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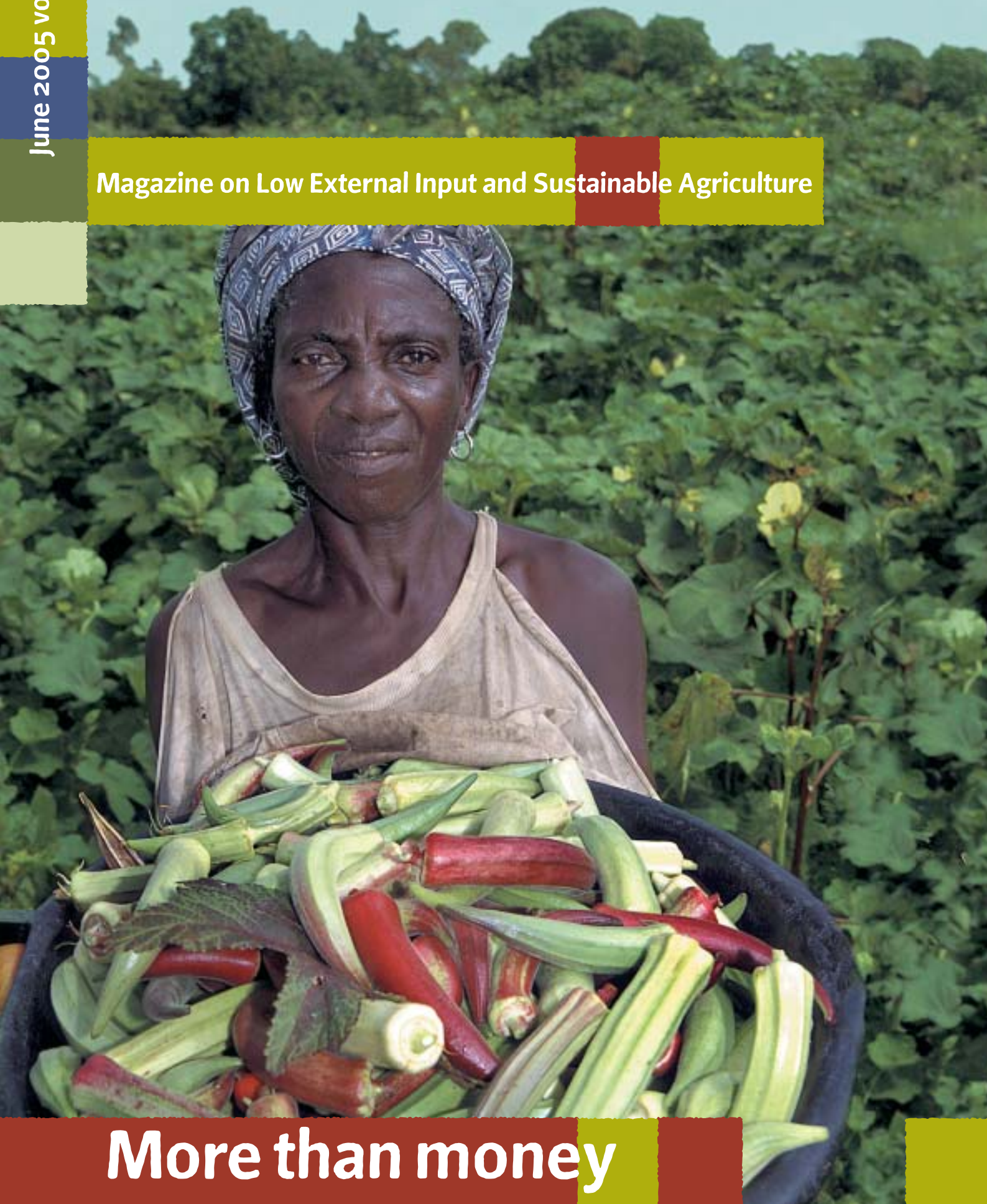
LEISA

Magazine on Low External Input and Sustainable Agriculture



More than money

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LEISA
Magazine on Low External Input and Sustainable Agriculture
June 2005 Volume 21 No. 2

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Cover photo
A woman of Kabekel village with harvest of okra, Gambia. Photo: Sean Sprague, Panos Pictures.

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LEISA is about Low-External-Input and Sustainable Agriculture. It is about the technical and social options open to farmers who seek to improve productivity and income in an ecologically sound way. LEISA is about the optimal use of local resources and natural processes and, if necessary, the safe and efficient use of external inputs. It is about the empowerment of male and female farmers and the communities who seek to build their future on the basis of their own knowledge, skills, values, culture and institutions. LEISA is also about participatory methodologies to strengthen the capacity of farmers and other actors to improve agriculture and adapt it to changing needs and conditions. LEISA seeks to combine indigenous and scientific knowledge, and to influence policy formulation in creating an environment conducive for its further development. LEISA is a concept, an approach and a political message.

ILEIA is the Centre for Information on Low External Input and Sustainable Agriculture. ILEIA seeks to promote the adoption of LEISA through the LEISA magazines and other publications. It also maintains a specialized information database and an informative and interactive website on LEISA (**http://www.leisa.info**). The website provides access to many other sources of information on the development of sustainable agriculture.

26 Bringing farmers together

Joshua Zake, Charles Walaga and Andre de Jager

Through Farmer Field Schools on integrated nutrient management, farmers in Uganda have managed to increase their capacity to analyze their farming systems and to apply practices that ensure good soil management. But the experience created a wider impact as well; it catalyzed the formation of community-based organizations. These organizations have led to the development of stronger and more cooperative relationships within the community, and the financial contributions made by the members have made it possible to avoid expensive credits. Through the organization, it has also become possible to establish relationships with other organizations to the benefit of the whole farmer community.

