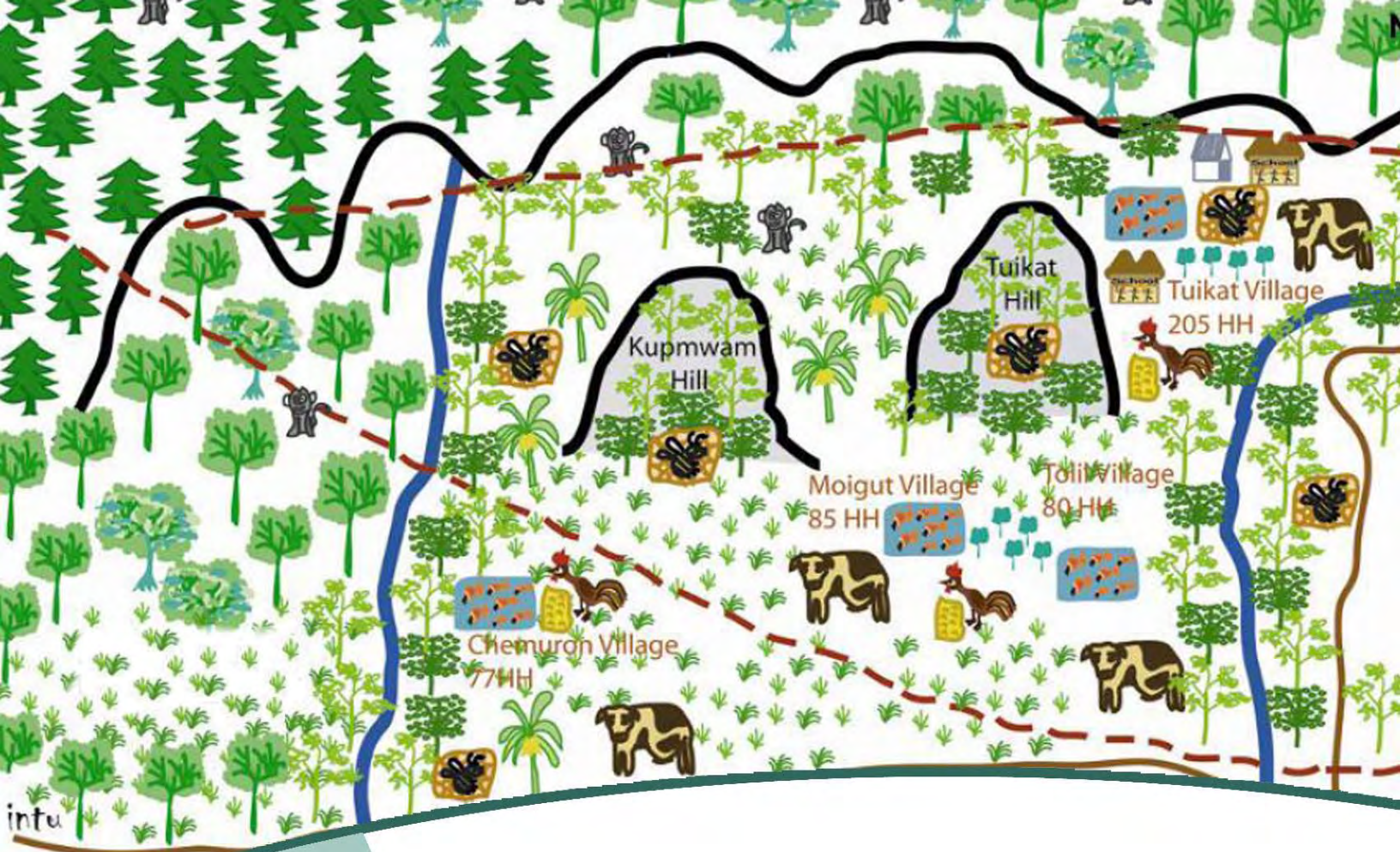




# Agriculture and the Convention on Biological Diversity

## Guidelines for Applying the Ecosystem Approach

Seth Shames

Sara J. Scherr









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**June 2009**

## ECOAGRICULTURE DISCUSSION PAPER SERIES

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## PREFACE

The 9<sup>th</sup> meeting of the Conference of the Parties (COP) to review the Convention on Biological Diversity (CBD) in May 2008 presented a unique opportunity to bring attention to the importance of integrating agricultural issues more fully into the CBD, as well as more broadly within the biodiversity conservation discourse. In 2007 and 2008, Ecoagriculture Partners engaged collaborators to convene an informal working group to raise the profile of, and support for, strategies to implement the CBD's Ecosystem Approach within an agricultural context. This group included Sara Scherr, Seth Shames, Claire Rhodes and Jenny Nelson of Ecoagriculture Partners; Toby Hodgkin of Bioversity International; Jeff McNeely of the International Union for Conservation of Nature (IUCN); Elspeth Halverson of the United Nations Development Program's (UNDP) Equator Initiative; Nora Ourabah Haddad of the International Federation of Agricultural Producers (IFAP); Delia Catacutan of Landcare International; Victor Archaga of The Nature Conservancy; Mohamed Bakarr of the World Agroforestry Centre (ICRAF) (now at Conservation International); Marieta Sakhalan of the United Nations Environment Program (UNEP); Anelissa Grigg of Fauna and Flora International; Benson Venegas of Asociación ANAI, Costa Rica; David Kuria of the Kijabe Environment Volunteers (KENVO), Kenya; Donato Bumacas of the Kalinga Mission, Philippines (KAMICYDI); and Arturo Massol-Deya of Casa Pueblo, Puerto Rico.

One of the outputs of this process was a policy brief called *Applying the Ecosystem Approach to Biodiversity Conservation in Agricultural Landscapes* (Ecoagriculture Partners *et al.* 2008). The goal of this brief was to provide clear guidelines and real-world examples to aid Parties in their attempts to implement the program of work on agricultural biodiversity. Elements of this brief have been incorporated into section 4. Our participation in the writing of this brief and in the discussions it sparked among CBD stakeholders made clear to us that there is a significant demand within CBD policy circles to explore these policy guidelines in greater depth and place them within a broader political and conceptual context. This paper is an attempt to do that.

