside protected areas; financial organizations have looked to investment opportunities outside agriculture. Planning and programming is undertaken sectorally and independently. Many strategies to enhance sustainability of food and resource systems still rely on sectorally defined approaches. Even the international food industry, which increasingly recognizes the business risks of unsustainable supply chains, addresses concerns mainly with individual farm suppliers. Actions are poorly coordinated and rarely at sufficient scale to influence landscape-scale ecosystem and social challenges. Governments that are concerned with sustainability and restored degraded landscapes often seek to lead and control these processes, but their efforts widely fail because the legitimate interests of farmers, other land managers', business and local community are not adequately recognized or addressed. While local farmer groups

and communities do often think holistically about their lands and livelihoods, they do not often consider the roles their community lands play in larger landscape processes.

An Agenda for Action

To increase the adoption of integrated landscape approaches in the places where they can have the greatest positive impact will require concerted action on three fronts.

First, *best practices for implementing such strategies in different contexts—and evidence about the benefits and costs of integrated landscape approaches——must be expanded, improved, and widely shared*. While the diversity of existing landscape initiatives is a sign of the great creativity and innovation that stakeholder groups have applied to solving key landscape challenges and capitalizing on opportunities, it means that valuable experience has remained widely scattered and poorly synthesized. Now, this vast knowledge and lessons learned from effective landscape approaches must be harnessed and incorporated into future projects, programs, and policies. Moreover, public investment must be greatly increased in research on underlying field-to-farm-to- landscape processes and interactions, and to develop farming and natural resource management systems that explicitly aim to realize synergies and reduce trade-offs across a range of benefits.

Second, *a vastly expanded network of technical assistance, professional training, and education is needed to support the efforts of local "landscape leaders" and policy makers to develop and effectively implement successful landscape initiatives*. Concepts of landscape assessment, planning, negotiation, and monitoring are rarely included in formal education for agriculture, environment, and rural development professionals. Effective facilitation and guidance of multi-stakeholder landscape management processes depends on a combination of technical and process skills that require specific training. Increased human capacity is thus needed in the many places where there is interest and mandate to apply integrated landscape approaches to ensure human and ecological wellbeing.

Third, *the enabling environment of policies, incentives, and investment priorities needs to shift from one that separately pursues distinct sectoral priorities to one that identifies and promotes new sources of synergy in rural landscapes*. Government policymakers, businesses, donors and other leaders must embrace a whole landscape approach, aligning and coordinating sectoral policies to support integrated landscape initiatives, mobilizing investment finance, and building public-private landscape partnerships

To advance a shared agenda for supporting landscape initiatives, a concerted effort is needed to unite diverse groups already taking action-- from agriculture, food security, forest, biodiversity, water, energy, health and rural development arenas. They need to speak with one voice in policy forums, to actively engage in pursuing this vision for sustainable development, and to craft the strategies and tools that will make integrated landscape initiatives effective in meeting local and global needs.

ANNEX 1: NETWORKS OF LANDSCAPE INITIATIVES REPRESENTED AT THE NAIROBI INTERNATIONAL FORUM, MARCH 2012

Landscape Initiatives and Networks	Scale	Lead/Facilitator
International NGO's		
African Heartlands	Africa	African Wildlife Foundation
CARE International	Global, developing countries	CARE International
Conservation International – biological corridors and climate-friendly landscapes	Global, developing countries	Conservation International
ECADERT (Central American Strategy for Territorial Development)	Central America	IICA (International Institute for Cooperation in Agriculture
EcoAgriculture Partners	Global	EcoAgriculture Partners
Ibero-American Model Forest Network	Latin America	Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Costa Rica
ICLEI (Local Governments for Sustainability)	Global (municipalities)	ICLEI, South Africa
International Partnership for Satoyama Initiative	Global	United Nations University-Institute for Advanced Studies (IAS), Japan
Landcare International Support	National chapters; international support	Various
Livelihoods and Landscapes	Global, developing countries	International Union for Conservation of Nature (IUCN)