12 More than profit: Horta e Arte

Tracy Perkins

Horta e Arte is the largest organic vegetable seller and distributor in Brazil. What makes it special is that it works with small-scale farmers. Over the years, *Horta e Arte* has provided farmers with technical assistance on organic farming. It has also provided the commercial and administrative infrastructure necessary for effective marketing and sales. Organic vegetables produced by small-scale farmers are now sold in supermarkets in the major cities of Brazil, and the farmers are reaping the financial and ecological benefits.

DEAR READERS

ILEIA and the *LEISA Magazine* are at present supported by the Dutch and the Swedish governments through their development programmes. We are happy to let you know that the Swedish Sida has renewed their commitment to ILEIA for another three-year period, 2005-2007. This means that we will be able to continue to publish and provide you with the *LEISA Magazine* and that we will be able to continue supporting our five partner organizations in their efforts to publish LEISA experiences in their respective languages and regions. In addition, we are continuing with efforts to make all LEISA magazines available on the website **http://www.leisa.info**.

ILEIA and two of its partner organizations, AME Foundation in India and Asociación ETC Andes in Peru, are at present collaborating on two initiatives that aim to assist local organizations and projects to document, analyze and publish the results of their work and their experiences. The initiative in Latin America can be followed online at **http://www.leisa-al.org.pe** under Documentación (in Spanish only). We will continue to work on these initiatives and will return to this subject in 2006 with an issue of the LEISA magazine on the documentation theme.

The Editors

Correction

In the article "Building silos to introduce healthier cook stoves" by Ian Cherrett in the previous issue ("Energy on the farm" 21.1 March 2005), the conclusion on page 27, should read: "*What at first sight seem like simple problems with simple solutions are not always so. Being* ***demand****-driven and understanding people's livelihood strategies is fundamental to the success of any project...*" We apologize for any inconvenience caused by this mistake.

More than money

Through the development of agriculture, man has managed to utilize natural resources and processes to produce more direct benefits for humans. In this process, there has been a close adaptation between humans and their environment. Different societies, cultures and agricultural systems have developed over the millennia, influencing the available natural resources and shaping the surrounding landscape. In some cases, these systems have been more or less sustainable. In other cases, they have ultimately degraded the environment and undermined the culture they supported. In all cases, however, agriculture and its practices has been inseparable from the cultural, social and economic performance of the respective society.

Today much of society is far removed from agriculture and it is easy to forget that food production still forms a major link between us and nature, and that we still depend on this link. Over the past 50 years or so, the development of industrialized agriculture has tried to de-link agriculture from natural processes and from rural communities, and to turn it into an industrial process like any other. One effect of this development has been a change in the way agriculture is valued: Instead of being seen as the foundation of culture and the basis for rural livelihoods, it is now perceived as an industry whose primary purpose is to produce cheap food and cash income. In addition, the value of agriculture is measured in short-term financial returns, in line with modern economic practices.

There is no doubt that the industrialization of agriculture has managed to increase production dramatically. However, it also has many costs, although these are not quantified by our present economic system and therefore remain hidden. Conventionally, the value of agricultural production is assessed only in terms of direct financial profit. Other important aspects – like the impact of agricultural practices on social and cultural relationships, on long-term environmental sustainability, and on human and animal health and well being – are not considered. As a result, we are given an incorrect impression of the real costs and benefits. This is increasingly recognized and some attempts to quantify some of these "hidden costs" are being made (see Box). This work helps to expose the limitations of conventional benefit/cost analyses and underlines the importance of using a more holistic and integrated method of valuing agricultural systems.

Agriculture has a fundamental role to play in supporting and shaping our present-day societies. It has far greater value to humans than the market price for the final produce: Agriculture could potentially form the basis for strong rural communities and their economic activities, provide healthy food and maintain ecosystem services such as clean air and water, recycling of nutrients, and the maintenance of biodiversity and attractive landscapes. In this issue of *LEISA Magazine* we have tried to bring together examples of how people have been able to create a richer and more sustainable livelihood through wise use of their natural resources and the available opportunities. Strengthening their communities has often proven to be an essential part of this process.

Managing natural resources

Traditional agricultural systems based on the locally available natural resources and building on traditional knowledge can highlight the cultural, social, economic and environmental values of sustainable agriculture. Boerma (p. 36) describes an initiative to preserve some of the most interesting agricultural heritage systems. However, traditional agricultural systems are often no longer viable when the conditions under which they were developed change too radically. For example, high population pressure often leads to shorter rotation periods in slash-and-burn agriculture, causing rapid soil depletion and rampant deforestation. By understanding the ecology of soil and plant interaction under these specific conditions, it has been possible to find ways to convert slash-and-burn agriculture into permanent farming systems which build the soil, suppress weed growth and create the right conditions for growing crops while at the same time protecting the environment (Elkan, p. 18). Another example of successful cropping that builds on ecological processes is the System of Rice Intensification (SRI), which gives higher yields with lower volumes of seeds and water

External costs of agricultural production in the USA

It is increasingly recognized that industrial agriculture has severe negative consequences for the environment, human health and rural communities. Soil loss and erosion reduce crop yields and block waterways; runoff from agricultural chemicals contaminates groundwater and pollutes aquatic ecosystems; and pesticides damage human health and biodiversity. In addition, these practices contribute to undermining the future productive potential of agricultural land. All these negative impacts have costs, many of which only become obvious in the longer term. These costs are borne by the individuals and communities affected and are not included in the price we pay for the produce. They can however be quantified indirectly, through a process of valuation. In this process, values (in dollars) are estimated for each specific side effect. Based on earlier valuation studies, the following figures were arrived at for the USA.