**Seth Shames and Sara J. Scherr, Ecoagriculture Partners**

## TABLE OF CONTENTS

|                                                                                               |           |
|-----------------------------------------------------------------------------------------------|-----------|
| Preface                                                                                       | iii       |
| Acknowledgments                                                                               | v         |
| Executive Summary                                                                             | vi        |
| <b>1. Introduction</b>                                                                        | <b>1</b>  |
| <b>2. The Inseparability of Conservation and Agricultural Development Agendas</b>             | <b>2</b>  |
| <b>3. Agriculture and the CBD</b>                                                             | <b>6</b>  |
| <b>4. Practical Guidelines for Applying the Ecosystem Approach in Agricultural Landscapes</b> | <b>13</b> |
| <b>5. Next Steps for the International Community</b>                                          | <b>20</b> |
| References                                                                                    | 22        |
| Acronyms and Abbreviations                                                                    | 25        |

## BOXES

|                                                                      |    |
|----------------------------------------------------------------------|----|
| Box 1. Principles of the Ecosystem Approach                          | 9  |
| Box 2. Applying a landscape lens to biofuels production              | 14 |
| Box 3. Landcare in Uganda                                            | 15 |
| Box 4. Landscape management capacity at Kalinga Mission, Philippines | 17 |
| Box 5. The Evolution of the Kijabe Environment Volunteers (KENVO)    | 18 |
| Box 6. Mesomerica Regional Agro-environmental Strategy               | 19 |

## **ACKNOWLEDGMENTS**

This project was a team effort. The policy brief (Ecoagriculture Partners *et al.* 2008) that served as an input for this paper was a collaboration that included input from representatives of Ecoagriculture Partners; The Nature Conservancy; ICRAF; Bioversity International; IFAP; the UNDP Equator Initiative; Landcare International; UNEP; IUCN; Fauna and Flora International; Asociación ANAI, Costa Rica; Casa Pueblo, Puerto Rico; Kijabe Environment Volunteers (KENVO), Kenya; and the Kalinga Mission, Philippines (KAMICYDI).

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## EXECUTIVE SUMMARY

While agricultural productivity improvements are widely agreed to be a critical strategy to reduce poverty in low-income rural areas of the developing world, growing ecological impacts from agriculture put enormous pressure on ecosystems. The Convention on Biological Diversity's (CBD) program of work on agricultural biodiversity has been adopted to harmonize agriculture and conservation agendas and to create synergies in agricultural landscapes that meet production, sustainable use and conservation, and livelihood objectives. These ambitious goals have been challenging conceptually and politically, but the program of work has progressed, particularly in the area of on-farm agricultural biodiversity conservation. But some CBD Parties have had difficulty fully applying the Ecosystem Approach, the CBD's primary implementation framework, in agricultural landscapes. A review of the program of work on agricultural biodiversity was conducted in the preparation for the CBD's 9<sup>th</sup> Meeting of the Conference of the Parties in May 2008. This review provided an opportunity to take stock and chart directions forward. The application of the Ecosystem Approach was considered at the same meeting.

The program of work's language is now more supportive of integrated approaches in agricultural areas that consider both on-farm biodiversity as well as the entire agro-ecosystem. The Ecosystem Approach itself is supported by operational guidelines, but there is a clear need to frame them for agricultural contexts to support implementation by Parties and other stakeholders (farmers' organizations, non-governmental organizations, intergovernmental organizations, agribusiness, etc). This paper provides a first step towards filling this gap. The recommendations, drawn from experience and research on ecoagriculture systems from international and local organizations throughout the world, suggest five practical and implementable guidelines for national and local implementation of the program of work on agricultural biodiversity. These recommendations are:

1. Take an agricultural landscape perspective
2. Empower multi-stakeholder processes for landscape management
3. Build farming communities' capacity for landscape management
4. Reposition the role of conservationists in agricultural landscapes
5. Coordinate environmental and agricultural policies and markets for more effective landscape management

Putting these guidelines into practice will be necessary for CBD Parties and other stakeholders to maintain the basis for thriving, biodiversity-rich, agriculture systems and to cope with increasing ecological and economic pressures.

# 1. INTRODUCTION

Prospects for reaching a more sustainable balance between conservation and agricultural concerns have been brightened in recent years by a surge in research and extensive documentation of management practices by farmers, farming communities, and agribusinesses that reveals a wide range of synergistic relationships between conservation and agricultural production (Scherr and McNeely 2007). This knowledge has substantially deepened our understanding of production and conservation approaches which together lead to positive-sum interactions in agricultural landscapes, often referred to collectively as ecoagriculture.

A unique confluence of interest in the lead up to the Convention on Biological Diversity's 9<sup>th</sup> meeting of the Conference of the Parties in Bonn, Germany, in May 2008, provided an opportunity to refocus international attention on agricultural biodiversity in general, and particularly to consider, with a sense of urgency, how new approaches to multifunctional, ecosystem-scale agricultural biodiversity management might be implemented. Foremost among these opportunities was the official review of the program of work on agricultural biodiversity at COP 9 and a focus on Agriculture and Biodiversity for the International Day for Biodiversity (22 May 2008).

Besides the scheduled review of the program of work during the lead-up to COP 9, the global policy community was confronting the previously discussed issues of biofuels and rising food prices, and the political instability in countries throughout the world caused by them. These conditions contributed to a wave of heightened political will for action around agricultural and conservation issues at the COP and in other fora. The COP completed its review of the program of work on agricultural biodiversity and took related decisions at its meeting in Bonn. Policy makers are now eager for guidance on how to operationalize these decisions. In other words, they want to know what the options are for addressing the challenges of rapidly increasing agricultural production while preserving its foundation of biodiversity and ecosystem services.

The goal of this paper is to synthesize messages from the CBD process on agriculture, including those from the program of work on agricultural biodiversity and the Ecosystem Approach, and link them with experience and research on ecoagriculture systems from international, national and local organizations to provide guidance for CBD Parties and other concerned policymakers and practitioners on ways forward. Section 2 reviews the multi-layered relationships between agricultural and conservation goals; section 3 examines the context of discussions on agriculture in the CBD; section 4 offers specific guidelines for applying the Ecosystem Approach in agricultural landscapes and gives examples of each; and section 5 considers next steps for the implementation of the Ecosystem Approach in agricultural landscapes.

## 2. THE INSEPARABILITY OF CONSERVATION AND AGRICULTURAL DEVELOPMENT AGENDAS

### Global Context for Agriculture and Conservation

There must be greater coherence between agriculture, and the conservation and sustainable use of biodiversity. An estimated 28% of the world's landmass has crops or planted pastures as the dominant land use; another 35% is under extensive livestock grazing (Wood, Sebastian and Scherr 2000). Up to 50% of the world's agricultural land and 60% of ecosystem services are now affected by land or water degradation, with agriculture as the chief cause (MA 2005; Pretty *et al.* 2006). The 'ecological footprint' calculated by Sanderson *et al.* (2002) found that 80 to 90% of lands habitable by humans are affected by some form of production activity.

While productivity improvements are widely agreed to be a critical strategy to reduce poverty in low-income rural areas of the developing world, agriculture's ecological pressure is growing rapidly with increases in population concentrated in poorer countries, higher global levels of meat consumption and reductions in water availability in many agricultural areas and emerging biofuels markets. In 2006, before the most intense period of food price spikes and the biofuels boom, roughly 850 million people already faced intermittent or chronic hunger (Rosen *et al.* 2008) of whom half were estimated to be smallholders in developing countries, another fifth were rural landless (dependent directly or indirectly on agricultural employment), and one tenth were dependent on fishing, hunting, forest extraction, or herding (United Nations Millennium Project 2005). World prices for basic food commodities have risen steadily since 2000, but a dramatic spike since 2006, despite benefiting some farmers, has created food crises in urban and rural areas throughout the world. Since the beginning of 2006, the average price of maize has increased by 125%, rice by 217%, and wheat by 139% (Steinberg 2008). Already in a critical period, this rising demand for agricultural products is projected to nearly double in the next 50 years (United Nations Millennium Project 2005). By the end of 2007, the number of food insecure rose to 982 million (Rosen *et al.* 2008), and the financial crisis and the global economic slowdown in 2008 will almost certainly assure the continuation of this trajectory. Mexico, Morocco, Senegal, Uzbekistan, Guinea, Mauritania, and Yemen, among others, have already experienced riots in 2008 associated with rising food prices and shortages.