Landscape Initiatives and Networks	Scale	Lead/Facilitator
Globally Important Agricultural Heritages Sites (GIAHS); Participatory Watershed Programme; Forest Programme	Global	Food and Agriculture Organization of the United Nations (FAO)
Holistic Land Management	USA, Africa	Savory Institute
Rainforest Alliance	Global	Rainforest Alliance
United Nations Development Programme (UNDP) -Satoyama Initiative	Global, developing countries	UNDP
Wildlife Conservation Society (WCS)	Global	WCS
World Vision	Global, developing countries	World Vision
Research on Landscapes		
Africa Soil Information Systems (AFSIS)	Africa	AFSIS
Agricultural Research for Development (CIRAD) – Sustainable Agriculture, Terroir	Global/Developing countries	CIRAD
CGIAR Research Program 5 Water, Land and Ecosystems	Global/Developing countries	International Center for Tropical Agriculture (CIAT)
CGIAR Research Program 6 - Forests, Trees and Agroforestry	Global, Developing countries	Centre for International Forestry Research (CIFOR)
CGIAR Research Program 7 Climate Change, Agriculture and Food Security (CCAFS)	Global, Developing countries	CCAFS
Agrobiodiversity Research in CGIAR Research Programme	Global, Developing countries	Bioversity International

Landscape Initiatives and Networks	Scale	Lead/Facilitator
Integrated livestock systems research (in CGIAR Research Programme)	Global, Developing countries	International Livestock Research Institute (ILRI)
Department for International Research (DFID) Research, ESPA (Ecosystem Services and Poverty Alleviation)	Global, Developing countries	DFID
Alternatives to Slash and Burn Initiative (ASB)	Global, Developing countries	World Agroforestry Centre (ICRAF)
International Center for Research on Organic Farming Systems (ICROFS)	International	ICROFS
Kunming Institute of Botany	China	Kunming Institute of Botany
Millennium Institute	USA	Millennium Institute
National Pollinator Initiative	Kenya	National Museums of Kenya
Platform for Agrobiodiversity Research	Global	Bioversity International
Renming University	China	Renming University
Rice Research Institute	Sri Lanka	Rice Research Insitute
Diversified Farming Systems	USA/international	University of California-Berkeley
World Agroforestry Centre (ICRAF)	Global	ICRAF
Multilateral Programs		
FAO (Watershed, Climate-Smart Agriculture, Globally Important Agricultural Heritage Sites (GIAHS), Sustainable Agricultural Intensification; Mitigating Climate Change in Agriculture (MICCA), Sustainable Forestry, Food and Energy Systems;	Global, LDC	FAO

Landscape Initiatives and Networks	Scale	Lead/Facilitator
Food and Cities)		
Global Environment Facility (GEF) Land Degradation/Climate/Biodiversity	Developing countries	GEF
International Fund for Agricultural Development (IFAD) (landscape SLM)	Developing countries	IFAD
TerrAfrica – Sustainable Land Management	Regional	Nepad Planning & Coordinating Agency (NPCA)
United Nations Environment Programme (UNEP)	International	UNEP
World Food Programme (WFP) (landscape resilience)	Developing Countries	WFP
Policy Initiatives		
Committee on World Food Security (CFS)	Global	CFS
Landscape Restoration Initiative	Global	World Resources Institute (WRI)
Prince's International Sustainability Unit (ISU)	Global	ISU
Campaign for No Net Land Degradation	Global	Convention to Combat Desertification (CCD)
Convention on Biological Diversity (CBD)	Global	CBD
4 F's Initiative (Food, Fuel, Fiber, Forest)	Global	Forest Dialogue
Network on agriculture and climate change in Africa	Africa	The Rockefeller Foundation

Landscape Initiatives and Networks	Scale	Lead/Facilitator
National Networks and Initiatives		
Solutions from the Land	USA (Global)	United Nations Foundation, Farm Foundation, Conservation International, The Nature Conservancy
Berlin-Brandenberg Landcare	Germany	Landscape-Germany
Biodiversity Centre	Sri Lanka	Biodiversity Department
Business and Biodiversity in Southern Cape of South Africa	South Africa	Conservation International
Capetown Integrated Food Systems	South Africa	ICLEI
Cross-River Sustainable Development	Nigeria	Cross River State Government
Ecotrust-Uganda	Uganda	Ecotrust
Kibera urban foodshed	Kenya	Various
Kijabe Environment Volunteers (KENVO)	Kenya	KENVO
Local Initiatives for Biodiversity, Research and Development (LI-BIRD)	Nepal	LI-BIRD
Model Forest	Bolivia	Ibero-American Model Forest Network
M.S. Swaminathan Research Foundation (MSSRF)	India	MSSRF
Rwanda Landscape Initiative	Rwanda	Government of Rwanda
Southern Agricultural Growth Corridor of Tanzania (SAGCOT)	Tanzania	Agriculture Council of Tanzania (ACT)