Table 1. Selected annual external costs of US agricultural production in 2002

Resource affected	Cost categories	Costs (in million US$)
Water	Costs of water treatment for microbial pathogens, nitrate, pesticides	419
Soil	Costs of waterborne erosion	2 243 – 13 395
Air	Costs related to greenhouse gas emissions	451
Wildlife and ecosystem biodiversity	Costs of the loss of beneficial insects due to pesticides, kills of fish and bird due to manure and pesticides	1 145 – 1 174
Human health	Costs related to foodborne pathogens Costs related to pesticides	416 – 442 1009
	TOTALS	5 683 – 16 890

The negative impacts of industrial agriculture in the USA are estimated at between US$5.7 - 16.9 billion annually, or between US$29 - 96 for each hectare of cropland cultivated. This is considered a conservative estimate. A further US$3.7 billion is spent annually to regulate and offset the damage caused by the present system. These calculations do not include direct subsidies and other financial support given to farmers. Many in the United States pride themselves on the "cheap" food produced. However, these calculations demonstrate that the real cost of food production is much higher than the market price would lead consumers to believe.

Adapted from: Tegtmeier E.M, Duffy M.D. 2004. External costs of agricultural production in the United States. International Journal of Agricultural Sustainability 2 (1): 1-20. 2004: http://www.leopold.iastate.edu/pubs/staff/files/externalcosts_IJAS2004.pdf

than conventional paddy cultivation. An account of experiences with SRI in Nepal is given by Uprety (p. 30).

Abject poverty can force people to use natural resources in an unsustainable way, thereby degrading the environment and further undermining their livelihoods. By tackling the root causes of debt and poverty, this negative spiral can be reversed and farmers can find new ways to secure their livelihoods and regenerate the environment (Hooper, p. 21).

There are many examples of individual farmers who have managed to build production systems that make optimum use of locally available resources. The Oray family in the Philippines spent many years converting a monoculture sugarcane farm into a diversified crop and animal farm, with practices like on-farm selection and breeding, crop rotation and integrated soil and pest management. In spite of the difficult climate, they have managed to obtain food security with almost no use of external inputs (Garcia, p. 6).

One of the most important local resources is genetic diversity. Breeds and varieties that are well adapted to local conditions provide more reliable yields and fit farmers' and local consumers' preferences for taste and cooking qualities. However, they are increasingly being replaced by a few commercial varieties that give high yields but also require high inputs of fertilizers and pesticides. This development threatens the existence of local varieties and efforts are being made to maintain genetic diversity by collecting and storing local varieties in community seed banks (SEARICE, p. 23). Local varieties are also important when communities are trying to recover from emergency conditions. A successful effort to make local, rather than imported, seed available to drought-stricken farmers in Mali is described by Schröder on page 22. In Cambodia, efforts are being made to recover knowledge about the local agrobiodiversity, as most of it has been lost as a result of the long civil war (Meijerink, p. 24).

Strengthening human capacity and social structures

While safeguarding traditional knowledge and cultural heritage is important, knowledge is a dynamic concept. Farmers constantly learn from experience and acquire new information from colleagues and through the media and training courses. The combination of traditional and newly acquired knowledge is necessary for the viability of a farm in a changing environment. Rodolfo Oray (p. 6) was able to transform and diversify his farm based on his family's experience in combination with newly acquired knowledge as a result of continuous interaction with colleagues and scientists. In Zambia, traditional methods of improving soil fertility were discontinued because of the state's promotion and subsidizing of synthetic fertilizers. Interestingly, farmers resumed this traditional practice when subsidies were lifted, an indication of the value of this traditional knowledge (Siame, p. 29).

Scientific knowledge has contributed to the understanding of the problems facing slash-and-burn farmers, and formed the basis for developing an alley cropping system that can meet their needs (Elkan, p. 18). The System of Rice Intensification on the other hand, is based on practical knowledge and experimentation and the scientific basis of the system is still not fully understood (Uprety, p. 30).

Building sustainable agricultural systems also depends on the presence of strong social structures, which allow for an improved management of individual or shared local resources, mutual learning, improved information exchange, and in some cases collective action. By taking part in Farmer Field Schools on integrated nutrient management, farmers in Uganda increased their capacity to analyze and understand their farming systems. This experience led not only to improved cropping practices, but also strengthened the social relations within the community and led to the establishing of community-based organizations (Zake, p. 26).

Financial benefits

Most agricultural produce is sold or traded. In most cases, farmers only get a small share of the price the consumers pay and this share is steadily decreasing. Market competition is fierce and local produce is often unable to compete with cheap imports. However, there is a growing appreciation worldwide for agricultural products that have been produced in an environmentally friendly way, or traded in a socially responsible way – and consumers are often prepared to pay extra for these products. Moers (p. 20) describes the work of a Honduran network of farmers associations, which buys produce from farmers at fair prices and distributes it through a wide network of local community shops. Farmers are also trained to increase the value of their products through processing, while at the same time linking different local agro-production chains and thereby strengthening the local economy. In Vietnam, many farmers have reduced their use of pesticides and sell cooperatively to outlets such as supermarkets and canteens that are willing to pay for their "safe" vegetables (van Wijk, p. 28).

A major opportunity for farmers is the growing organic market. Jeff Klinge, a US farmer, explains that organic farming has made it possible for him to keep on farming and he shows that his profits are higher than those of a comparable, conventional farm (Sayre, p. 16). In addition, farming organically has stimulated his interest in farming and has led to increasing interaction between the members of the community. In Brazil, with the help of a commercial company, small-scale organic vegetable growers are able to sell organic vegetables to supermarkets in the country (Perkins, p. 12). Organic coffee growers in Mexico and Tanzania supply international markets (Juárez, p. 10; Wietheger, p. 14). The experience of the small-scale coffee producers of Chiapas in Mexico is particularly interesting, as they have managed to set up a chain of coffee shops where they market and sell their own coffee at a higher retail price.