The strains on agriculture from climate change will also steadily intensify, particularly in the tropical developing countries that are ecologically sensitive and are, even now, most affected by food shortages. In addition to the shifting of crop ranges due to temperature increases, rainfall patterns will change, severely impacting semiarid and arid rainfed production areas. Risks of flooding from

strengthening and more frequent storms will be higher, and an increased incidence of drought will threaten many people who are already vulnerable. Effects will vary based on region and type of crop, but in Africa and Western Asia, on average yields may fall by 15-35% for dominant crops once temperatures rise 3 or 4° C (Stern 2006), which is a fairly conservative estimate of future warming. These effects will likely begin soon, if they haven't already. Models show clear food security threats from climate change by 2030 (Lobell *et al.* 2008).

These and other pressures have led to precipitous losses of biodiversity in agricultural landscapes. Agricultural areas are critical for the conservation of genetic, species and ecosystem diversity. Nearly half of public protected areas established to conserve biodiversity contain large areas under production (Wood, Sebastian and Scherr 2000). More than 1.1 billion people, most directly dependent on agriculture, live within the world's 25 biodiversity hotspots, the most threatened species-rich regions on Earth (Cincotta and Engelman 2000; Myers *et al.* 2002).

The genetic basis of agriculture is also at risk. *The State of the World's Plant Genetic Resources for Food and Agriculture* (PGRFA) describes 'substantial' loss of species and varieties of agricultural plants (FAO 1998). The World Watch List of Domestic Animal Diversity reports risks of extinctions for mammalian and avian breeds as 35% and 63% respectively. Another recent Food and Agriculture Organization of the United Nations (FAO) report on animal genetic resources found that 60 breeds of livestock have been lost in the past five years (FAO 2007). In addition to these declines of productive species and varieties, the biodiversity that supports both production and other ecosystem services in agricultural landscapes is also facing serious threats. Affected groups include pollinators, predators on pests, soil biodiversity, and the vast array of wild species that maintain overall ecosystem integrity in agricultural areas.

## **Agricultural Landscapes and Conservation Goals**

The conservation community has been slow to address the ecological dominance of agricultural systems in much of the world. Through much of the history of the modern conservation movement, it has prioritized the establishment of protected areas (PAs) and the conservation of specific species and undisturbed habitats. It is a remarkable achievement that over 10% of land is now officially designated as public PAs, yet all acknowledge that the current level of protection is not sufficient to maintain critical habitat and ecosystem services. First, the *Millennium Ecosystem Assessment* estimates that almost half of PAs have more than 30% of their land under crops (MA 2005). Second, estimates suggest that more than half of all wild species exist principally outside PAs, mostly in agricultural landscapes (Blann 2006). Some ecologists estimate that 30 to 50% of species in existing PAs may be lost because isolated PAs do not have populations large enough to be viable in the long term (Blann 2006). There are also increasing pressures from climate change.

The conservation potential of agricultural areas has been largely under-recognized by conservationists, in most of the world, mainly because the most productive areas have typically been perceived as having habitat conditions so radically modified from their original states that their biodiversity conservation value could only be marginal. But this ignores the diversity of agricultural systems and their existence within many ongoing conservation efforts. Given anticipated trends in agricultural product demand, other unprecedented pressures on biodiversity and ecosystem services, and emerging research on biodiversity in agricultural areas, approaches need to be re-evaluated.

While relatively undisturbed areas remain essential for conservation, agricultural regions must play an enhanced role. When managed in coordinated ways across a landscape, agricultural production areas can increase the efficacy of nearby PAs, improve the effectiveness of biological corridors that cross through unprotected areas, and provide patches of critical habitat in uncultivated and farmer-protected spaces. Certain production systems themselves can provide wildlife habitat by closely mimicking the structure of natural ecosystems. Agricultural landscapes also already support *in situ* conservation of crop and livestock varieties and the wild species that are necessary for sustainable agricultural production and rural livelihoods.

While research efforts on these conservation/production/livelihood synergies are relatively new, ecoagriculture is increasingly studied and operational principles are beginning to emerge. For example, Buck *et al.* (2006) conducted a literature review of 82 studies and demonstrated that strategies such as maintaining hedgerows and woodlots within farming landscapes, some forms of organic agriculture, and shaded tropical agricultural production can promote biodiversity and production at the same time. Harvey (2007) synthesized current knowledge to suggest 10 guiding principles for conserving biodiversity in agricultural landscapes. Ecoagriculture approaches are becoming increasingly recognized in international policy discussions and synthesis reports including the *Millennium Ecosystem Assessment* (MA 2005), the 2008 World Bank report, *Agriculture for Development* (World Bank 2007), and the *International Assessment of Agricultural Science and Technology for Development* (IAASTD 2009).

## **The Services and Functions of Biologically Diverse Agricultural Landscapes**

In addition to production and biodiversity conservation values, ecoagriculture landscapes provide other critical ecological services and functions. Diverse crop, livestock, tree, and wild species can enhance livelihood security by sustaining such critical ecological bases for production as water quality and quantity, erosion control, soil moisture retention, and pollination services. These diverse systems can provide producers access to markets for eco-certified products, and generate other ecosystem services including carbon storage, watershed protection, tourism and recreation. Diversity also supports adaptability and resilience to changing environmental (such as climate change) and economic (such as vacillating commodity prices) conditions. Finally, biologically diverse agricultural

systems are necessary to maintain critical elements of traditional knowledge related to agricultural practices as well as other plant and animal uses.

### **New Tools for Integrated Landscape Planning**

Increases in productivity achieved by managing genetic, species, and ecological diversity can be knowledge and technology-intensive and better documentation of existing systems as well as new research is needed. But recent breakthroughs in ecology, agroforestry, agroecology, precision and conservation farming, geographic information systems, genetics, postharvest technology, processing, and marketing are providing new opportunities to scale-up best practices. Ecoagriculture landscape planning and coordination has also advanced. The Landscape Measures Resources Center ([www.landscapemeasures.org](http://www.landscapemeasures.org)) is a notable new tool that assists multi-stakeholder groups in landscape planning and monitoring.

As the links between agriculture and environment have become better recognized, and as the potential for mutually beneficial outcomes has grown due to improved technologies and more sophisticated planning processes, so too have efforts in international policy to promote synergies between agricultural and environmental goals. The most broad and visible of these has been within the context of the Convention on Biological Diversity (CBD), particularly within its program of work on agricultural biodiversity.