Landscape Initiatives and Networks	Scale	Lead/Facilitator
Quechua-Aymara Association for Sustainable Livelihoods (ASL)	Peru	ASL
Ecoagriculture-Uganda	Uganda	Makerere University
Smejak Save the Lake Victoria	Kenya	Smejak

ENDNOTES

1 IFAD [International Fund for Agricultural Development]. 2010. Rural poverty report 2011: New realities, new challenges: new opportunities for tomorrow's generation. Rome: IFAD.
2 WFP [World Food Programme]. 2010. Fighting hunger worldwide: annual report 2010. Rome: WFP.
3 Deininger, K. and D. Byerlee. 2011. Rising global interest in farmland: can it yield sustainable equitable benefits? Washington, DC: World Bank.
4 IFAD. 2010. Op.cit.
5 UN, Depart Economic and Social Affairs, 2012. Esa.un.org/unpd/wup/CD-ROM/Urban-Rural-Population.htm
6 Bruinsma, J. 2009. The resource outlook to 2050: By how much do land, water and crop yields need to increase by 2050? FAO Expert Meeting, 24-26 June 2009, Rome on "How to Feed the World in 2050".
7 Bruinsma, J. 2009. Op.cit.
8 IPCC [Intergovernmental Panel on Climate Change].2007. IPCC Fourth Assessment Report: Climate Change 2007 (AR4). Cambridge, United Kingdom and New York, NY: IPCC.
9 Eswaran, H., R. Lal and P.F. Reich. 2001. Land degradation: an overview. In: Bridges, E.M., I.D. Hannam, L.R. Oldeman, F.W.T. Pening de Vries, S.J. Scherr, and S. Sompatpanit (Eds). Responses to Land Degradation. Proc. 2nd. International Conference on Land Degradation and Desertification, Khon Kaen, Thailand. Oxford Press, New Delhi, India. Bai, Z., D. Dent, L. Olsson, M. Schaepman. 2008. Proxy global assessment of land degradation. Soil Use and Management. Vol 24, 3, pp. 223–234
10 Nellemann, C., MacDevette, M., Manders, T., Eickhout, B.,Svihus, B., Prins, A. G., Kaltenborn, B. P. (Eds). 2009. The environmental food crisis – The environment's role in averting future food crises. Geneva: UNEP.
11 Wood, S., Sebastian, K. & Scherr, S. 2000. Pilot analysis of global ecosystems: agroecosystems. Washington, DC: IFPRI and World Resources Institute.
12 Rockstrom, J. et al. 2009. A safe operating space for humanity. Nature 461, 472–475.
13 IPCC 2007.Op-cit.
14 McIntyre, B.D. ed. 2009. International assessment of agricultural knowledge, science and technology for development (IAASTD): global report. Washington, DC: Island Press.
15 The Coca Cola Company. 2012. The water stewardship and replenish report. The Coca Cola Company. http://www.thecoca-colacompany.com/citizenship/pdf/TCCC_WSRR_2012_FINAL.pdf
16 Mars. 2011. Securing cocoa's future: Mars and cocoa sustainability. http://www.mars.com/global/brands/cocoa-sustainability/mars-and-cocoa-sustainability.aspx
17 Scherr S.J. and S. Shames. 2012. What we call 'Landscapes for People, Food and Nature.' Landscapes for People, Food and Nature Blog, 5 March. http://blog.ecoagriculture.org/2012/03/05/terminology/
18 Definition is adapted from: J.C. Milder et al. 2012. Landscape approaches to achieving food production, conservation, and the Millennium Development Goals. In F.A. DeClerck, J.C. Ingram, and C. Rumbaitis del Rio, editors. Integrating Ecology and Poverty Reduction. Springer, New York.
19 Landscapes are cohesive land areas defined by common biophysical, socioeconomic, and/or political conditions, and typically encompassing approximately 100 to 10,000 square kilometers. Landscapes may correspond to watershed boundaries, distinct land features, and/or jurisdictional boundaries, or they may cross-cut such demarcations. Boundaries may be discrete or fuzzy.
20 Liniger, H.P., S. Mekdaaschi, C. Hauert and M. Gutner. 2011. Sustainable Land Management in Practice—Guidelines and Best Practices for Sub-Saharan Africa. TerrAfrica, WOCAT and FAO. http://knowledgebase.terrafrica.org/fileadmin/user_upload/terrafrica/docs/topic_page/SLM_in_Practice_english.pdf
21 BANR [Board on Agriculture and Natural Resources] and Committe on Twenty-First Century Systems Agriculture. 2010. *Toward Sustainable Agricultural Systems in the 21st Century*. Washington, DC: The National Academies Press; Foresight. 2011. *The Future of Food and Farming. Final Project Report.* London: The Government Office for Science.
22 J. Pretty. 2008. Agricultural sustainability: concepts, principles and evidence. Philosophical Transactions of the Royal Society B, 363: 447-465 and The Royal Society. 2009. Reaping the benefits: science and the sustainable intensification of global agriculture.
23 Buck L.E. and S.J. Scherr. 2011. Moving ecoagriculture into the mainstream. In *State of the World 2011: Innovations that Nourish the Planet*, 15-24. Washington DC: Worldwatch Institute; Food and Agriculture Organization [FAO]. 2011. *Save and grow: a policymaker's guide to the sustainable intensification of smallholder crop production*. Rome: FAO; Giovannucci D., with S.J. Scherr, D. Nierenberg, C. Hebebrand, J. Shapiro, J. Milder and K. Wheeler. 2012. *Food and Agriculture: The Future of Sustainability*. Sustainable Development in the 21st Century. New York: UN Department of Economic and Social Affairs, Division of Sustainable Development; McIntyre, B.D. ed. 2009. *Op-cit*; United Nations Environment Programme [UNEP]. Forthcoming 2012. Avoiding future famines: strengthening the ecological basis of food security through sustainable food systems. Nairobi: UNEP.
24 Linger et al. 2011. Op-cit.
25 O'Farrell, P.J. and P. Anderson. 2010. Sustainable multifunctional landscapes: a review to implementation. Current Opinion in Environmental Sustainability. Vol. 2: 59 – 65
26 David W. Cash*†, William C. Clark*, Frank Alcock*, Nancy M. Dickson*, Noelle Eckley, David H. Guston,, Jill Jager. 2003. Knowledge systems for sustainable development. PNAS 100(14): 8086-8091.