The experiences in Brazil, Mexico and Tanzania show that accessing organic markets may be profitable, but it is not without problems. Production volumes for individual farmers may be insufficient to provide a substantial income (Wietheger, p. 14) and organic certification is expensive. It is possible to overcome these problems through organization of small-scale farmers and alternative certification processes, but experience show that strong institutional support, in terms of initial funding, training, market information and access, is usually required.

Conclusion

Agriculture is important not only for those who live directly of the land, but for all of us. For the production of food and many other services we are dependent on the environment and the way agriculture is practiced has major positive or negative effects on many different aspects of our lives. Modern agriculture is, in general, unsustainable and in the longer term, this will undermine our food supply. In large part, this is due to the fact that agriculture is often valued only in direct financial terms. However, as the examples in this issue show, there are alternatives. Many individuals as well as organizations are trying to develop forms of agriculture which build on natural processes, regenerate the environment and support local economies. They need to be actively supported by consumers as well as by favourable policies. ■

Photo: MASIPAG

The Oray family keeps different livestock for nutrient recycling, as a source of income and as a capital reserve in case of an emergency.

Transforming the land

Jelson T. Garcia and Lindsey Mulkins

Large sugarcane plantations dominate the agricultural landscape of the Philippine province of Negros Occidental. In the mid-1980s, this dependence on a single crop resulted in widespread famine when world prices fell and the sugar industry collapsed. Many seasonal sugar workers were left jobless and poverty was acute. There was much social unrest and many families were forced to abandon their farms and homes. Although the world sugar market stabilized in the late 1980s, there was a clear need for crop diversification. Farmers like Rodolfo "Dolpo" Oray from the village of Tapi, set about converting their farms from sugar monocultures to more sustainable cropping systems.

Below subsistence farming (1984-1985)

Dolpo has been farming for more than 25 years. Before moving to Tapi, he had owned land in another municipality, but political unrest had forced the family to leave. In 1984, they acquired 1.3 hectares of land in Tapi from Dolpo's grandfather. But years of sugarcane monoculture, regular post-harvest burning and chemical fertilization had left the soil in poor condition, and the slopes in particular were prone to erosion.

Convinced that monocropping would not satisfy his family's needs and given the low market price of sugar, Dolpo decided to convert most of his new land to rice paddy. He put a lot of effort into levelling these rain-fed areas to ensure proper water management. He had to rent a costly water buffalo to complete the levelling work and he was not able to plant his rice on time because he had to wait untill the buffalo's owner had finished his own land preparation before he could start to work. Late planting made Dolpo's crop vulnerable to rice bug infestation. He realized he needed to have his own water buffalo and decided to start working in a nearby sugar plantation to save money to buy one.

The family relied on rice for most of its income. In order to add value to the crop, Dolpo decided to avoid middlemen and to market milled rice directly to his neighbours. The family also planted maize and some vegetables for home consumption, and started keeping a few livestock – a sow, a few piglets and chickens.

Self-sufficiency (1986-1987)

In 1986, Dolpo and his family took over 2.2 hectares of land that had formerly belonged to his grandfather but which a local landlord had absorbed into his sugar plantation. Dolpo spent a lot of time levelling and terracing the slopes. He devoted 0.5 hectares to rice cultivation, but planted most of his new land with maize. This crop involved significant investments. Money was spent on pesticides, inorganic fertilizers and renting a tractor. Unfortunately, the maize crop failed due to bad weather conditions and the family never recovered their expenses.

After the drought caused by the *El Niño* weather condition, Dolpo selected, propagated and planted drought-resistant varieties of indigenous tree species on the steepest parts of the

farm that had formerly been under slash-and-burn cultivation. Expanding and diversifying his cropping system proved to be extremely labour intensive and costly. Dolpo stopped working as a cane cutter in order to spend more time on the farm. Together with his youngest brother, Roden, the family planted vegetables and root crops that would sell well on the market.

From the money earned from the sale of pigs, rice and maize, Dolpo bought a water buffalo calf and in 1987, the animal was ready to start working. This reduced the cost of land preparation and meant rice could be planted on time.

As Dolpo began extending his cropping areas, he and his family drew up a plan for the continued development of the farm, including the planting of additional trees. Cultivation methods for rice, maize, banana and root crops were improved, and beans and peanuts were grown in rotation to improve soil fertility. At the same time Dolpo started to learn more about alternatives to expensive, conventional monocropping by attending regional seminars in soil and water conservation, erosion control and nursery management. The family was moving towards food self-sufficiency!

Generating surplus (1988-1990)

Dolpo became an active leader in the newly formed PATDA (*Pagnanawon Agricultural Technology Development Association*), a farmers' organization that supported farmers technically and financially. He and other PATDA members were given on-the-job coaching by an agronomist and a local NGO supplied them with revolving capital. PATDA set up its own nursery for vegetables, forest and fruit trees. Commercial trees, mostly mahogany, were planted on the extensive hilly part of the farm and served as a communal agroforest. Watering of the communal tree farm was possible through *dagyao*, a cooperative labour system.

A quarter of a hectare was planted with squash, but due to the low market price much of this harvest was fed to the pigs. Meanwhile the production of peanuts – which are easy to store – was expanded and Dolpo used the profits to buy an old but larger house adjacent to the family's homestead.

