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Recent PLEC News

Liang Luohui and Miguel Pinedo-Vasquez

The successful completion of the GEF-funded PLEC Project is well recognized in the final evaluation reported in this issue. The evaluation concludes that 'PLEC as a whole has successfully achieved all four original project objectives and it has created and demonstrated a way to reform agricultural research in order to reverse global trends toward monoculture, land degradation, and biodiversity loss'. Over the years of collaboration, hundreds of project participants, including scientists, technicians, local officials, students, and farmers have come to embrace agrodiversity for sustainable rural development. After completion of the GEF-funded phase, many participants have continued to promote successful agrodiversity principles and approaches through development of follow-up projects and partnerships, and dissemination of project outputs.

Progress

Progress in developing PLEC follow-up projects varies. The Scientific Coordinator (Miguel Pinedo-Vasquez) has been particularly active, developing a medium-scale global GEF project for submission through UNDP, seeking more specific funds for his colleagues in Latin America, and networking with other bodies, in particular CIFOR and IPGRI.

In a major step forward for PLEC, the Earth Institute of Columbia University has provided a substantial grant to support Miguel's salary, and that of his research assistant, Andres Gomez, as well as funding in support of project travel.

Some groups have obtained funds:

- Thailand has a large grant from the McKnight Foundation for 'Agrodiversity for *in situ* Conservation and Management of Thailand's Native Rice Germplasm'. Ongoing work is also supported by the Thailand Research Fund.
- Brazil has a one-year grant from Overbook Foundation to support work in the Amapá sites, and travel in connection with further fund-

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raising. In addition, a longer-term proposal for work in Amapá site has been accepted, though not yet funded, by JICA. A proposal for a PDF-B for other Amazonian work was sent to the World Bank office in Brasilia.

- Uganda has a small grant from the Network of Uganda Researchers and Research Users (NURRU) for a project on 'Effects of market-oriented agriculture on agrobiodiversity, household income and food security: A case study of Mbarara and Bushenyi District'.
- Papua New Guinea has a small grant from the UNDP/GEF Small Grants Programme for field activities at Ogotana on community-based landscape rehabilitation.

Others have not yet obtained funds but have received encouragement from potential donors or sponsors:

- Ghana has submitted to UNDP/GEF a full project brief for a medium-sized project 'Sustainable land management for mitigating land degradation, enhancing agricultural biodiversity and alleviating poverty in Ghana'.
- Tanzania is preparing a full project proposal for a medium-sized project on 'Agrobiodiversity in development for smallholder farmers in Tanzania' after their project concept was endorsed by UNEP/GEF.
- Uganda continues to develop a proposal for UNDP/GEF Small Grant Programme.
- Peru developed a proposal on integrated management of the floodplains of the upper Amazon and Ucayali Rivers in Peru and submitted it to USAID.

UNU has approved a modest grant to provide seed money to support clusters' work on fundable proposals as well as monitoring field activities. Proposals from groups in Ghana, Tanzania, Guinée and Brazil have been accepted after evaluation by the scientific advisory group.

Partnerships are being developed for scaling up agrobiodiversity approaches, such as:

- A proposal is being developed on strategies for building a PLEC-CIFOR global initiative for capacity development in smallholder forestry.
- By invitation, PLECserv is now also posted to the mailing list of the Future Harvest/IUCN Ecoagriculture Network, for wider readership.
- Partnership proposals have been made to the FAO Globally-important Ingenious Agricultural Heritage Systems (GIAHS). Proposals are on the alder-based rotation and intercropping system in southwest China and on the traditional tapade cultivation system in the Fouta Djallon in Guinée. A proposal on the traditional milpa system in Mexico is being developed.
- UNU, Kyoto University and Japan International Research Center for Agricultural Sciences have agreed to jointly organize and sponsor an International Symposium

'Alternative Approaches to Enhancing Small-Scale Livelihoods and Natural Resource Management in Marginal Areas – Experience in Monsoon Asia', UN House, Tokyo, Japan, 29-30 October, 2003. PLEC will be represented at the symposium, including a keynote presentation.

Widening PLEC

There have been a number of initiatives going beyond the range of countries and regions in which PLEC has operated in the past. At an international meeting organized by IPGRI in Morocco the idea of developing a dryland PLEC was proposed. On the other side of the world there has been cooperation with the China National Key Basic Research Development Program 'Ecosystem restoration mechanism and optimized eco-productive paradigm of grassland and farming-pastoral zone of north China' to develop a project on 'Participatory approaches to enhancing stakeholder participation in sustainable land management in northern China'. Encouragement has been received from UNEP/GEF and the Ministry of Science and Technology of China.

A meeting in Bogota, Colombia, brought together a Peruvian expert farmer Pedro Sanchez-Sandoval (an author in this issue), and some leading Colombian and other farmers. There was agreement to form a Latin American smallholders' network (Cadena Latinoamericana de Pequeños Productores), with members in Peru, Brazil, Colombia, Ecuador and Bolivia. The Scientific Coordinator also attended a CIFOR conference in Bonn, and a forest genetics and conservation conference in Bariloche, Argentina, and spoke about the PLEC approach on each of these occasions.

Three PLEC book manuscripts for the dissemination of project experiences have received favourable peer reviews and will be published by UNU Press. They are:

Brookfield, et al. (eds) *Agrobiodiversity: Learning from farmers across the world*. Expected 25 August 2003

Kaihura, et al. (eds) *Agricultural biodiversity in small-holder farms of East Africa*. Expected 25 September 2003

Gyasi, et al. (eds) *Managing Biodiversity: the traditional way in West Africa - Methodological and policy lessons for sustainable resource use*. Expected 2004

With IPGRI, SCBD and FAO, a book called *Managing biodiversity in agricultural ecosystems* is being developed based on the presentations of the joint symposium at Montreal in 2001. Dr. Padoch is one of three editors. PLEC researchers are invited to lead three chapters of the book. ■

Cover Photo: Management of mixed age stands of trees in secondary fallow, Muyuy, Peru

Papers

From global to local and back again: a cautionary tale

Miguel Pinedo-Vasquez

Scientific Coordinator of PLEC

The local 'expert farmer' is the cornerstone of the PLEC approach and locally-developed technologies are PLEC's most important tools. But PLEC is also a global project and PLEC is not alone in suggesting that local farmers and their practices can and should have beyond local to even global significance. In Amazonia, some PLEC expert farmers have advised the national government of Brazil on approaches to conservation, and Don Pedro Sanchez, an expert from the community of Santana de Muiyuy in Peru has recently traveled across borders to Colombia, to give advice at the World Bank office in Bogota on rural conservation and development strategies. In this short paper I want to look critically at the roles of expert farmers¹ on a global stage and examine how these local actors might contribute to an 'up-scaled' and 'mainstreamed' PLEC.

Upscaling with care

An example from Brazilian Amazonia can illustrate some of the dilemmas. During the last years members of the community of Foz de Mazagão significantly increased their household incomes by catching and marketing an increased quantity of shrimp. Many of these farming and fishing households learned new techniques for managing vegetation along streams and river margins for enhanced shrimp production from three local expert shrimp fishers who had developed the methods. This improved management, which was promoted by the PLEC project through demonstration activities, resulted not only in higher production but also in environmental conservation. The good advice of the experts was widely acknowledged as important in improving the incomes of the shrimp-managing families.

As a result of the Mazagão experience the village as a whole gave the three experts increased recognition and opportunity to use their knowledge and expertise as resources for the development of the community. The success of the experience helped the three experts gain influence and prestige far beyond the boundaries of Foz de Mazagão.