### 3. AGRICULTURE AND THE CBD

#### The Development of Agriculture within the CBD

The CBD was one of three multilateral environmental agreements, including the United Nations Framework Convention on Climate Change (UNFCCC) and the United Nations Convention to Combat Desertification (UNCCD) signed by governments at the United Nations Conference for Environment and Development (UNCED) in Rio de Janeiro in 1992. The CBD process has evolved since then; by 2008 some 192 countries had ratified (but conspicuously not the United States). The objectives of the Convention are to promote, “the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources (SCBD 1992).”

The Convention’s early development reflected the perspectives of the conservation movement at the time, a group concerned with the protection of wild genetic resources (before the term ‘biodiversity’ had been coined) and still considering appropriate roles within this agenda for other sectors and stakeholder groups. This period in the Convention’s history has been criticized by some for not fully integrating all perspectives, particularly those of local people and of the agriculture sector (Wood and Lenne 2005).

Nonetheless, well before the Convention was adopted, leading voices within the conservation community were calling for a broad, intersectoral approach. The IUCN-UNEP-WWF 1980 *World Conservation Strategy* stated that, “Probably the most serious conservation problem faced by developing countries is the lack of rural development,” and that, “In rural development, as in development generally, the narrow sectoral approach is almost invariably self-defeating (Item 14, Conservation-based rural development).” In the midst of the negotiations around the Convention, McNeely *et al.* (1990) wrote in *Conserving the World’s Biological Diversity*:

The technologies for conserving biological diversity have tended to focus on protected areas and in gene banks. While these approaches will continue to be important, conservation must become more innovative and cross-sectoral. The close link between rural development and conservation of biological resources demonstrates that action in either area alone will not solve the problem. Instead, conservation needs to be woven together with agriculture, forestry, fisheries, transport, national defense, and other efforts.

In a general sense, this view of conservation as inextricably linked with rural development was represented in the Convention with the inclusion of *sustainable use* of biodiversity as one the Convention’s three key objectives (along with *conservation* and *fair and equitable sharing*). This was advocated largely by developing countries and a number of agencies dealing with these issues. While

the word *agriculture* is mentioned only once in the CBD, in an annex on monitoring economic species, certain Convention objectives can clearly only be achieved by integrating conservation and agricultural goals. For example, Article 6b, calls for Parties to, “integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies.” Article 8e, aims to, “Endeavor to provide the conditions needed for compatibility between present uses and the conservation of biological diversity and the sustainable use of its components (SCBD 1992).”

## **The Program of Work on Agricultural Biodiversity**

Since the Convention was adopted as a legal text in 1992, the COP has expanded its scope and coverage through subsequent decisions and by including programs of work which defined in more detail relevant steps to implement the goals of the Convention for specific biomes, ecosystems and issues. It now has seven programs of work on thematic issues and on 17 cross-cutting issues. While many of these are very relevant to agricultural landscapes, most of the focus on agriculture within the CBD process has been in the program of work on agricultural biodiversity, established by the meeting of the 3<sup>rd</sup> COP in 1996.

Agricultural biodiversity for the CBD is broadly defined. It includes:

...components of biological diversity of relevance to food and agriculture, as well as all components of biological diversity that support the ecosystems of which agriculture is a part (agro-ecosystems): the variety and variability of animals, plants and micro-organisms, at the genetic, species, and ecosystem levels, which are necessary to sustain key functions of the agro-ecosystem, its structure, and processes (SCBD 1996).

The expansiveness of this definition is important to note as the term *agricultural biodiversity* or *agrobiodiversity* is still understood in some circles to mean specifically the genetic diversity of crops and livestock. This view does not include the components of biodiversity which support the agro-ecosystem, nor does it consider the ways in which agricultural production impacts biodiversity outside of the immediate production area.

The overall goals of the program of work on agricultural biodiversity can be summarized as 1) assessing the state of agricultural biodiversity, 2) assessing relevant tools for its conservation and sustainable use, and 3) providing support to countries to implement conservation plans for agricultural biodiversity. The program of work now also includes cross-cutting initiatives on pollinators, soil biodiversity, biodiversity for food and nutrition, and a newly minted theme on agricultural biodiversity and climate change (SCBD 2008a). At COP 9, the subject of biofuels was included as an element of this program of work and very quickly became a central topic within the

agricultural biodiversity discussion with decision IX/2 on *Agricultural Biodiversity: Biofuels and Biodiversity*.

The development of this program of work has been an important step forward for agriculture within the CBD. However, historical tensions and compartmentalized thinking among the agricultural and conservation communities have slowed its implementation. Agricultural biodiversity has been a thornier topic conceptually than mountain biodiversity or island biodiversity, for instance, which have been more able to rely on Protected Areas and seem to have struggled less to balance production and biodiversity conservation. For example, in 2000, COP 5 decision V/5 described, “the special nature of agricultural biodiversity, its distinctive features and problems needing distinctive solutions.” In 2004, after it was decided that agricultural contexts were not sufficiently considered during the first iteration of the Addis Ababa Principles and Guidelines for the Sustainable Use of Biodiversity, the Principles had to be revisited (SCBD 2004a).

Despite these challenges, the program of work on agricultural biodiversity has made notable progress, particularly in the conservation and use of agricultural genetic diversity. This work has been largely led by the FAO, Bioversity International (formerly the International Plant Genetic Resources Institute) and other Consultative Group for International Agricultural Research (CGIAR) centers. FAO has undertaken assessments on the state of the world’s plant and animal resources (CGRFA 1997) and has led the development of an International Treaty on Plant Genetic Resources for Food and Agriculture, which was adopted in 2001 and entered into force in 2004. The first ever global assessment of the status and trends of animal genetic resources was completed in 2007 (CGRFA 2007) and the international community has been discussing a Global Plan of Action for animal diversity similar to the one that now exists for plants. The COP has been supportive and cooperative throughout these treaty development processes.

This progress, while substantial and enormously important, has tended to focus somewhat narrowly on crop and animal genetic diversity, and less on the associated species which provide valuable ecosystem services and functions within agricultural landscapes. The aforementioned inherent challenges in agricultural biodiversity conservation certainly contributed to this limited focus. A 2004 COP decision (VII/11) on the Ecosystem Approach, the Convention’s primary framework for implementation, acknowledged this problem. It concluded, “...there is a potential deficiency in that the agricultural biodiversity program of work does not apply the ecosystem approach in an integrated way. Furthermore, there has been less progress in development of relevant tools within the agricultural sector than in other sectors (SCBD 2004b).” This same decision VII/11 noted the difficulty of applying the Ecosystem Approach to agriculture and highlighted the importance of the subsequent official review (COP 9). It reported, “Participants...suggested that the issue of integrating the ecosystem approach within the agricultural sector be addressed in a comprehensive manner the next time that the program of work on agricultural biodiversity is reviewed (SCBD

2004b).” This challenge of syncing agricultural biodiversity and the Ecosystem Approach is central to the success of the CBD in agricultural areas throughout the world.