Dolpo procured nine traditional rice varieties from local sources and planted them on the upland part of his farm in continuous rotation, but he still maintained the conventional IR-64 variety, which required chemical inputs, in the lowland area. Although diversification laid the foundations for more productive land use, the transition towards fully organic farming could not happen immediately.

By combining his family's local experience and the knowledge he gained from training, Dolpo started to make organic fertilizer from water buffalo dung, decomposed weeds and rice stalks. He also continued rearing livestock. He introduced crop rotations using leguminous crops such as peanut, soybean, mung bean and cowpea. Thanks to the farm's crop diversity its vegetable garden harboured few pests and diseases and did not require pesticides.

Since the benefits of the arduous diversification process did not become apparent immediately, it was difficult in the beginning to convince everyone in the family to put their trust in the new farming system. Dolpo's wife Raquel, for example, questioned the value of contouring, levelling and planting the upland parts of the farm. Her main concern was to secure a quick and predictable harvest for her family. She was concerned that diversification efforts were putting their farm at a disadvantage.

In time, however, trust in the diversification process began to grow as the efforts made by all the members of the family began to pay off. Planting pineapples along the contour lines slowed erosion on the steepest slopes of the farm. Check dams and soil traps were dug on another part of the farm and trees were planted along the contour lines. These measures were very labour intensive and could be achieved only with outside help. Different species of trees and vegetables were planted throughout the farm. A small forest was established on the steepest part of the farm where cultivation was impossible. PATDA members worked together to help the family plant and water the seedlings.

Dolpo had a tough time balancing his farm chores with his increasing role in community affairs. His involvement in communal matters had grown substantially and in 1989 he co-founded a federation of producer organizations called BUGANA, and started providing free training in farm diversification. In return, he gained practical knowledge from the farmers he interacted with and collected different crop varieties. A training centre for BUGANA was established on the family's farm.

MASIPAG approach (1991-1995)

Through his institutional network Dolpo came in contact with MASIPAG, a farmer-led network of farmer organizations and local communities representing more than 30 000 farmers in the Philippines. MASIPAG promotes the sustainable use and management of biodiversity through people's control of genetic and biologic resources. It maintains a seed collection and encourages farmers to adopt the *Diversified and Integrated Farming System* (DIFS) approach. In 1991, BUGANA gained access to MASIPAG rice varieties, which grow well without the use of chemical fertilizers and pesticides. A total of 54 rice cultivars were selected for trials on Dolpo's farm. The trial farm helped the farmers observe and gather data on the performance of cultivars in terms of their adaptability to different soil types, pest resistance, productivity, taste, smell, and other considerations. After much effort, the Oray's had selected 15 rice-varieties for verification.

In 1995, the farm's entire rice area was planted with MASIPAG varieties. The Oray family rotated ten MASIPAG varieties, using at least three to four varieties every cropping season and storing another six for subsequent rotation. Tall and short cultivars were alternated to improve biomass and organic matter content of the soil, to facilitate nutrient cycling and the build-up of soil fertility. The family also discovered that many MASIPAG selections were well adapted to upland conditions and tended to have normal growth even with modest irrigation.

In 1996, these MASIPAG varieties produced 4800 kg/ha – a significant improvement when compared to the gains from high-yielding varieties (2520 kg/ha), see Table 2 on page 8. No inorganic fertilizers and pesticides were used. The money saved was invested in hiring labour for ploughing, harrowing and transplanting (Table 1, p. 8). Production continued at a high level except during periods of drought or rat infestation, and production costs have stayed low.

Improving on the MASIPAG model (1996-1997)

As Dolpo became familiar with the MASIPAG model, he started experimenting to solve specific problems on his farm. He invested some of his income in rearranging the layout of the family's farm to improve the integration of farm components and promote better nutrient cycling. One important change, relocating the

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>> house to the centre of the farm, symbolizes the essential role of the home in planning and monitoring the farm. He also developed pest management strategies. He planted taro near the rice field and this helped control the damage caused by snails that, in fact, prefer taro to rice. Rice hull thrown on the paddies stuck to the snail's skin, killing the pest slowly. To keep rats away from the rice seedlings, a plot of their preferred food, cassava, was planted along the paddy. Additionally, a large net was built to catch destructive pests. Planting tolerant varieties and using organic fertilizer further reduced pest pressure. Ducks were also raised on the farm to eliminate pests.

Table 1. Expenses related to rice cultivation (in Philippine Pesos)

Input	IRRI var.	MASIPAG varieties			
	1992	1994	1995	1996	1998
1st plowing - 6 days	300	300	400	420	470
Harrowing - 1 day	50	50	70	80	-
Brushing of paddies	200	200	300	320	-
2nd plowing - 3 days	300	420	420	-	-
2nd harrowing - 3 days	150	150	280	-	-
Rent for hand tractor	-	-	-	1200	1300
Pulling of seedlings	400	240	480	500	500
Transplanting	600	-	350	500	-
Fertilizers (5 bags)	1000	-	-	-	-
Pesticides (1 liter)	300	-	-	-	-
Carabao manure	-	200	-	-	-
Weeding	200	-	-	-	-
Brushing of paddies	150	50	-	-	-
Seeds	1200	-	-	-	-
Labour - 12 days	-	-	-	-	
Food	300	300	300	300	300
Total	**5150**	**1910**	**2600**	**3320**	**2570**

Table 2. Income from rice cultivation (in Philippine Pesos)

1992	63[1] cavans x P250.00[2]	=	15 750
	Less expenses[3]	–	5 150
	Earnings		10 600
1994	60[1] cavans x P280.00[2]	=	16 800
	Less expenses[3]	–	1 910
	Earnings		14 890
1995	93[1] cavans x P315.00[2]	=	29 295
	Less expenses[3]	–	2 600
	Earnings		25 575
1996	120[1] cavans x P315.00[2]	=	37 800
	Less expenses[3]	–	3 320
	Earnings		34 480
1998	108[1] cavans x P350.00[2]	=	37 800
	Less expenses[3]	–	2 570
	Earnings		35 230

[1] Gross production less costs of threshing and harvesting

[2] Buying price per cavan

[3] For details refer to Table 1

(1 cavan = 40 kg).