[27] Nelson, E., G. Mendoza, J. Regetz, S. Polasky, H. Tallis, D.R. Cameron, K. Chan, G. C. Daily, J. Goldstein, P.M. Kareiva, E. Lonsdorf, R. Naidoo, T.H. Ricketts, and M.R. Shaw. 2009. Modeling multiple ecosystem services, biodiversity conservation, commodity production, and tradeoffs at landscape scales. Frontiers in ecology and the environment. Vol . 7: 4 – 11.

[28] Hemmati, Minu. 2008. Multistakeholder Partnerships. Chapter 19 in S.J. Scherr and J.A. McNeely, Eds. Farming with Nature: The Science and Practice of Ecoagriculture. Washington, DC:Island Press, p. 344-357.

[29] FAO [Food and Agriculture Organization]. 2007. The state of food and agriculture: paying farmers for environmental services.FAO Agriculture Series No.38. Rome: FAO.

[30] For a detailed overview of the 40+ studies and knowledge products being developed by the Landscapes for People, Food and Nature Initiative collaborators, see Landscapes for People, Food and Nature. 2012. Global Review. Reports as they are completed will be posted on the LPFN website at: http://landscapes.ecoagriculture.org/pages/global_review

[31] Phase 2 of the continental reviews will provide more in-depth analysis of institutional and governance characteristics of the initiatives.

[32] Data compiled by EcoAgriculture Partners and the Tropical Agronomic Center for Research and Teaching (CATIE), forthcoming in a 2012 report.

[33] Data compiled by EcoAgriculture Partners and the World Agroforestry Centre, forthcoming in a 2012 report.

[34] K. Ichikawa, editor. 2012. Socio-ecological production landscapes in Asia. United Nations University Institute of Advanced Studies, Yokohama, Japan. More recently formed initiatives have not yet been inventoried

[35] TerrAfrica. 2009. www.terrafrica.org

[36] International Model Forest Network. 2010. Ibero-American model forest network. http://www.imfn.net/ibero-american-model-forest-network

[37] Satayoma Initiative. http://satoyama-initiative.org/en/.

[38] Food and Agriculture Organization. 2012. Globally Important Agricultural Heritage Systems (GIAH). http://www.fao.org/nr/giahs/en/

[39] LPFN [Landscapes for People, Food and Nature Initiative]. 2012. Nairobi 2012 international forum report. Washington, D.C: LPFN. http://landscapes.ecoagriculture.org/documents/nairobi_forum_report

[40] Buck, L., J. Milder, S. Scherr, T. Philip and P. Casal. 2009. EcoAgriculture Landscape Measures Initiative: Toward a Proof of Concept. Washington, DC: EcoAgriculture Partners.