## **The Ecosystem Approach and Agricultural Biodiversity**

As early as COP 2 in 1994, the Ecosystem Approach was adopted as the primary framework for CBD implementation. The goal was to create a framework for implementing the Convention that cut across all of its elements. However, clearly defining the Ecosystem Approach has been challenging for Parties. Principles of the Ecosystem Approach, developed to clarify its meaning, were completed in 2000 (see Box 1). These principles were further elaborated in a series of operational guidelines in 2004.

### **Box 1. Principles of the Ecosystem Approach**

Principle 1: The objectives of management of land, water and living resources are a matter of societal choices.

Principle 2: Management should be decentralized to the lowest appropriate level.

Principle 3: Ecosystem managers should consider the effects (actual or potential) of their activities on adjacent and other ecosystems.

Principle 4: Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context.

Principle 5: Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a priority target of the ecosystem approach.

Principle 6: Ecosystem must be managed within the limits of their functioning.

Principle 7: The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

Principle 8: Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.

Principle 9: Management must recognize the change is inevitable.

Principle 10: The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.

Principle 11: The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.

Principle 12: The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

*Source: SCBD 2007*

The Ecosystem Approach is defined as “a strategy for management of land, water and living resources that promotes conservation and sustainable use in an equitable way (SCBD 2000a).” It has several key elements: functional relationships and processes within ecosystems; management at the scale appropriate for the issue being addressed; decentralization to the lowest level appropriate; intersectoral cooperation; equitable distribution of benefits; and use of adaptive management policies that can deal with uncertainties and are modified in the light of experience (SCBD 2000a).

While this framework is useful generally for implementing the goals of the CBD, clarity on the Ecosystem Approach has been particularly challenging when applied to agricultural biodiversity.

For agricultural contexts, a comprehensive application of the Ecosystem Approach would represent a deepening level of sophistication beyond genetic resource conservation, the focus of much of the agricultural biodiversity under the CBD so far, to one that more explicitly considers ecosystem function in agricultural areas, the effects of production on surrounding ecosystems and the role of farmers in agricultural ecosystem management.

Some have argued that the application of the Ecosystem Approach to agriculture has been particularly challenging, in part, because initial discussions on the idea did not carefully consider relevance within an agricultural landscape context. Wood and Lenne (2005) trace the concept back to US Federal Policy, and consider the US-centric atmosphere around the genesis of the term as dated and “designed for natural systems and not agricultural systems”. Another interpretation as to why the Ecosystem Approach has been difficult to implement in agricultural areas is that agriculture is a highly political sector in many countries and agricultural policies are usually focused on narrow sector objectives.

These challenges notwithstanding, FAO and Bioversity International, along with the CBD Secretariat, have taken some steps to address any inherent challenges of applying the Ecosystem Approach to agriculture. An information document was prepared for COP 5 as part of a review of the program of work on agricultural biodiversity titled *The ecosystem approach: toward its application to agricultural biodiversity* (SCBD 2000b). It focused on a range of tools including integrated pest management and farmer field schools. The FAO has initiated a *Priority Area for Inter-Disciplinary Action on Integrated Management of Biological Diversity for Food and Agriculture*. The Commission on Genetic Resources for Food and Agriculture, housed at FAO, discussed ‘The Ecosystem Approach Applied to Food and Agriculture: Status and Needs’ at its 11th regular session in June 2007 (CGRFA 2007). The newly formed Platform for Agrobiodiversity Research (PAR), hosted by Bioversity International, has attempted to answer the question of whether the Ecosystem Approach has, in practice, been applied to the conservation and sustainable use of agricultural biodiversity (PAR 2008). The report concludes that although the concepts of the Ecosystem Approach are

generally relevant in agricultural contexts, integrated conservation and agriculture projects still focus mainly on the farm level and are not integrated into a larger ecosystem context.

There is clearly a danger in getting caught in the complicated semantics of the CBD. But the debate around applying the Ecosystem Approach to agricultural biodiversity is leading to real progress and awareness raising of agriculture within the CBD, and to significant learning among Parties and other stakeholders to the Convention on the links between conservation and agriculture. New conceptual and technological innovations and heightened political will are also adding significant momentum and weight to the argument that biodiversity conservation must be reconciled with sustainable agricultural production. These advances were on full display at COP 9.

### **Agricultural Biodiversity at COP 9**

Signs of increasing focus on agricultural biodiversity were evident throughout the COP 9 process. Much of the attention in the formal negotiating sessions centered on the official review of the program of work on agricultural biodiversity. The sessions on agricultural biodiversity were the settings for the most dynamic interactions of the COP, infused with urgency on food security and biofuels. At COP 9, Decision IX/1 (SCBD 2008a), while not necessarily a tectonic shift, does soften some of the language that had framed agriculture as a threat, and moves toward viewing it as an opportunity for conservation. It also recognizes the importance of agricultural ecosystems and of landscape-scale conservation. For example, paragraph 7a of IX/1 calls for a compilation and dissemination of information on “the positive and negative impacts of agricultural practices and policies on all components of biodiversity related to agriculture, landscapes, ecosystems and ecosystem goods and services.” Decision IX/2, *Agricultural Biodiversity: Biofuels and Biodiversity* (SCBD 2008b), the COP’s first biofuels decision, brings biofuels within the umbrella of agricultural biodiversity. This decision, emphasizing the precautionary approach and calling for further study, may also raise agricultural biodiversity’s profile within the CBD.

Also on the official agenda at COP 9 was a review of the relatively new Global Strategy for Plant Conservation (GSPC), an initiative led by the plant conservation and botanical garden communities (SCBD 2008c). While the GSPC has not been historically central to the debates around agriculture and the Ecosystem Approach, some of its principles are very relevant. For example, Principle 6 calls for “At least 30 per cent of production lands managed consistent with the conservation of plant diversity” (SCBD 2002). The implementation of this goal would be a remarkable achievement for agricultural biodiversity. Discussions around the GSPC, as well as other topics on the COP 9 agenda, including Forests, Climate Change and Biodiversity and Dry and Sub-humid lands, served as a reminder of the linkages between agricultural issues and biodiversity within all areas of the CBD, not just within the program of work on agricultural diversity. These discussions highlighted that fact the practically all programs of work need to consider agricultural issues in implementation.

In addition to the formal negotiations, the theme for the 22 May 2008 International Day of Biodiversity, was *Biodiversity and Agriculture*. It was scheduled during COP 9 for maximum impact. The goal of this day was to “highlight the importance of sustainable agriculture not only to preserve biodiversity, but also to ensure that we will be able to feed the world, maintain agricultural livelihoods, and enhance human well being into the 21st century and beyond” (SCBD 2008d). This occasion, celebrated not only in Bonn at COP 9 but in events around the world, provided a clear opening for key institutions and leaders to express their appreciation for the central role that agriculture must play not only within biodiversity conservation in a strict sense, but also in confronting food and energy security issues. In commemoration of the International Day of Biodiversity, high-level officials from key organizations made statements at COP 9 in a special plenary session on the topic. The UN Secretary General Ban Ki-Moon said, “In any attempt to address this problem [of biodiversity loss,] agriculture should be viewed as a starting point.” Emile Frisson, Director General of Bioversity International, declared that, “solving the food crisis depends on agrobiodiversity.” Robert Watson, the leader of the global research effort that led to the IAASTD called directly for the application of the Ecosystem Approach in agriculture, and a “need to appreciate, develop, [and] invest in the multi-functionality of agriculture.” These statements and others clearly underscore the progress that agriculture has made within the CBD discourse.