(100 Philippine Pesos = US$1.84, June 2005)

The soil was improved continuously by adding organic matter. Rice straw was never burned but was always allowed to decompose. In addition neem tree, *Gliricidia sepium* and *macabuhay* leaves, water buffalo manure, soap and water were combined to form a homemade organic foliar fertilizer which was applied to infertile parts of the rice paddies and to the vegetable crops. The water buffaloes' shed was moved and placed next to a major canal so that during the rainy season decomposed dung and urine would flow naturally along the canals into the rainfed rice paddies. Dolpo also realized the importance of a fishpond for additional nutrients and in 1995 he constructed one next to his duck pen.

Planting distance and rice seedling transplantation were also modified on the Oray farm. The planting distance was increased and the number of seedlings per hill decreased from four to five seedlings per hill to only one or two. As a result there were more productive tillers per hill and higher numbers of grains per pinnacle.

The rice paddies were drained and flooded whenever possible. Intermittent flooding allows the root systems to breath and encourages growth. Dolpo noticed that intermittent flooding helped create a harsher microclimate, making plants less susceptible to pest infestations.

In addition, rice seedlings were transplanted after 25 to 30 days instead of the usual 15 to 20 days, when they were sturdy enough to withstand snail attacks. The more developed seedlings also have a head start over the weeds which Dolpo controlled mainly by flooding.

Even the most infertile or vacant lots of Dolpo's farm were incorporated into his development plan. These areas were kept under long fallow to enable beneficial insects to multiply in his farm. The previously slash-and-burned area of the farm was planted with different commercial and fruit trees, root crops and some legumes. Weeded grasses were placed on top of large rocks to decompose while others were used as mulch to maintain soil moisture.

Maintaining these developments was not always easy. Dolpo realized he needed to spend more time in his fields so he could observe the dynamics of his farm's ecology. However, it was a struggle to manage his own farm duties and conduct training while also maintaining the communal farm and training centre.

Risk management

Despite its diversity, the farm was seriously hit by drought caused by *El Niño* in 1997. Many trees died including jackfruits, citrus, rambutan, *marang*, *lanzones*, apple guavas, *bilariba*, star apple, coffee, and others. Hardest hit were those trees growing on the moderate slopes with shallow soil. In 1998, there was too much water and the *La Niña* typhoon destroyed his fishpond. That year the family also suffered medical problems and the huge medical bills forced them to sell their two working water buffaloes, three pigs and some goats. Dolpo was tempted to sell their land and to move to an irrigated lowland farm in Hinoba-an. However, his family preferred to stay put.

The family is now focusing their efforts on making the farm more resistant to periods of drought, for example by planting the most drought-resistant species and locating the fruit trees in areas with deep soil, where they have a greater chance of surviving severe drought. Vegetable cultivation has also been modified to include more drought-tolerant species and the time of planting has been altered to optimize crop survival.

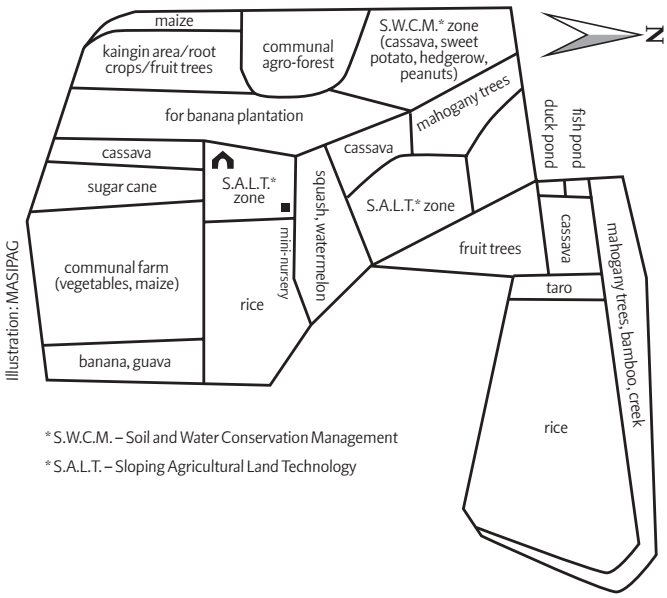

Illustration: MASIPAG

Present layout of Oray's farm.

The plant nursery is carefully maintained because it serves as a secure source of planting materials. Even during the long seven-month drought in November 2004, the family made sure it had seedlings of vegetables, fruit trees and forest trees ready. Velvet beans were multiplied and will be used as a green manure crop, cover crop, and fodder.

The family has again bought two water buffaloes and two cows and they continue to rear goats, a sow, several chickens and a pair of turkeys.

The farm today

The Oray family maintains the farm lay-out they designed in 1998 and work continuously to improve crop rotation and nutrient flow and recycling. After ten years of continuously practicing organic diversified integrated farming, they notice a definite improvement in soil fertility.

Lessons

Several key factors enabled Dolpo to succeed in his efforts to convert his farm and develop it into an integrated and diversified system. His own experience combined with the knowledge he acquired from "formal training" were essential in helping him decide how best to manage his farm. He also was able to access land, the basic element in the development of food security.