Members of governmental and non-governmental agencies operating in the area then suggested that the experience

be replicated in other regions, even beyond Amazonia. People running conservation and development projects in the region are now interested in making alliances or partnerships with the experts and with other community members. Expert farmers are the innovators that are needed for making development initiatives work in many rural areas of developing countries.

While the role of expert farmers as innovators in their communities is clearly understood, should they now be thrust into the role of 'global innovators'? Can and should the three local expert farmers/fishers become global shrimp experts? Answers to these and other questions are needed to clearly understand what role for expert farmers is being advanced by the PLEC projects. While PLEC initiatives in many countries have demonstrated that 'expert farmers' often have more to offer locally than do globally-credentialed consultants, is it PLEC's intention to try to place expert farmers into the roles of international consultants?

Knowing the local way

The Brazilian example may be illustrative. The three Mazagão expert farmers were brought by a local NGO to another PLEC site – the community of Ipixuna Miranda – to teach members of the community how to produce shrimp. The expert farmers immediately observed that the vegetation along the rivers of Ipixuna differed significantly from that in Mazagão and expressed scepticism about bringing the exact same management technologies to the new environment. Their principal observation was that the stands of *aninga* (*Araceae*) that produce a sugary fruit and create favourable habitats for shrimp in Mazagão do not exist in Ipixuna. Members of the NGO, however, eager to recreate the successes of Mazagão, told the experts and members of the community that the different environments would pose no problem. They had sufficient funds to plant *aninga* as part of a reforestation program and thus make the environment of Ipixuna equal to that of Mazagão. The *aningas* of Mazagão, however, had not been planted, but rather 'maintained' and 'managed'. Since the NGO was willing to pay, members of the community were eager to plant *aninga*, despite the doubts of the experts.

After a year all the planted *aningas* died and members of the NGO concluded that the farmers do not know how to take care of them and that therefore the techniques of the expert farmers from Mazagão are too difficult to be applied in Ipixuna. The expert farmers of Mazagão explained that they had not recommended planting *aninga*, they merely explained to Ipixuna Miranda villagers that in Mazagão shrimp production is enhanced through maintenance of natural stands of *aningas*. As a matter of fact, they had asked Ipixuna shrimpers about the kinds of vegetation used by shrimps as habitats (*moradias* in the local terminology). They

¹ Information on who expert farmers are and how to identify them can be found at www.unu.edu/env/plec-web-page.

learned that some farmer-shrimpers in Ipixuna mentioned that areas dominated by *canarana* grasses and *turias* shrubs are shrimp *moradias*. The expert farmers from Mazagão even asked who manages these *canaranas* and *turias* and what precisely they do. Two farmers told the experts that there was a family who manages these vegetation stands in their landholdings and they catch enough shrimp to sell to their neighbours and others. The Mazagão experts had recommended that Ipixuna shrimpers and farmers learn from that family about management of vegetation for shrimp production. Unfortunately this part of the advice was not followed, as the NGO had already identified their 'experts' and their 'system'.

Know-how and knowing how

This Amazonian example demonstrates that the most important technical advice that the experts of Mazagão and other PLEC sites often have to offer beyond their own environments is not a 'package' nor a specific 'technique', but rather a process of arriving at the knowledge necessary for reaching a solution to production and conservation problems. It is more a 'way of knowing how' rather than simple 'know-how' that the experts of Mazagão offered to Ipixuna and can offer a global audience.

The management techniques and production systems developed by expert farmers are the results of observation and experimentation under complex and varying local conditions. They are integrative and reflect adaptation to and mastery of a large array of local opportunities, problems and changing conditions. The expert farmer from Mazagão cannot and should not replace the expert farmer from Ipixuna, but both can play the expert function in their own villages and can play the role as model in the 'global village'. Such models are needed for promoting the integration of expert farmers and other local innovators into the process of development and conservation of rural communities in poor countries. This example of 'thinking locally and acting globally' – a reverse of the familiar adage – illustrates how expert farmers can have a global presence while maintaining their local functions.

In arguing for a global reach and significance of a 'scaled-up' and 'mainstreamed' approach, we must not fall into the trap of arguing that expert farmers should move into the traditional roles of 'global technical experts'. Both our network and our individual members have important roles to play in the 'global village', but they are new roles that acknowledge the importance of local expertise and innovation and the necessity of taking the time to understand local complexities.

Growing crops on sand: integrated smallholder production systems on sand bars in Muyuy, Peru

Pilar Paredes del Aguila¹, Pedro Sánchez Sandoval² and Andres Gomez³

In this short report we present one of the three production systems demonstrated by expert farmers in the Sector Muyuy in Peru. Muyuy is immediately upstream from Iquitos where the Amazon floodplain has a width of more than 20 km and a very dynamic geomorphology. The area of the floodplain known as Sector Muyuy is approximately 292 km² of which approximately 223 km² is land and 69 km² is river during the season when river levels are at about an annual midpoint. The area is dominated by a yearly flood cycle during which river levels rise and fall over nine metres on average. When river levels are at their lowest annual level the land area increases by

about 30 per cent; when it is at its highest level, virtually all land disappears. The aquatic phase lasts for 3 months.

Such landscape heterogeneity offers the smallholder farmers, called *riberenos*, many potential agro-environments. Landscape and land-use surveys conducted in 1995 and 2001 identified four main landforms, high levee, low levee, silt bar and sand bar. Each landform offers different production opportunities. The farmers of Muyuy do not plough, level or drastically change the topography and soils but use the tremendous diversity

Table 1 Average number of management systems and techniques used by *riberenos* to farm in the four main landforms

Landforms	Number of systems	Number of techniques
High levees	32	53
Low levees	17	36
Silt bars	5	12
Sand bars	8	18

of terrains, soils, temporal qualities and other subtle differences as a resource. The farmers create a large number of management systems and techniques in each of the four landforms (Table 1). Farmers have selected different species adapted to the unique production environment (Figure 1).

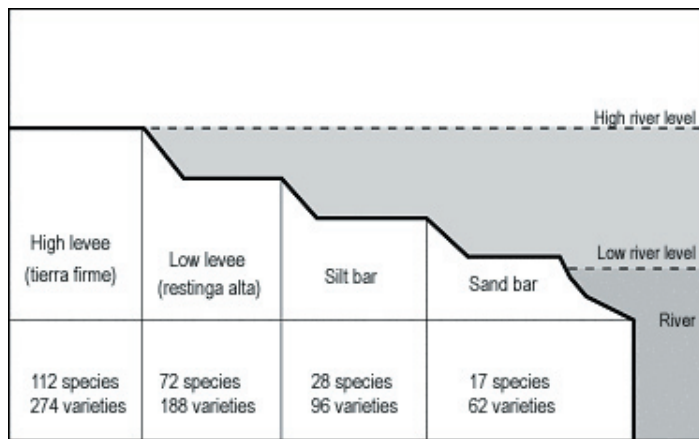


Figure 1 Species and varieties on the four main landforms of the Muyuy floodplain

One of the most difficult and unpredictable landforms as a planting space is the sand bars. At the end of the aquatic phase large areas of sand are formed by the receding river. Landholders use the new area by planting crops in an integrated system for household production and to increase fish and turtles. The tablone system or cluster system, of planting beans, peanuts and watermelon in blocks, vegetates the beaches. The beans and peanuts fix nitrogen and are able to find other nutrients in the riverine sand.