## **The Guidance Gap**

COP 9 represents significant progress for the CBD stakeholders towards acknowledging a landscape perspective in agricultural areas as a core component of the global conservation agenda. Nonetheless, elements of this decision are still in the very early stages of being applied. The gap now is less a lack of understanding among stakeholders of the importance of these ideas or from insufficient political will, but rather a lack of clear guidance on how precisely the Ecosystem Approach can be applied to agricultural biodiversity. The generic principles and operational guidelines for implementing the Ecosystem Approach and Decision IX/1 on the program of work on agricultural biodiversity provide guidance in broad brush strokes, but do not offer specific recommendations for agricultural landscape managers or policymakers as they develop or re-evaluate their agricultural management strategies and policies.

The following section attempts to address this guidance gap. It synthesizes recommendations from the program of work on agricultural biodiversity, current knowledge on ecoagriculture management, and lessons from the real world. The product is a set of five practical guidelines, enhancing past guidance from the COP, on how the Ecosystem Approach can be implemented in agricultural areas. Each guideline is illustrated by an example.

## 4. PRACTICAL GUIDELINES FOR APPLYING THE ECOSYSTEM APPROACH IN AGRICULTURAL LANDSCAPES

The COP 9 meeting to review the CBD in May 2008 presented a unique opportunity to bring attention to the importance of integrating agricultural issues more fully into the CBD, as well as more broadly within the biodiversity conservation discourse. In 2007 and 2008, Ecoagriculture Partners engaged collaborators to convene an informal working group (see the preface for the full list of working group participants) to raise the profile of, and support for, strategies to implement the CBD's Ecosystem Approach within an agricultural context.

One of the outputs of this process was a policy brief called *Applying the Ecosystem Approach to Biodiversity Conservation in Agricultural Landscapes* (Ecoagriculture Partners *et al.* 2008). The goal of this brief was to provide clear guidelines and real-world examples to aid Parties in their attempts to implement the program of work on agricultural biodiversity. This section incorporates elements of this brief.

### 1. Take an Agricultural Landscape Perspective

Agricultural landscapes are mosaics of natural features and agricultural (and other) land uses in a particular geographic region. A landscape perspective is necessary if the goals of biodiversity and ecosystem services maintenance, agricultural production, and improved livelihoods for local people are to be achieved. Farm or plot management alone will not provide the opportunities for spatial and temporal planning required for sustainable management. Neither will an approach in which managers simply select areas of most important biodiversity near agricultural land and protect them. PAs must be fully integrated within participatory multi-stakeholder planning frameworks. Agricultural lands should be managed as part of the matrix surrounding PAs, while natural habitat areas should be managed in relation to surrounding agricultural lands. Integrated landscape planning and management will become even more critical as climate change begins to effect land use options and land users scramble to adapt.

Examples of agricultural landscape management strategies for the conservation and sustainable use of biodiversity include protecting and promoting local crop and livestock diversity, maintaining connectivity between native habitats within agricultural landscapes, planting hedgerows between farm fields, protecting watersheds with spatially-targeted perennial natural and planted vegetation, maintaining continuous year-round soil cover to enhance rainfall infiltration, managing inputs and wastes to minimize agricultural pollution of natural habitats, and designing farming systems to mimic

the structure and function of natural ecosystems. Box 2 describes how landscape planning principles could be applied to an area of biofuel production.

### **Box 2. Applying a landscape lens to biofuels production**

The global biofuels rush was partly driven by the notion that they are 'greener' than fossil fuels. By the time of COP 9 in May 2008 this idea was heavily challenged. A multitude of analyses have demonstrated that large scale biofuel production can cause serious damage to climate, biodiversity, and water resources. Serious attempts to achieve ecologically sustainable biofuel production and to apply the Ecosystem Approach to these fuel (and often food) landscapes, should take the following design principles into consideration:

- Biofuel crop species and locations should be selected such that they improve the spatial heterogeneity of the landscape.
- By growing biofuel crops in degraded or barren areas of the landscape, connectivity between different habitat patches can be restored.
- Biofuels should be grown in lands not suitable for other important uses for crop production or wildlife habitats. By focusing biofuels in lands less suitable for crops, farmers can restore the land while also maximizing overall production of the landscape.
- Landscapes typically already maintain several productive activities, from crop production to other ecosystem services. Biofuel production should be focused on the in-between spaces, not yet exploited by these activities. For example, plant wastes or surpluses can be utilized as feedstocks or unused agricultural lands can be used to grow feedstocks.
- Biofuel crop species should be selected such that they are well adapted to the local conditions and can grow well in low-input production systems.
- Preference should be given to perennial and mixed species systems to improve habitat complexity and minimize the risks of pest and disease faced by monocultures.

*Adapted from Milder et al. 2008*

## **2. Empower Multi-stakeholder Processes for Landscape Management**

Agriculture landscapes managed for production and conservation require multi-stakeholder management approaches. These arrangements should be dynamic and facilitated by a neutral party. Multi-stakeholder processes should recognize all stakeholders within the landscape and actively engage local farming and livestock-raising communities as lead stewards of biodiversity and priority beneficiaries of conservation activities. Local communities and agricultural enterprises will often advocate for the protection of certain habitats that can provide local agricultural benefits such as pollination and water recharge. Effective protection can also enable other livelihood options

including fishing or tourism. Multi-stakeholder processes should aim to deliver change on a broad scale by mobilizing local farming communities as part of a social fabric for achieving sustainable ecosystems, improving livelihoods, and promoting regional approaches (for example, through coordinating government policies). The international Landcare movement provides a model of successful multi-stakeholder processes (see Box 3).

Agribusinesses should be brought fully into the process in landscapes where they are key actors. Many in the corporate sector are beginning to recognize the business case for ecosystem conservation for sustainable supply, to meet consumer demand, or to reduce regulatory costs. In fact, many of the major international agribusinesses participate in one or more of a rapidly-emerging group of discussion platforms that explore sustainability issues in the food business and propose solutions. These discussions include both global and local issues. Some are industry-wide while others focus on specific commodity supply chains. Notable examples include the Sustainable Food Lab (SFL), the Sustainable Agriculture Initiative Platform (SAI), and the Roundtable on Sustainable Palm Oil (RSPO).

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### **Box 3. Landcare in Uganda**

Landcare is a movement of farmer-led organizations, with backing from local government, the private sector, and technical experts, which focuses on landscape management to improve agricultural productivity by sustaining natural resources. It originated in Australia, but has been adapted to a range of contexts in 17 countries. NGOs, community-based organizations, and local and national governments in a given country collaborate to train Landcare group facilitators who work with communities to develop collective action and investment plans to address farm and landscape scale land management challenges.