The mere planting of various crops is not enough for farm diversification. It is also important to develop nutrient cycling on the farm, and alternative pest management. MASIPAG's *Diversified Integrated Farming System* strategy was helpful in guiding this process. DIFS is a family affair where every member has his or her own stake in the process. It brings back the family's control over the entire production process. Though time consuming and labour intensive, DIFS is inexpensive and can work without government support.

Dolpo's experience also highlights the importance of a social network as a support system. Dolpo stays actively involved in social activities, giving advice and training but at the same time receiving valuable support. The visits by scientists and farmers for exchanging ideas reinforced his farm conversion efforts. Dolpo admits that it is hard to get rid of the "modern" agricultural system that has been embraced in such a short span of time: 'The hardest thing to contour is the mindset'. Everything should start with a right attitude. Fortunately, the Oray's farm provides a living representation of such an attitude.

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This article is based on a case study carried out by the authors on behalf of MASIPAG: "Transforming the upland through a diversified and integrated farming system: the case of Rodolfo Oray. October 2001".

The Oray family analyzing their farm layout.

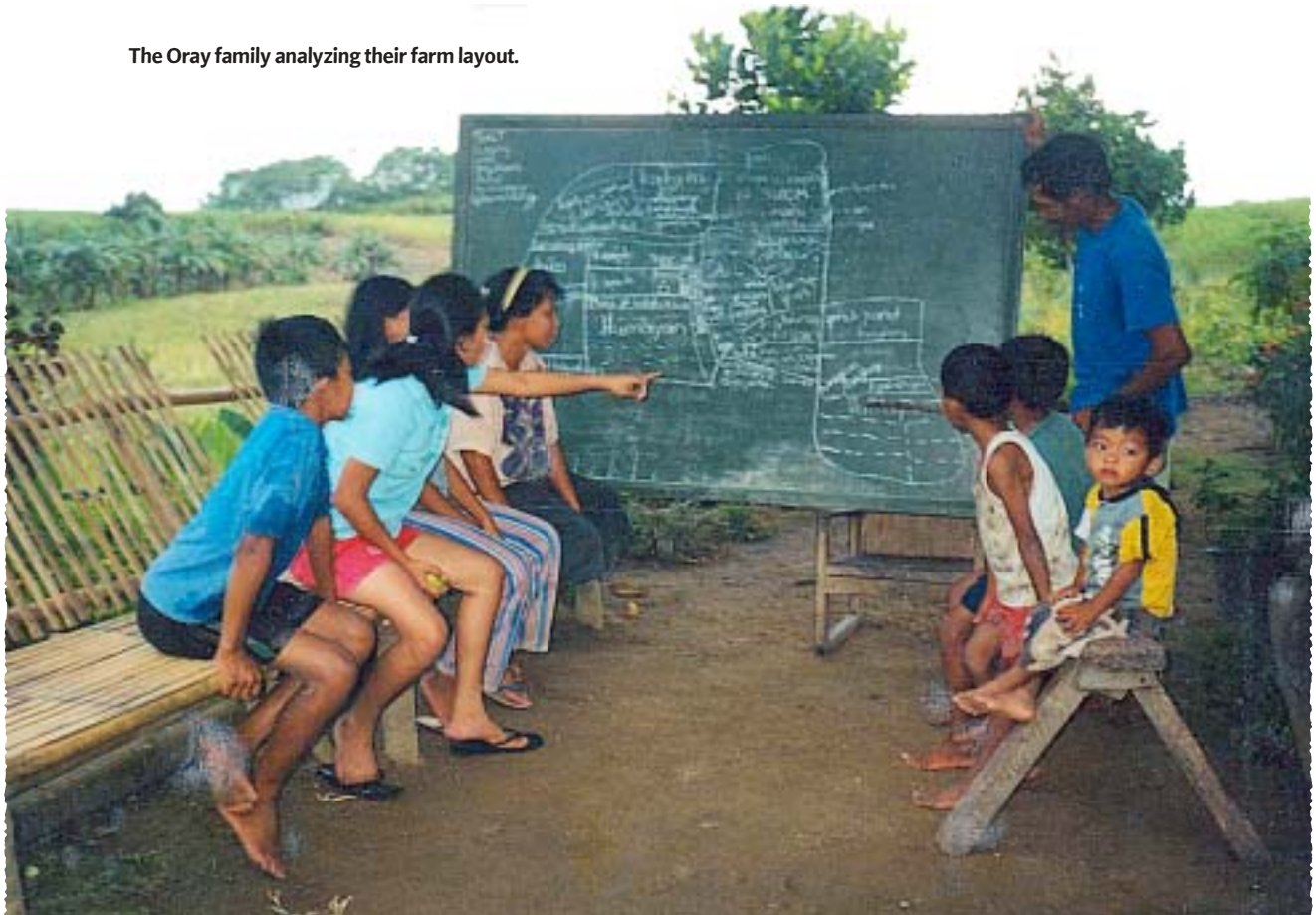

Photo: MASIPAG

Café La Selva: on the road of life

José Juárez Varela

Chiapas in Southern Mexico is the country's poorest state, with a long history of upheaval and ongoing social conflict. For generations, the indigenous people of this area have struggled to gain access to land and to raise their living standards. Most farmers are small-scale producers with less than two hectares of land and as coffee is the main cash crop, communities are extremely vulnerable to fluctuations in growing conditions and world market prices.

In 1979, the coffee-farming Tojolabales and Tzeltales communities of Chiapas decided to join forces to strengthen their communities and to improve their living conditions. Together, they founded the *Unión de Ejidos de la Selva*, which now has around 1600 members, all small-scale coffee producers.