Varieties of beans, rice, watermelon and other annual crops have been selected by farmers for their particular adaption to the flood pulse. Most of the annual crop varieties can withstand floods and survive inundation for at least two weeks. The crops remain alive under water and thereby attract fish and river turtles. Bean varieties have been selected according to their capacity to withstand different amounts of inundation as well as the length of

time from planting to harvest. There are varieties that can be harvested in 2, 3 or 4 months. The dos mesinos (two months) varieties are planted on the lowest parts of the sand bars.



Figure 2. Sand bars are exposed during the low water season



Figure 3. Farmers use the tablone system to plant annual crops

continued over



Figure 4. The sandbars become vegetated with a mix of annual crops

The production system has other functions as well. The planted crops protect and provide food for fish fry (alevinos) and newly hatched turtles, species that have become rare due to overfishing and use of pesticides. On average 30% of production from the sand bars is harvested and the rest is consumed by fish and turtles in the following aquatic phase. A diversity of other fish is subsequently attracted to the created habitat, including predatory fish like catfish (bagres), and in this way fishing is made easier. For the ribereños fishing is an important and significant source of income which can then be used for other purchased household needs and especially schooling expenses.



Figure 5. Catching young turtles



Figure 6 The inundated crops on the sandbar provide food and habitat for fish and turtles

1. Pilar Paredes, from the Facultad de Biología, Universidad Nacional de la Amazonia Peruana, Iquitos, Peru, is one of the few women biologists in Peru. She was born and bred in Iquitos. Since graduation she has been dedicated in her work with ribereño smallholders, conducting numerous studies on smallholder management of water bodies during low-water season. She has also participated in documentation of forest and agroforest management in the Muyuy region and during the last 5 years has been a member of the PLEC-Perú team.
2. Pedro Sanchez is a ribereño smallholder from the community of Santana de Muyuy, near Iquitos in the Peruvian Amazon. He is an expert farmer who has had particular success in the management of secondary forest for the production of construction timber, fruits and medicinal plants. He is one of the most active members of his community in the management of fish in community lake reserves.
3. Andres Gomez, from Colombia, is research assistant to Miguel Pinedo-Vasquez at CERC, Columbia University. ■

Reports

The Final Evaluation of the 1998-2002 GEF-PLEC Project

EDITORIAL INTRODUCTION

As explained in the initial extract from UNEP's Executive Summary (drafted by Timo Maukonen, see p 12), the final evaluation was a somewhat protracted process, and it was early 2003 before the final text became available, following its submission to the Global Environmental Facility. Occupying a total of 85 printed pages, the Final Evaluation was also a large document, too large to be reproduced in its entirety in PLEC News and Views. More than half its total length was made up of reports on the Cluster demonstration sites and the work done in them, and with regret it was decided to reproduce none of this material.

What follows begins with the initial descriptive remarks in the Executive Summary, then reproduces substantial extracts from the reports by the Evaluators concerning the project as a whole, and concludes with an edited version of the main body of the Executive Summary. Other than selection, editing has been restricted to correction of spelling and grammatical errors. The original wording has not been amended in any way.

The project did not make a formal reply to this report. Although retaining a few reservations about remarks made on some of the Clusters, which seemed to be misapprehensions due to the short time spent in each, all members of the project who have read the report are very appreciative of the careful work done by the Evaluators and by the supportive nature of most of their many insightful comments. The criticisms offered are accepted.

Because this Evaluation concerned the larger part of the project which had support from the GEF, nothing is said about the four Clusters which were supported, and gratefully, by the core funds of the United Nations University alone. These were Jamaica, Mexico, Peru, and Thailand. But the same management and support system, described here for the GEF-supported project, applied also to them.

INITIAL EXTRACT FROM THE EXECUTIVE SUMMARY

Due to the scope and approach of the PLEC project, evaluation of the project was conducted in two stages. An in-depth field study of PLEC project activities was carried out by two external consultants between April and June 2002, which was followed by a desk study of the project

prepared by a third external consultant between November and December 2002. The desk study provides a brief overview of higher-level achievements and discusses future project management and programme issues. The findings of the field study are based on field visits to the eight GEF-supported project countries and focus on the activities taking place at the demonstration sites.

This evaluation focuses on the execution, performance and delivery of each of the programmed outputs, both in quantity and quality. Project impacts on improved knowledge, capacity building, stakeholder involvement and project sustainability have been assessed in accordance with the indicators specified in the project document. The impact of the project in making recommendations for changing policies and approaches at the national level towards sustainable management of biodiversity has also been evaluated.

Interviews at the demonstration sites with farmers, researchers and administrators were conducted and the mid-term review report, progress reports, publications and other documents were reviewed for this evaluation. Management and supervision of activities during project implementation was monitored continuously by UNU and UNEP in addition to internal assessment continuously done by the Scientific Co-ordinators. The project Advisory Group (AG) oversaw implementation of the overall level. Monitoring helped facilitate informed adjustments to the project design during implementation. Most importantly, the focus of the clusters was narrowed from landscape to conservation of biological diversity within the participating agricultural systems.

EXTRACTS FROM THE DESK EVALUATION

by Janis Alcorn

PLEC uses a unique concept of 'agrodiversity' that frames 'agrobiodiversity' within its broader social and natural context (see rationale and distinctions elucidated by H. Brookfield in the PLEC book *Cultivating Biodiversity*). Agrodiversity includes not only crop genetic diversity and its continuing evolution, but also the landscape diversity that incorporates natural vegetation, as well as farmers' practices and the social organization that supports the continuation and regeneration (evolution) of those practices that maintain agrodiversity.

PLEC is an ideal development program, because it primes the pump that then continues to work with minimal investment. Following the PLEC approach, farmers demonstrate to others that agrodiversity is a solution for farmers' problems. Agricultural scientists and extension workers learn that agrodiversity and the PLEC process offer

them solutions to offer to farmers elsewhere, and a process to discover, evaluate, and disseminate new solutions in the future with little outside investment or inputs.

PLEC has created and demonstrated a way to reform agricultural research in order to reverse global trends toward monoculture, land degradation, and biodiversity loss. PLEC should not be mistaken for simply being a successful a farmer-driven demonstration project networked around the world. PLEC demonstrates that it is possible for scientists to collaborate with agriculture advisors and 'end-users' of agricultural technical advice, beyond 'integrated pest management'. A continuation of PLEC into the next phase offers the promise of radically reforming agriculture and landscapes in 'marginal areas' to create and nurture social and ecological landscapes that support the conservation of biodiversity.

Broader achievements

PLEC has reached significant achievements at local levels but the purpose of this evaluation is not to recapitulate those, but rather to review the program for its global significance.¹

Increased agricultural scientists' appreciation of agricultural landscape diversity and social diversity are inseparable prerequisites for sustainable biodiversity conservation and sustainable agricultural production. Amazingly, in the face of globalization and transformation of Earth's landscapes into monocultures accompanied by the loss of biodiversity, PLEC has successfully planted and nurtured the seeds for global appreciation of the value of landscape-level diversity (social and biological) in agriculture, by creating the conditions for agricultural scientists to realize that successful adaptation to change in sustainable agriculture relies on the same basic evolutionary principles that govern evolutionary adaptation at genetic and organismal levels.