For example, in Eastern Uganda, the Kapchorwa District Landcare Chapter (KADLACC) works in the Mt. Elgon area which contains a national park of high biodiversity importance as well as vulnerable farming communities surrounding it. KADLACC is a platform for institutions including local farmers groups, community development associations, soil and water conservation and agro-forestry associations, research organizations, and district and local government representatives. KADLACC works with the poor and vulnerable communities in the degraded, densely populated watersheds and landscapes in and around Mt. Elgon to address issues of low agricultural productivity.

Priority areas for KADLACC members include collaborative watershed management; documentation of on-farm innovations; peer-to-peer learning processes to enhance knowledge exchange; partnership and network building; and marketing and enterprise development activities. Demonstrated on-farm productivity improvements for staple crops, including maize and bananas, have been complemented by soil and water health improvements on-farm and within the surrounding landscape. Income generation opportunities, including livestock rearing and fruit production, have also grown.

*Source: Catacutan 2008; Kapchorwa District Landcare Team 2006*

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### **3. Build Farming Communities' Capacity for Landscape Management**

For farming communities to successfully direct ecoagriculture landscape management, they must be supported to build strong local institutions. In general, financial and technical assistance to communities for capacity building should be channeled in a flexible way to complement local initiatives rather than introducing models from the outside that are governed from above (as demonstrated in the Kalinga Indigenous Peoples case featured in Box 4). A crucial first step for many communities will be securing rights to own, use and manage the natural resources in the places they live. Secure tenure arrangements will give farmers a more powerful voice in environmental management, and provide incentives to manage landscapes for long-term environmental sustainability. Many of the world's richest biodiversity areas are already under successful local community control (Molnar, Scherr and Khare 2004).

Devolution of power will make it easier for local people to design and manage agricultural landscapes. This is particularly true when communities possess the institutional linkages to share landscape management knowledge with each other. But in many cases community organizations and local administrators are not linked into knowledge sharing systems, have little training in new landscape planning tools and have few resources at their disposal to learn how to use them. These groups need support to build the institutions for knowledge sharing and to access technologically sophisticated landscape planning tools.

Access to markets for diverse agricultural goods and services will further spur the management of landscapes for multiple goals. In particular, emerging markets for ecosystem services, including carbon sequestration, watershed services, biodiversity conservation, tourism and recreation, provide opportunities for community landscape management if appropriate institutional models can be established for small farmers to take advantage of them.

Farming communities must also be engaged as full partners in the ecological and social science research projects that have the potential to affect their lives. Otherwise there may be limited support from them to integrate the research results into their own work. They should be involved from the beginning, even as research questions are formulated. Researchers should consider the relevance of the findings for local communities, and also be mindful of the impact that field work itself can have on communities, positively and negatively. Furthermore, researchers should consider that communities often need support in integrating the results of these studies into their management systems.

#### **Box 4. Landscape management capacity at Kalinga Mission, Philippines**

For many centuries, the Kalinga Indigenous Peoples have integrated their livelihoods with mountain biodiversity conservation through the landscape-level management of indigenous rice terraces and old-growth forests. Since the establishment of the Kalinga Mission for Indigenous Communities and Youth Development (KAMICYDI) in 1984 (originally founded as the Dananao Students Organization), over 35 community-led development programs and services have been facilitated, based on the vision of ensuring a sustainable future for the Kalinga Indigenous Peoples. Programs of KAMICYDI in Kalinga Province revive successful proven indigenous peoples' technologies and knowledge systems to reduce poverty and conserve biodiversity by conducting training courses and seminars to enable the empowerment of Kalinga children and youth; providing culture-based education programs; supporting indigenous communities' research; running entrepreneurship and business planning trainings to encourage micro-enterprise development and management; organizing peace building initiatives; and advocating for ancestral land/domains and rights of the Kalinga Indigenous Peoples.

KAMICYDI works with communities to manage watersheds for a continual supply of water to communal irrigation systems, and in recent years over 150 ha of integrated rice terraces (including fish and vegetable production) have been rehabilitated. It is estimated that between 1990 and 1996 alone, this project enabled 1,071 families to increase their annual family income by 27%. This project has also led to the maintenance of 81% of regional forest lands in the Province of Kalinga that continue to support rich biodiversity and to the protection of 108 watersheds.

*Source: Bumacas 2008; Gillis and Southey 2005; KAMICYDI 2008*

#### **4. Re-position the Role of Conservationists in Agricultural Landscapes**

The international conservation community has tended not to engage in core agricultural development policies and programs beyond seeking limits on agricultural expansion. An important implication of the centrality of agricultural communities in conservation is that conservation organizations will need to re-orient themselves to explicitly support local community stewardship in ways that respect and realistically address the role of agriculture and livelihoods in planning and implementation methodologies. This broad view, including a focus on yield improvements, market access, and livelihood opportunities, will help facilitate a process of local validation of conservation agendas while more clearly identifying roles for local people in biodiversity conservation. For conservationists to contribute to ecoagriculture objectives, they must evolve to find their footing in a wider range of institutions and organizations than those required for biodiversity management in protected areas.

In an ecoagriculture landscape, a primary role for a conservation group might be to support and participate in multi-stakeholder planning exercises facilitated by a neutral party. They might provide expertise to help map landscape resources. For market support, conservationists could work with other technical service providers to play an intermediary role with communities to lower marketing

costs and provide expertise and assistance linking to warehouses, transportation, loans, and any other market bottlenecks. In the policy arena, they might engage in national policy processes on agriculture, advocate for ecologically sensitive approaches, and encourage environmental ministries to see agriculture as a potential ally. Their research initiatives should include local farmer partners and emphasize the translation of results for local benefits. Many local conservation groups have succeeded in these roles and can serve as models for other local, national and international conservation groups (see the example of KENVO in Box 5).

### **Box 5. The Evolution of the Kijabe Environment Volunteers (KENVO)**

The Kijabe Environment Volunteers (KENVO) is a community-based organization created by a group of young people in 1996 living near the Keirita Forest on the Kikuyu Escarpment in Kenya. The founders were responding to the degradation of the forest and high rates of youth unemployment. KENVO's initial work centered on community education, through programs in schools and wider public education events, on the value of forests and the key factors that were leading to their destruction in the area. Early activities also included indigenous tree planting projects.

KENVO's work with forests and community education led to the recognition among group members that sustainable livelihood opportunities and farming activities, in particular, are central to a comprehensive approach to community environmental management. As a result, KENVO began to organize forums for farmers to work together to exchange knowledge and collaborate to protect catchment sites, forest patches and biodiversity. They are now working with farmers on knowledge sharing and marketing activities. KENVO has collaborated with farmers to identify and document best management practices, establish a farmer information center to facilitate peer-to-peer learning, organize farmer field days, conduct a market assessment for environmentally friendly products, form a farmers' marketing group, and link farmers with financial institutions that can provide credit. KENVO has also initiated some specific income generating activities around the forest including bee keeping, community tree nurseries, and ecotourism facilities.