[41] EcoAgriculture. 2012.Reported Impacts of 23 Integrated Landscape Initiatives. Washington, D.C: EcoAgriculture.Partners.

[42] http://www.tarunbharatsangh.org/programs/water/arvari.htm

[43] Imarisha 2012. Imarisha Naivasha Watershed Implementation Plan. 2012. Naivasha, Kenya: Imarisha-Naivasha. Draft.

[44] Ross, Helen, Sarah Ewing, Tony Meppem. 2002. Integrated Catchment Management: Learning from the Australian Experience for the Murray-Darling Basin. Final Report. Canberra, CSIRO. January.

[45] Avelino, J., A. Romero-Gurdian, H.F. Cruz-Cuellar and F.A.J. DeClerck. 2012. Landscape context and scale differentially impact coffee leaf rust, coffee berry borer, and coffee root-knot nematodes. *Ecological Applications*. Vol. 22(2): 584 – 596. Canet-Desanti, Lindsay. Diagnostico sobre la efectividad de manejo de los Corredores Biologicos de Costa Rica. Cartago: CATIE [Centro Agronomico Tropical de Investigacion y Ensenanza].

[46] Statistics from the Government of Zambia Conservation Farming Unit.

[47] African Wildlife Foundation, http://www.awf.org/content/solution/detail/3511; COMACO, http://www.itswild.org.

[48] Calmon, M., H, P.H.S. Brancalion, A. Paese, J. Aronson, P. Castro, S.C. da Silva and R. R.Rodrigues. 2011. Emerging threats and opportunities for large-scale ecologocial restoration in the Atlantic Forest of Brazil. Restoration Ecology Vol. 19, No. 2, pp. 154–158.

[49] Ecoagriculture Partners. 2008. Kericho…. Washington, DC: EcoAgriculture Partners.April.

[50] World Bank, Restoring China's Loess Plateau, http://www.worldbank.org/en/news/2007/03/15/restoring-chinas-loess-plateau

[51] Ecoagriculture. 2007 est..Community-Based Stewardship, Improved Range Management, and Habitat Conservation in Southwestern United States Grasslands. Ecoagriculture Snapshot #11. Washington, D.C.: EcoAgriculture Partners.

[52] Giovanucci, D., et al. 2012. Op.Cit.

[53] UNEP. 2012. Op-cit.

[54] UNCCD [United Nations Convention to Combat Desertification]. 2012. Zero net land degradation: a sustainable development goal for Rio +20. Bonn: United Nations Convention to Combat Desertification.

[55] The Gaborone Declaration. 2012. Drafted during the Summit for Sustainability in Africa in Gaborone, Botswana held on 24 – 25 May. Endorsed by 10 Heads of State of African countries and 19 representatives and supporting institutions. http://www.conservation.org/conferences/africa_sustainability_summit/Documents/Gaborone-Declaration-HoS-endorsed_5-25-2012_Govt-of-Botswana_CI_Summit-for-Sustainability-in-Africa.pdf

[56] World Bank. 2012. World Bank VP eyes opportunities for sustainable growth in Africa. The World Bank 7 February.

[57] IFAD [International Fund for Agricultural Development]. 2012. Adaptation for smallholder agriculture programme (ASAP): Rome: IFAD. http://www.ifad.org/climate/asap/

[58] IICA. 2010. Central American Strategy for Rural Area-Based Development, 2010-2030 (ECADERT). Central American Agricultural Council, Inter-American Institute for Cooperation on Agriculture, and Regional Unit for Technical Assistance, San Jose: IICA.

[59] World Bank. 2011. Sahel and West Africa program in support of the Great Green Wall Initiative. Washington, DC: World Bank. http://www.thegef.org/gef/sites/thegef.org/files/publication/SAWAP_English_Final.pdf

[60] SAGCOT [Southern Agricultural Growth Corridor of Tanzania]. 2011. Greening the southern agricultural growth corridor of Tanzania. Dar es Salaam: SAGCOT.

[61] The Global Partnership on Forest Landscape Restoration. 2011. http://www.ideastransformlandscapes.org/

[62] Satayoma Initiative. http://satoyama-initiative.org/en/