PLEC not only demonstrates the valuable results of cross-scale collaboration but also provides a replicable method for mobilizing other agricultural scientists and policymakers to support ecological resilience through cross-scale collaboration appropriate to local circumstances within weak or strong states. PLEC demonstrates a successful alternative to the standard 'blueprint' project 'top-down' implementation approach, by offering a flexible project design that does allow locally adapted solutions to emerge. At local on-the-ground levels, PLEC has successfully

¹ It is important to reflect on the general significance of this project to orient readers before they enter the labyrinth of reports and reviews. The extensive documentation from the project sites and the analysis of site data describe and measure specific local and cumulative achievements against milestones. It is not the purpose of this evaluation to summarize those achievements. This paper was commissioned to provide a brief STAP expert opinion that provides a broader reflection on the project's value derived from a desk review of the existing volumes of reports and evaluations of the project. Many of the existing documents and reviews focus on 'the forest' as a 'sum of its trees', and as a consequence generally 'fail to see the forest for the trees'. This review offers an outside perspective on the PLEC 'forest' as more than the sum of its parts.

created sustainable local processes appropriate to each site.

PLEC has demonstrated how it could be possible to replicate and expand efforts to conserve and nurture the social and biological diversity in agricultural systems in different conditions around the world. The most important achievement of PLEC is its creation of a smart process that is replicable and can proceed alone after initial investments to empower people who support agrobiodiversity – social and biological, local and individual, at the landscape level. PLEC shows the way to identify master/expert farmers – people who are generally not political leaders and who are not likely to trust agricultural extension agents but rather their own skills. PLEC also shows the ways to empower these farmers by working with scientists, within the structure and framework of agricultural research and extension (found in almost every country on Earth).

PLEC demonstrates the value of broadening agricultural scientists' concepts of diversity from meaning simply genetic resources (genetic diversity of crops) to meaning the landscape level biodiversity and the diversity of local social organizations and technologies that support that biodiversity and reduce agricultural and ecological risks (i.e., the agrobiodiversity that supports genetic, organismal and ecosystem level diversity).

One of the keys to the success of the PLEC process can be found in the excellent book *Cultivating Biodiversity*, Chapter 10, PLEC Demonstration Activities: A review of procedures and experiences. This chapter clearly lays out the fundamental process for identifying and working with master farmers – something that sounds simple but in reality can be difficult for local agricultural research agents to do without understanding the information in that chapter. The book – with all its chapters – should be used in agricultural universities.

Harmonization of methodologies

The concept of harmonization of methodologies is very interesting, because it recognizes the necessity of building on local variation. Instead of seeking to use a network to 'standardize' rigid blueprints and 'packages of practice' to be followed by researchers wishing to collaborate with farmers (blueprints which would not be possible or advisable), PLEC has developed a process that allows clusters and centres to evolve along a local path (based on what is possible as much as on what might be achieved in their particular environments). But PLEC also used guidelines and recommendations to nurture cluster scientists toward reflection on their methods and how they differ from others, and how they could be improved.

Successful harmonization, however, is also highly dependent on the calibre and orientation of the researchers at each site and cluster, in the same way that the success of the demonstration plots depended on the calibre and orientation of the master farmers and their colleagues at each site and cluster. The process for selecting and managing expert

farmers is well articulated in the documents. However, there does not seem to have been any rigorous method for selecting agricultural researchers and cluster centres. The various reports seem to indicate that some cluster centres and scientists were stronger than others.

On the one hand, this apparent lack of 'selection' criteria for 'master agricultural scientists' was wise, because it enabled the project to test how the PLEC process would work in reality, where many (possibly most) agricultural researchers and extension agents are not 'masters' at their trade. On the other hand, it made harmonization more difficult. The lack of 'selection' challenged the global level scientists to devise ways to encourage local agricultural scientists to reorient their data gathering and analysis to enable their research to incorporate more global analytical questions in addition to those of local interest and direction. The global scientists were forced to work harder to develop replicable mechanisms for working with the full range of agricultural scientists that exist around the world.

International coordination: oversight by global management

The international coordination activities made PLEC much more than a sum of its clusters. PLEC management vigorously pursued their objectives and sought the review and advice from other scientists.

International coordination has been essential for PLEC, not only to provide oversight, but also because PLEC is designed to jumpstart global change. PLEC addresses two global crises – falling biodiversity in landscapes, and the crisis of land degradation which not only increases poverty but also forces people to move into lands that have been reserved for maintaining forests, wild ecosystems, and other types of biodiversity.

Under GEF, PLEC matured as a global network through improved international coordination with attention to constantly improving performance. PLEC's international coordination work achieved many milestones, despite the challenges of coordinating activities in such a diverse set of countries. The PLEC project's Scientific Coordinators developed guidelines and assisted clusters to prepare their annual workplans. They also assisted the clusters to standardize their financial and personnel management. The PLEC Biodiversity Advisory Group created methods and frameworks to improve data collection and analysis. And PLEC's Demonstration Activities Advisory Team developed guidelines for working with master farmers and stimulated change by visiting clusters to work with farmers and researchers in each cluster.

There was inadequate information for the desk review to evaluate the degree to which information in the PLEC bulletins and publications influenced the activities in other clusters or outside the network. PLEC presented its methods and results to others outside the network through presentations in many conferences and other fora, but

the impact of presentations is always difficult to measure. PLEC produced several valuable books on methods, but it is difficult to measure their impact yet. The PLEC bulletin was distributed to many researchers around the world, but it is difficult to judge what impact it has had in a world full of bulletins or how the PLEC information might have influenced agricultural research in other parts of the world that lie outside the clusters.

Intercluster communication has been an important method used to try to move the slower clusters forward. However, the calibre of scientists and their interests varied within and between clusters, making it more difficult for them to 'speak the same language' when they met. The impact of intercluster cooperation was limited in some clusters by the lack of openness of the researchers and extension agents. Unless researchers are open to understanding the benefits of farmer-researcher communication, cooperation will remain low, as it has been traditionally – with agriculture experts telling farmers what to do based on their training in university and attitudes as elite researchers. Nonetheless international networking proved to be a viable strategy to reach researchers and change their way of thinking about their work.

It is important to note that the success of intercluster cooperation also depended on the success and experiences of each cluster's own outreach efforts. Project documents illustrate the impact of outreach in influencing other projects and activities in China, Tanzania, Guinée, Ghana and Brazil. In some cases, university curricula were developed. These local outreach activities enabled those clusters to better represent the value of their approaches to visitors from other clusters. Likewise, where the master farmers engaged in wider outreach, they were better prepared to influence activities in other clusters through exchanges between clusters.

Scientific progress and rationale as a joint project of people and scientists

Over the past fifty years, individual researchers – ethnobotanists, ethnoecologists, and anthropologists working in agricultural systems – have documented thousands of local resource management systems that include biodiversity and natural processes in all ecosystems around the world. PLEC has moved that knowledge into a new realm by

- 1) linking it to agricultural projects and
- 2) creating replicable methods for training anyone to recognize these systems and support the people whose actions and choices maintain these systems and the knowledge that underlies these systems.

The 'peoples' science' approach is not new in developing countries. The value of master farmers' knowledge has been recognized and promoted by activist NGOs who network this knowledge among farmers and support local gene banks. Agricultural researchers, however, tend

to view these NGOs as ideological activists, and tend to ignore the farmers' knowledge. PLEC recognized this attitudinal gap was hindering the evaluation and support of good local farmers' knowledge. By working with scientists to evaluate agrodiversity and its maintenance, rather than only supporting farmers, PLEC has advanced scientific knowledge as well as created the potential for expanding sustainable and productive relationships between scientists and farmers.

PLEC systematically demonstrated the scientific value of farmers' empirical knowledge to researchers. The recent book *Cultivating Biodiversity* and the PLEC newsletters are replete with wide-ranging specific examples. As agricultural researchers and extensionists observed the positive results of local cultivation techniques and landscape management, the scientists were able to analyse the reasons why the farmers' empirically-based methods worked.