*Source: KENVO 2008; Mwangi 2008*

## **5. Coordinate Environmental and Agricultural Policies and Markets for More Effective Landscape Management**

To support and scale up ecoagriculture initiatives, local, national, and international environmental policy processes must reconsider relationships to agricultural policies and institutions. Most policy, legal and institutional frameworks separate action on ecosystem management from agricultural production and rural livelihoods. Government structures are not easily changed, but sectoral policy priorities can be harmonized. Inter-sectoral policy agendas must be integrated into public investment plans including the Poverty Reduction Strategies of low-income countries and donor strategies designed to support the Millennium Development Goals (MDGs).

At the local level, cross-sectoral planning can be achieved more easily by removing jointly identified policy barriers. At the national level, inter-ministerial committees or working groups can be formed, and environmentally trained staff can play key roles in agriculture ministries (and vice versa). To support international coordination, CBD focal points need information to effectively advocate for ecoagriculture within their home governments, and focal points for all related international conventions should work more closely together. Implementation of the program of work on agricultural biodiversity and other relevant CBD programs at the national level, should be coordinated between all relevant ministries including not only environment, but also agriculture, water, forestry, health, finance and others where appropriate. The Mesoamerican regional Agro-Environmental-Health Strategy (Box 6) provides a regional example of integrated sectoral policy planning.

Along with enhanced coordination efforts, policy-makers will need to make use of emerging policy and market tools to find solutions that balance conservation with the exploding demand for agricultural output. New mapping technologies allow planners to identify and differentiate the most sensitive ecological areas within a landscape that require strict protection with those that are better suited for production. Maturing markets for ecocertified products and ecosystem services provide conservation alternatives to regulation in agricultural areas. Public regulations can be used alongside private investment screens that require large agricultural investments to incorporate conservation plans consistent with landscape-scale multi-stakeholder agreements.

### **Box 6. Mesomerica Regional Agro-environmental Strategy**

The Mesoamerica Regional Agro-Environmental-Health Strategy (ERAS) is a minister-led process that also includes local, regional, and international NGOs, research institutions, and multilateral entities. ERAS is designed to articulate integrated agendas between regional bodies that oversee health, environment, and agriculture. Ministers from health, environment, and agriculture from Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panamá have all been involved, and the process has been supported by representatives from the Central American Commission on Environment and Development (CCAD), Central American Council of Agriculture (CAC), and the Central American Council of Ministers of Health (COMISCA). The secretariats of these three inter-ministerial councils formed an Inter-agency Consultative Committee (ICC) to advise on the drafting of ERAS. They were supported by a number of global and regional agricultural development groups, conservation organizations and research institutions.

The goal of ERAS is to promote sustainable production that reduces poverty and assures food security. Thematic programs include 1) adaptation to climate change; 2) promotion of ecosystem services with a strong focus on those that mitigate climate change; and 3) eco-markets and sustainable value chains. The combination of work in these three areas and the sectorally integrated way in which they are taking it on is raising hopes that ERAS will make significant contributions to poverty reduction, food security and conservation.

*Source: Carazo 2008; CATIE 2008*

## 5. NEXT STEPS FOR THE INTERNATIONAL COMMUNITY

The international community faces a severely crowded natural resource-related crisis agenda. Policy-makers are now confronted by constraints on finance, food, and energy as well as the set of issues traditionally associated with conservation such as climate, biodiversity, and water. A fundamental breakthrough for stakeholders to the CBD will be the understanding that by applying an Ecosystem Approach in agricultural areas, many of these challenges can be met in ways that create win-win solutions. Discussions within the CBD and in other international policy fora show that this perspective is entering the mainstream. As the political will for the conservation and sustainable use of agricultural biodiversity conservation grows, the CBD's Ecosystem Approach provides a framework for implementation of new models for conservation and agricultural development that will be in increasing demand. The guidelines presented in this paper begin to flesh out what these approaches might look like and suggest concrete steps necessary to achieve them.

Examples in the previous sections show thriving cases of the Ecosystem Approach's application in agricultural areas. Many of them happen solely through the initiative of local stakeholders in response to biophysical and economic realities. These local initiatives should be supported. However, so far these cases are scattered. Governments are learning from local successes within their countries and from around the world, and some are even developing national policies based on principles similar to those presented in this paper to support agricultural biodiversity conservation. In order for them to be scaled-up and develop, many governments will need additional support from key international organizations.

FAO and Bioversity International have been crucial leaders in this area among international organizations, and their capacity to support communities and governments to apply the Ecosystem Approach to agricultural biodiversity is growing. The IUCN Commission on Ecosystem Management has been a leader in the development of the Ecosystem Approach, and has been working to operationalize it in a variety of contexts (Shepherd 2008). Other leading global conservation organizations including the World Wide Fund for Nature (WWF), Conservation International, and the Nature Conservancy have recently demonstrated an interest in strengthening the focus on agricultural landscapes within their conservation strategies, and this will undoubtedly continue. This shift has been inspired by a recognition that many local and community-based initiatives in agricultural landscapes are successfully conserving biodiversity and other ecosystem services. Agricultural development and anti-poverty organizations are also increasingly recognizing the importance of ecosystems to food security and rural development. Fortunately, much of the knowledge necessary to apply the Ecosystem Approach to agricultural landscapes already exists.

With shifts in focus among these groups and many national governments, opportunities for implementation are substantially improving.

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## ACRONYMS AND ABBREVIATIONS

|          |                                                                  |
|----------|------------------------------------------------------------------|
| CAC      | Central American Council of Agriculture                          |
| CBD      | Convention on Biological Diversity                               |
| CCAD     | Central American Commission on Environment and Development       |
| CGIAR    | Consultative Group for International Agricultural Research       |
| COMISCA  | Central American Council of Ministers of Health                  |
| COP      | Conference of the Parties                                        |
| ERAS     | Mesoamerica Regional Agro-Environmental-Health Strategy          |
| FAO      | Food and Agriculture Organization of the United Nations          |
| GSPC     | Global Strategy for Plant Conservation                           |
| ICC      | Inter-agency Consultative Committee                              |
| ICRAF    | World Agroforestry Centre                                        |
| IFAP     | International Federation of Agricultural Producers               |
| IUCN     | International Union for Conservation of Nature                   |
| KADLACC  | Kapchorwa District Landcare Chapter                              |
| KAMICYDI | Kalinga Mission for Indigenous Communities and Youth Development |
| KENVO    | Kijabe Environment Volunteers                                    |
| MDGs     | Millennium Development Goals                                     |
| NGOs     | non-governmental organization                                    |
| PAs      | protected areas                                                  |
| PGRFA    | Plant Genetic Resources for Food and Agriculture                 |
| RSPO     | Roundtable on Sustainable Palm Oil                               |
| SAI      | Sustainable Agriculture Initiative Platform                      |
| SFL      | Sustainable Food Lab                                             |
| UNCCD    | United Nations Convention to Combat Desertification              |

|        |                                                           |
|--------|-----------------------------------------------------------|
| UNCED  | United Nations Conference for Environment and Development |
| UNEP   | United Nations Environment Program                        |
| UNFCCC | United Nations Framework Convention on Climate Change     |
| WWF    | World Wide Fund for Nature                                |

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