The new PLEC database (initiated in response to S. Brush's midterm report in 2000) is providing a framework for gathering comparable data for analysis to reveal the conditions (political, social and ecological) in which farmers' knowledge continues to exist, and as a baseline for identifying and following farming system trends into future. The STAT-led meta-database development initiates the basis for quantifying and comparing agrodiversity situations among sites.²

The farmers associations nurtured by PLEC are an especially important aspect of the capacity building strategy. Associations enable farmers to interact with each other and share observations, as well as represent themselves to the project personnel and agricultural extension agents in the future. Working with associations is a much more effective way to expand and sustain project impacts. In some cases, the associations were created specifically for PLEC (village committees to chicken-breeders club) and in other cases existing associations incorporated a new focus on agrodiversity and local knowledge (women's nursery groups to labour unions).

PLEC included many training activities that were designed to ensure use of knowledge gained during training (and thereby reinforce adult learning). They were primarily focused on transferring skills for project implementation (listed in annual reports and analysed in the Consolidated Report on Capacity Building). Many focused on the tasks necessary for implementing the research. Others were designed to bring local officials and bureaucrats on board to support PLEC objectives. Others were training courses run by farmers and farmers' associations. In addition, undergraduate and graduate students gained valuable skills and experience by working with PLEC activities in most clusters.

Aside from the expected capacity building via training for individual farmers and agricultural scientists, the PLEC process itself built capacity by creating the conditions for agricultural researchers to discover 'on their own' that working with expert farmers was rewarding. This discovery created an incentive for researchers to take a 'learning approach' to their work in the future – something that might not be fully appreciated by many reviewers. The embrace of a learning approach, more than any specific new skill transferred to PLEC participants via training, is a key for projects attempting to achieve sustainable transformation of agricultural landscapes.

Recommendations for the future

PLEC is poised to upscale and mainstream its approach globally – something that remains to be achieved. PLEC has demonstrated that biodiversity can be maintained in agricultural systems in ways that also improve farmers' livelihoods and reduce their risks across a variety of social and ecological systems. PLEC has demonstrated that farmers and scientists can collaborate to increase the area of land under this type of management. PLEC has developed replicable methods for extending the PLEC approach to new sites and for documenting and evaluating the techniques discovered. Continued work at each cluster is an admirable goal, but to enhance the impact of PLEC, a more visionary goal is to develop a way to reach agricultural researchers and extension agents around the world. This is essential if agricultural landscapes are to become more compatible with biodiversity conservation.

This could be achieved through three processes:

- 1) curricula development for use in agricultural universities around the world;
- 2) regional training centres; and
- 3) policy analysis and reform that removes the incentives for unsustainable land use.

Curricula development is the basic next step because agricultural universities are continually producing new generations of researchers and extension workers who follow the old model of agriculture which is useful in some areas where intensive agriculture is appropriate, but not appropriate in most of the marginal lands that generally comprise the landscapes of concern for biodiversity conservation, and serve as the resource base for millions of impoverished farmers. PLEC should develop curricula for training scientists, agricultural researchers and extension agents in the 'agrodiversity' approach and the techniques developed by PLEC.

One way to start mainstreaming would be for PLEC to establish regional training centres that would build interest among more established universities, as well as provide specific types of training. These centres (along the lines of what RECOFT has offered for community forestry perhaps) could offer different courses for different audiences – policy makers, expert farmers, scientists,

² STAT (Scientific and Technical Advisory Team) was formed in late 2000 by fusion of members of the old Biodiversity Advisory Group and Demonstration Advisory Team. This was an action taken in consequence of the Mid-term Review (eds).

conservationists, etc. Some of the clusters, such as the one in Ghana, include the idea of regional centres in their future workplans – an indication that this is a natural next step given that there is already enthusiasm for this approach among PLEC participants.

Finally, to remove disincentives for more ecologically sustainable agriculture, PLEC should be supported by a policy analysis and reform component or partner. Without policy reforms that remove incentives for converting land into other uses, the more ecologically sustainable agriculture, and the biodiversity it sustains in the larger landscape, will be overcome by economic/financial driving forces that result in homogenization of the landscape. But simply removing disincentives will not be sufficient to change loss of biodiversity. Mainstreaming PLEC approaches into agricultural research and farmer-based promotion of sustainable alternatives will be the essential companion to economic reforms to support biodiverse landscapes.

EXTRACTS FROM THE GENERAL PART OF THE FIELD EVALUATION REPORT

by Benjavan Rerkasem and Eduardo Fuentes

The main focus of PLEC was on improving yields and sustainability of agricultural lands. Activities were concentrated on demonstration sites, which were made up of farming communities or villages. At many sites, e.g. throughout Africa, the landscapes have been more or less completely converted to agriculture. Very little of the original vegetation remained. Brazil and China were notable exceptions. Near Macapa in the Amazon delta farmers live in the forest and manage the landscapes mostly by altering the density of original trees. In addition to their crop fields, demonstration villages in China either had their own land use stages such as community forests, head-water forests or fallow fields in which cultivation and management were limited or they were situated near protected nature reserves.

The agrobiodiversity assessment, which still remains to be much further analyzed, has shown that even in the most intensively cropped land, in small mainly poor villages across wide ranging agroecosystems of the different clusters, some biological diversity, native or introduced, is routinely cultivated by farmers. Biodiversity has been cultivated by increasing species and genotype mixes in individual fields, over the different seasons and in mosaics of land use stages and field types over the landscape. Most importantly, a new body of knowledge has begun to emerge. The project has contributed much to the growing understanding and dissemination of farmers' biodiversity management, in the usage and maintenance of many individual species, including wild and semi-domesticated ones as well as those considered 'weeds' by agronomy textbooks, and occasionally even a few on the national

endangered list. Some of the main findings have been published in peer-reviewed journals but many more are still in internal project reports.

Central to PLEC's demonstration activities were the so-called expert farmers, identified variously by different clusters. Some were particularly skilled in agrobiodiversity management, able to employ local and introduced plant genetic resources to make the best use of their given circumstances. Some were keen on experimentation and some possessed certain specialized skills. Some clusters chose as their expert farmers those with aptitudes for transfer of knowledge and certain skills to other farmers. Some clusters worked with experts with combinations of these attributes. The project has been generally successful in demonstrating scientist-farmer and farmer-farmer transfer of practices aiming to increase farm income while maintaining or increasing number of crop varieties and useful species in each individual field type.

At most sites PLEC played an important role in helping to constitute, strengthen or make official existing farmers associations. This is likely to be one of the more important and sustainable outcomes of the project. These associations provide an effective platform for future developments. The associations are already successful in giving farmers negotiating power with banks and governments, and are enabling fruitful exchanges of information and genetic material. Support in local biodiversity management was provided through the farmers' associations and the expert farmers. In some clusters, the model was extended to include local government agencies responsible for conservation, e.g. Nature Reserve Bureau in China.

In most cases the net result of PLEC at the field level was to increase biodiversity through crop management and to increase productivity through various agronomic management practices from new cropping systems to nutrient recycling and soil fertilization. More sophisticated models were developed and tested by some clusters, e.g. Brazil and China. In the Amazon delta, for example, scientists are only now starting to understand the complex and very dynamic interactions of farmers with the forested landscapes and they are far from being able to suggest improvements.

Brazil has developed a very attractive environmental education program. In this program they assessed the needs of elementary school teachers and then provide them with very attractive materials and trained them in their use. This program may be worth replicating elsewhere in the PLEC and non-PLEC world.

Interaction between groups and clusters has been associated largely with the annual meetings, limited regional meetings and visits, and the scientific coordinators directed development and dissemination of methodology and guidelines. There were, however, signs of increasing collaboration, as clusters were becoming technically mature, more confident with making contributions and learning from one another. More synergy from between-countries interaction might be expected in the future, e.g. should there

be the next phase of PLEC.

In conclusion, while goals and progress varied among clusters, PLEC as a whole has successfully achieved all four original project objectives. Furthermore, although designed as a demonstration and not a scientific project, PLEC has begun to shed light on the understanding of how farmers and communities can help to maintain and enhance biological diversity even in intensively cultivated areas. In the reviewers' opinion, only through insights gained from such an understanding may sustainable management of biodiversity be developed to the extent that it can be recommended at national and regional levels.

It would seem that more critical analysis at the project and individual field types and land use stages of social, financial as well as biophysical conditions that promote and limit biodiversity should give some insight into long term sustainability of agrodiversity. Long-term databases that started or continued under GEF support provide an excellent resource and opportunity for analysis of dynamics and trends over time.

The systems approach may be brought in to examine other interactions among various components of local agrodiversity, specifically at the household, village, valley, provincial and regional level. It may also be fruitful to relate biodiversity data, between varieties of individual species as well as between species, to strategic determinations of the physical environment, including ones that are measured and those estimated or 'known' by farmers. Obviously only some clusters are equipped for such in depth studies.

THE MAIN BODY OF THE EXECUTIVE SUMMARY by UNEP

The findings of this evaluation show that PLEC has made significant achievements in successfully planting and nurturing the seeds for global appreciation of the value of landscape level diversity (social and biological) in agriculture. This has been achieved by creating the conditions for agricultural scientists to realize that successful adaptation to change in sustainable agriculture relies on the same basic evolutionary principles that govern evolutionary adaptation at genetic and organism levels. At the higher level, PLEC has laid the foundations for analysing how resource use systems and diversity levels are correlated and how they are influenced by the market and by policies. Higher-scale appreciation of local scale adaptations to ecological and social conditions is essential for ecological and social resilience. PLEC has demonstrated a process for catalysing that appreciation and in turn supporting ecological resilience through cross-scale collaboration. At the local level, PLEC has successfully conserved biodiversity in agricultural landscapes through the replication of good agricultural techniques based on expert farmer experimentation and demonstration.

Central to PLEC's demonstration activities are the so-called expert farmers, particularly skilled in agrodiversity management which, facilitated by the project, have been able to employ local and introduced plant genetic resource to make the best use of their given circumstances and with aptitudes for transfer of knowledge and certain skills to other farmers. The project has been successful in demonstrating scientist-to-farmer and farmer-to-farmer transfer of practices aiming to increase farm income while maintaining or increasing number of crop varieties and useful species in each individual field type.

PLEC focuses primarily on improving yields and sustainability of agricultural lands, through activities concentrated on demonstration sites, made up of farming communities or villages. There are indications that even in the most intensively cropped land, in small mainly poor villages across wide ranging agroecosystems of the different clusters, some biological diversity, native or introduced, is routinely cultivated by farmers. Biodiversity has been cultivated by increasing species and genotype mixes in individual fields, over the different seasons and in mosaics of land use stages and field types over the landscape. Most importantly, the project has contributed much to the growing understanding and dissemination of farmers' biodiversity management models, in the usage and maintenance of many individual species, including wild and semi-domesticated ones.

PLEC's achievements in capacity building and enhancement of knowledge base are plenty. Besides capacity building of individual farmers and agricultural scientists who received training, the PLEC process itself has built capacity by creating the conditions for agricultural researchers to discover 'on their own' the rewarding working with expert farmers. The database developed by the project provides a framework for gathering comparable data for analysis to reveal the conditions (political, social and ecological) in which farmers' knowledge continues to exist, and as a baseline for identifying and following farming system trends into future.

PLEC's role in helping to constitute or strengthen farmers' associations is likely to be one of the more important and sustainable outcomes of the project, as these associations provide an effective platform for future developments. The associations have been found successful in giving farmers negotiating power with banks and governments, and in enabling fruitful exchanges of information and genetic material, and even in the management of biodiversity in neighboring protected land as well as their own productive land (e.g. in China). The evaluation also finds the environmental education programmes of PLEC (e.g. Brazil) very attractive and worth replicating elsewhere in the PLEC and non-PLEC world.

In addition to meetings and coordinators' and technical team visits, there are also signs of increasing interaction and collaboration as clusters are becoming technically mature, more confident with making contributions and

learning from one another and more synergy coming from interaction between countries. The PLEC process has allowed clusters and centres to evolve along local paths based on what is achievable in different environments.

PLEC, although designed as a demonstration and not a scientific project, has begun to shed light on the understanding of how farmers and communities can help to maintain and enhance biological diversity even in intensively cultivated areas. PLEC has advanced scientific knowledge as well as created the potential for expanding sustainable and productive relationships between scientists and farmers. PLEC has moved knowledge into a new realm by linking local resource management systems to agricultural projects and by creating replicable methods for anyone to be trained in how to recognize and support these systems and the people who maintain these systems as well as the knowledge that underlies them. The replicable process to empower people who support agrobiodiversity – social and biological, local and individual, at the landscape level is probably the most important achievement of PLEC. Only through insights gained from such an understanding may sustainable management of biodiversity be developed to the extent that it can be recommended at national and regional levels.

The project has demonstrated that agricultural scientists can overcome biases instilled by their educational formation, learn from master farmers, and use that knowledge to develop a 'learning environment' as well as new techniques based on the empirical observations and experiments of local farmers. PLEC has created a global network of agricultural scientists and has operationalized an approach that demonstrates the value of broadening the concepts of agricultural biodiversity from meaning simply genetic resources (i.e., genetic level diversity of crops) to meaning the landscape level biodiversity and the local social organizations and technologies that support that biodiversity to reduce agricultural and ecological risks, and ecosystem diversity.

There are important lessons to be learned for the future of this project. In four years the project of this kind cannot be expected to generate, test and disseminate land use innovations. The optimum mixture of species, and their arrays and densities are the subject of involved academic studies, or the result of long trials and errors in the field. China provides an example of achievements that can be made in project like PLEC when scientists have sufficient time to gain an understanding of local conditions and can collaborate effectively with farmers. PLEC associated scientists in China began to look for diversity in local agroforestry before 1995, when they started on participatory work with farmers of the demonstration villages that later evolved into PLEC.

The strength of PLEC in helping to shape agrobiodiversity policies has been affected by the overall weakness in design between and within clusters. Clusters have little in common besides the goal of improving yields and increasing biodiversity.

The project approach has been flexible enough to make the best out of the clusters according to their capacities. Sharing of the agrobiodiversity information collected and knowledge that farmers share with the project could be stored at local level through the compilation of information in a simple booklet in local language and serve many purposes. It would begin to store local knowledge that can be built upon and used by everyone from farmers to schoolchildren.

While the main focus of PLEC should be to continue work at each cluster, a more visionary goal of how to develop a way to reach agricultural researchers and extension agents around the world would enhance the impact of PLEC. This could be achieved through three processes:

- 1) Curricula development for use in agricultural universities around the world;
- 2) Regional training centres; and
- 3) Policy analysis and reform that removes the incentives for unsustainable land use.

This evaluation concludes that, while goals and progress vary among clusters, PLEC as a whole has successfully achieved all four original project objectives. PLEC should not be mistaken for simply being a successful farmer-driven demonstration project networked around the world. PLEC demonstrates that it is possible for scientists to collaborate with agriculture advisors and 'end-users' of agricultural technical advice. A continuation of PLEC into the next phase offers the promise of radically reforming agriculture and landscapes in 'marginal areas' to nurture ecologically and socially sustainable agricultural systems that create a landscape that in turn supports the conservation of biodiversity.

The long-term databases, started or continued under GEF support, provide an excellent resource and opportunity for analysis of dynamics and trends over time. It may be fruitful to relate biodiversity data, between varieties of individual species as well as between species, to strategic determinations of the physical environment, and a more critical analysis of the project and individual field types and land use stages and of social, financial as well as biophysical conditions that promote and limit biodiversity would give some insight into long term sustainability of agrobiodiversity. PLEC's contributions to the understanding and pioneering approaches for the management of agrobiodiversity may be found useful for GEF as a whole, especially when implementing its Operational Program on biodiversity of importance for agriculture (OP13). ■

News and Reviews

Published PLEC related papers

Rerkasem, K., N. Yimyam, C. Korsamphan, C. Thong-ngam and B. Rerkasem. 2002. Agrodiversity lessons in mountain land management. *Mountain Research and Development* 22 (1): 4-9.

Pinedo-Vasquez, M., J.B. Pasquale, D. Del Castillo Torres, K. Coffey. 2002. A tradition of change: the dynamic relationship between biodiversity and society in sector Muyuy, Peru. *Environmental Science and Policy* 5: 43-53.

Guo, H., Padoch, C., Coffey, K., Chen, A., and Fu, Y. 2002. Economic development, land use and biodiversity change in the tropical mountains of Xishuangbanna, Yunnan, Southwest China. *Environmental Science and Policy* 5 (6):471-479.

Umezaki, Masahiro and Ryutaro Ohtsuka. 2002. Changing migration patterns of the Huli in the Papua New Guinea highlands: a genealogical demographic analysis. *Mountain Research and Development* 22 (3): 256-262.

Castelan-Ortega, O.A., Fawcett, R.H., Arriaga-Jordan, C., and Herrero, M. 2003. A Decision Support System for smallholder campesino maize-cattle production systems of the Toluca Valley in Central Mexico. Part I-Integrating biological and socio-economic models into a holistic system. *Agricultural Systems* 75 (1): 1-21.

Castelan-Ortega, O.A., Fawcett, R.H., Arriaga-Jordan, C., and Herrero, M. 2003. A decision support system for smallholder campesino maize-cattle production systems of the Toluca Valley in Central Mexico. Part II - Emulating the farming system. *Agricultural Systems* 75 (1): 23-46.

Yimyam, N., K. Rerkasem and B. Rerkasem. 2003. Fallow enrichment with pada (*Macaranga denticulata* (Bl.) Muell. Arg.) trees in rotational shifting cultivation in northern Thailand. *Agroforestry Systems* 57(2): 79-86.

Eilu, G., Obua, J., Tumuhairwe, J.K. and Nkwine, C. 2003. Traditional farming and species diversity in agricultural landscapes of south-western Uganda. *Agriculture, Ecosystems and Environment*. (in press)

An important book for sceptics about agroecology

Norman Uphoff, ed., *Agroecological Innovations: Increasing Food Production with Participatory Development*. London, Earthscan, 2002. xviii+ 306 pp. ISBN 1-85383-857-8 (paperback). UKP 18.95.

Benefits of ecological agriculture are most often expressed in terms of soil fertility, soil quality and biodiversity. Farmers are often aware of these benefits, but are inclined to adopt only those ecologically benign technologies that will also yield improvements in their production, welfare and in the return to their labour and skills. Strong yield and other economic benefits have been claimed, with data over a decade or more in some cases. However, because most agro-ecological systems involve synergies between different practices at ecosystem level, quantitative evaluation is difficult and can omit important and even unforeseen dimensions. Because standard reductionist methods of measurement are generally difficult or impossible, there remains great reluctance among agricultural scientists and economists, in particular, to accept agroecological claims to have answers better than those of the conventional, modernist agriculture of the past half century. One of the few exceptions is the widely-adopted conservation tillage because, in this case, a significant reduction in costs is involved.

This book arose from a conference on the future world food supply held in 1997, after which it was proposed by Miguel Altieri and Norman Uphoff (respectively of Berkeley and Cornell), to hold a further conference specifically on the contribution of agroecological methods, old and new. With support mainly from the Rockefeller Foundation, this meeting was held at Bellagio, Italy, in 1999, and the present book arises out of that conference. All or almost all of it has been rewritten by its 22 authors, and edited so that there is abundant cross-reference between both the general and case-study chapters, and between the case studies themselves. Such integration is facilitated by the fact that although the writers are a mixture of natural scientists and social scientists, all have a common interest in developing new approaches to agricultural change.

The book has three parts. The first is general, and sets out the issues, and in particular the question 'can agroecology do the job that is needed in the twenty-first century?' Uphoff introduces the book, its objectives and the need of an expanded role for the farmers in technology generation. Altieri provides an elegant summary of agroecological principles. In an important Chapter, Erick Fernandes, Alice Pell and Norman Uphoff set out new dimensions of four old 'equations'. They show that control of pests and diseases is not simply a matter of chemical applications, that soil fertility constraints can often be more effectively handled by non-chemical means, that water

harvesting is as important as irrigation, and that the genetic potential of crops is far from fully exploited, without any transgenic initiatives. This chapter is particularly effective in arguing that soil needs to be thought of as a volume that is full of life, not just as a surface, in demonstrating the folly of treating monoculture as 'real' agriculture, and in demonstrating the cyclic nature and biological basis of farming activity. This is followed by a rather less persuasive chapter on human and social capital by Jules Pretty, by a good and clear discussion of the economics of sustainability by Arie Kuyvenboven and Ruerd Ruben, and then by a rather strained argument by Mary Tiffen and Rolando Bunch on how far ecological agriculture can feed the world.

In Part 2 there are six case studies from Africa and three each from Asia and Latin America. All have value, but two are particularly revealing on more general grounds. Pedro Sanchez, former director of ICRAF and now of Columbia University, shows how mechanistic ideas about agroforestry through alley-cropping have now been discarded and have given place to a view which focuses centrally on the need to sustain and restore soil fertility, especially in sub-Saharan Africa. In addition to trees planted in the fallow, two-year leguminous fallows, and biomass transfers of the widely-found nutrient-scavenging hedgerow plant *Tithonia diversifolia*, are now fully a part of what works in agroforestry. Then the present director of ICRAF, Dennis Garrity, for years an aficionado of the steep-land version of alley-cropping agroforestry known as the Sloping Agricultural Land Technology (SALT), has learned from the Filipino farmers who never took up this system. They instead developed their own 'salt' – leaving unplanted strips on their slopes, which quickly revegetated with native grasses and forbs. ICRAF scientists found these 'natural vegetative strips' to have all the same beneficial effects as the hedgerows, while being far less demanding of labour and not depriving crops of light. As Garrity remarks, this is neither a conventional nor an 'alternative' solution, but an adaptation of agroecological principles.

Also included in this group is a chapter on the controversial 'System of Rice Intensification' (SRI) by Norman Uphoff. The term is in fact a misnomer, since this is a management practice that involves less seed, less external inputs and less use of water than conventional modern rice production with close spacing and continuous irrigation. What it does demand more of is labour. In largely unverified trials it has given substantial improvement in yields, due to maximizing the rooting and tillering potential of the plant. The system was developed in the unlikely locale of Madagascar, based on the observed practices of some farmers and some intuition by a Jesuit priest. Since 1999 it has been experimented with quite widely, especially in China where some improvements have been suggested (Yuan 2002).

There has been a great deal of doubt about SRI, which the editors of this periodical encountered when they gave it publicity in our twice-monthly information series (PLECserv 2003). It encountered the scepticism of one of

our colleagues, and through him we saw some very hostile comment from certain Indonesia-based agronomists of the old school. Since that time an important new assessment has appeared, suggesting that the effectiveness of SRI may be greatest in areas of poor soil and longer growth duration (Dobermann 2003).

The debate is certainly not closed. Nor is it likely soon to close when so much remains to be learned, and so much is specific to particular areas, for which the system must be modified. The recent debate also contains a warning that is not specific to SRI alone, but applies to many agroecological innovations. Although the additional labour and knowledge required varies from area to area, in Madagascar itself the demand is sometimes too much for those, mainly but not only the very poor, who depend on seasonal off-farm labour for basic livelihood. The opportunity cost of this labour may be too high for farmers to adopt SRI for, where there is no other way of earning cash, labour may be the scarcest input of all (Moser and Barrett 2003).

The third part of the book is again general, including a useful paper on the ways of involving people by Pretty and Uphoff, and a valuable summary of the differences between conventional and agroecological systems by the editor. Its most distinctive chapter, however, is on the 'unplanned' diversity that follows from 'planned' diversity, by Alison Power and Peter Kenmore. Since the latter is the main generator of Integrated Pest Management and all that it has led to, this chapter not surprisingly has a strong focus on the diversity of predators and its relationship to planned agrobiodiversity. However, it goes on to show how synergies can develop within production systems that can produce very parallel outputs in systems that are different in almost every aspect of their inputs. They use the example of the similarly high yield behaviour of industrial and 'natural' rice farming in Japan, the latter famously described by Fukuoka (1978). The production syndromes that emerge are more than the sum of their parts, and this is one of the central messages of the book.

Although policy conclusions are presented, they emerge from the argument rather than being central to it. This is a book for scientists and applied scientists containing a great deal that is worth reading and chewing over. . Moreover, it is very well referenced and up to date. The collective aim of the authors is a hybrid agriculture, embracing both the newest research and the oldest of farmer's knowledge. A final message may, perhaps, best be drawn from the conclusion to Garrity's confession, at p.230.

Moving beyond a choice between 'alternative' vs 'conventional' agriculture will enable us to explore the common ground that they share. The central issue is how to guide decision-makers to invest in research that employs and benefits from all of these tools.

Harold Brookfield

continued over

Dobermann, A. 2003. A critical assessment of the System of Rice Intensification (SRI). *Agricultural Systems*, in press.

Fukuoka, M. 1978. *The one-straw revolution: an introduction to natural farming*. Emmaus Pa, Rodale Press.

Moser, C.M. and C.B. Barrett 2003. The disappointing adoption dynamics of a yield-increasing, low external-input technology: the case of SRI in Madagascar. *Agricultural Systems* 76: 1085-1100.

PLECserv 2003. Out of step with fashion: spectacular rice yields through management alone. *PLECserv* 10, 22 April 2003. <http://c3.unu.edu/plec>

Yuan, L.P. A scientist's perspective on experience with SRI in China for raising the yields of super hybrid rice. Proceedings of an *International conference on assessment of the system of rice intensification (SRI), Sanya, China, April 1-4 2002*. <http://ciifad.cornell.edu/sri/procontents.html> ■

Conserving biodiversity in agricultural landscapes

McNeely, J.A., and Scherr, S.J. *Ecoagriculture : strategies to feed the world and save wild biodiversity*. Washington: Island Press, 2002, 345pp, ISBN 1 55963 645 9 (paperback), \$27.50.

With this new book Jeff McNeely and Sara Scherr bring into focus the major issues facing biodiversity conservation. In conventional wisdom those promoting wildlife conservation largely see modern farming as the problem and thus policies to protect wildlife have typically relied on land-use segregation and establishing protected areas from which agriculture is excluded, so-called 'fortress conservation'. However, the mounting evidence is that protected areas are not sufficient to maintain the world's biodiversity into the future. Many protected areas are already heavily used for agriculture, and population growth in biodiversity hotspots areas is often higher than the world average. Managing agricultural areas in ways that achieve sustainable protection for wildlife habitats provides a solution, as an accompaniment to the protected areas systems. Over the years farmers and scientists have been exploring and testing innovations that protect and even enhance biodiversity while maintaining agricultural production. These have been the inspiration for the concept of ecoagriculture - the management of landscapes both for the production of food and the conservation of wild biodiversity. Ecoagriculture places food security and rural livelihoods at the centre of strategies for biodiversity conservation and ecosystem management.

The authors develop the argument for ecoagriculture in three parts in the book. Part I presents a comprehensive yet relatively succinct account of the human impact on the

world's ecosystems and why we have to act. It examines the threats to wild biodiversity, the challenge of feeding a growing world population and the impact of agricultural practices.

In Part II the authors outline and discuss the concept of ecoagriculture. They propose 6 strategies for ecoagriculture:

1. Create biodiversity reserves that also benefit local communities.
2. Develop habitat networks in non-farmed areas.
3. Reduce or reverse conversion of wild lands to agriculture by increasing farm productivity.
4. Minimize agricultural pollution.
5. Modify management of soil, water and vegetation resources.
6. Modify farming systems to mimic natural ecosystems.

Case studies, thirty-six in all, from the United States, Europe and Australia as well as developing countries, are used to illustrate the strategies. In addition, a considerable number of other examples are cited. In general, there is a strong reliance on scientific progress. The references are mainly recent, and some are not primary sources. But collectively, they support the authors' point. While the conservation of natural diversity is their central consideration, they make a persuasive case that without a healthy agriculture, nature cannot survive.

Part III explores how policies, markets and institutions can be reshaped to support ecoagriculture. It will require new technical research, support for local farmer innovation, and adoption of new agricultural and environmental policies at local, national and international levels. The conclusion is upbeat: 'innovative ecoagriculture approaches can draw together the most productive elements of modern agriculture, new ecological insights, and the knowledge local people have developed from thousands of years of living among wild nature' (p. 266). Given the mainstreaming of ecoagriculture, both people and the rest of nature can prosper together far into the future.

While these issues are not new to readers of *PLEC News and Views*, the book presents a strong argument and brings together some of the wider issues at a global scale that affect agriculture and conservation. Although not offering practical tools, it presents potential strategies of how by modifying farming practices, farmers are able to increase returns from farming while enriching the biodiversity found on and around their land. *Ecoagriculture* strengthens the case PLEC has also strongly promoted, that increasing food production need not be done at the expense of the environment. The book will be useful to inform policymakers, students, and others concerned with conserving biodiversity while sustaining human populations.

Helen Parsons ■

What is PLECserv?

Our companion enterprise, PLECserv, can be found at <http://c3.unu.edu/plec/>. It reports recent articles or other publications of interest to people working among developing-country farmers, and concerned about development with conservation. Issues appear twice in each month. They provide means of obtaining these documents and corresponding with the authors. Since February 2003, seven issues have appeared, entitled:

8. Are GM crops the magic solution for African smallholder farmers?
9. Nature frustrates planners
10. Out of step with fashion: spectacular rice yields through management alone
11. Finding a common language: farmers' theories about the soil
12. A new slant on agriculture and conservation
13. Onward the Green Revolution
14. The power of biodiversity: conserving traditional rice varieties through blast management

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People Land Management and Ecosystem Conservation (PLEC), a UNU project, involves a collaborative effort between scientists and smallholder farmers from across the developing world to develop sustainable and participatory approaches to conservation, especially of biodiversity, based on farmers' technologies and knowledge within the agricultural systems of the farmers.

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