The Union started as a reaction to the many problems its members were facing, especially regarding the access to, and secure rights to farmland. They also wanted to ensure that roads were constructed in their area and sought alternative ways to sell their products, in particular coffee, to avoid selling through middlemen.

During the first ten years of its existence, the Union mainly functioned as a social pressure group. As such, it achieved several important results: It managed to gain access to land for its members and to have this land officially registered in the names of the individual members. It also mobilized enough strength to negotiate successfully with the government, helping to ensure that roads were constructed and other important needs of the communities were met. In spite of these successes, the Union experienced serious limitations and was not able to substantively address the core issues that influenced the lives of the member families and their communities. Issues like production methods, resource management and linkages with the market, were unfamiliar topics and at first there were no ideas on how to approach them.

In the late 1980s, the Union started to become more proactive and tried to address the welfare of the member communities. The first efforts concentrated on taking over responsibility for services that the government neglected or carried out inefficiently, such as health care and schools. However, in the longer term it was impossible for the Union to maintain these services. It did not have the necessary technical capacity, knowledge or resources. But the main reason for the Union's initial failure was that it lacked a clear vision of what it wanted to achieve – it was merely copying the development strategies of the government. To make the transition from a social pressure group into an organization that can take its destiny into its own hands, it needed a strategy and an organizational structure which was developed and supported by the member communities on the basis of their own felt needs, interests and objectives.

Developing new strategies and a new organizational structure was a major challenge for the Union. During this process the organization was faced with a serious question: Is it really possible to survive, and to develop the farmer community with the local resources available?

In spite of this uncertainty, the members came to the conclusion that with the close attachment to the land they farm and with the strength of their traditional culture, a positive attitude was the only option, despite the difficulties. The question had to be rephrased: What can we do to be able to continue to live in our rural area with pride and dignity, and how can we make the best use of the local resources available to us?

The members of the Union started to exchange ideas with other communities and tried to understand their experiences. They also renewed their interest in how their parents had lived, and eventually began to develop concrete proposals. The Union had found a clear direction: It needed to design and promote its own development models based on independent management by the community. These models had to build on the principles of self-sufficiency, cultural traditions and identity, development of local products and direct marketing links with consumers. The models had to be socially accepted, guarantee access to food and generate resources to invest in improvement of the living conditions.

Organic coffee

A first important step for achieving the Union's objectives was to get directly involved in the coffee crop, since it is the main cash crop in Chiapas and the communities depend on it for their survival. The coffee had been conventionally grown in accordance with the advice of the public extension system, but after the removal of government subsidies on inputs such as pesticides and fertilizers in the late 1980s, farmers had discontinued their use. As a result, coffee yields had fallen from around 800 kg/ha to as low as 184 kg/ha and producers were forced to search for alternatives.

The Union decided that it did not make sense to try to continue the development model used in "conventional" or "modern" coffee growing, based on the high use of external inputs, high yielding varieties and little or no shade. The members of the Union grow coffee on a very small scale, and are therefore interested not only in the profitability in terms of the ratio of costs to benefits, but also in factors such as a stable income and a balanced use of their labour throughout the year. These producers needed production methods in which little was bought from outside, the coffee was sold at the best possible price, and where it was possible to grow food crops for home consumption at the same time.

Agronomists from the Union began to train farmers in organic techniques to increase the quantity and quality of coffee production. In return, the farmers who had been trained were responsible for passing the knowledge on to other members of their group. Farmers started managing coffee trees with locally available resources instead of external inputs, focusing on shadow management, renewal of trees and the use of compost. Over time, this system evolved into organic agriculture and average yields gradually increased to the present level of just under 700 kg/ha. By adopting organic and agroecological management, the Union managed to improve their livelihood without depending on external inputs and without destroying their own resources.

Developing the coffee business

Coffee grown with environmentally friendly methods is of good quality and therefore highly marketable. The Union also found that it could contact and link up directly with the market. They started exporting coffee at the end of the 1980s and by the start of the 1990s, they were able to obtain organic certification from the *Organic Crop Improvement Association* (OCIA) and Naturland. In this process, the Union discovered that there were entire networks of consumers who wanted to use their purchasing power to support the work of the Union.

As part of the effort to further develop the coffee business, the Union started promoting the concept of coffee shops with its own brand name: Café La Selva. The coffee shops made it possible to market the coffee at more competitive prices and to generate more benefits for the members. The Union opened eleven shops in Mexico, the United States and Europe. In this process it found a strategic partner in *Vínculo y Desarrollo*, an organization created to foster business partnerships with social organizations based on trust, joint responsibility and professionalism. The outcome of this unique entrepreneurial partnership was the establishment of five more coffee shops. *Vínculo y Desarrollo* helps to market the coffee by promoting the brand and the cultural values associated with the indigenous communities that grow the coffee. Through *Vínculo y Desarrollo* approximately 50 small private investors have bought shares in the Union's Coffee shops, in this way establishing new mechanisms to strengthen social enterprise in Mexico.

The Union maintains and builds the relationship with the communities. Organic coffee is bought at a fair price and processed in a plant owned by the Union. This gives the Union control over the quality and value of the coffee. Two thirds of the coffee is exported as green, unroasted coffee to countries like the Netherlands, Denmark, Germany, England, United States and Canada. The remaining one third is roasted and sold through the chain of coffee shops with the help of *Vínculo y Desarrollo*. The guaranteed sale to this coffee chain gives growers a much-needed regular income. A small percentage of the profits go to the village associations of the member communities to reinvest in coffee production and community development activities such as health, education and infrastructure projects. For example, the Union has set up a women's training centre that runs reading classes and human rights training, and where women learn how to bake biscuits that are sold with the coffee.

At present there are 18 Café La Selva outlets in Mexico (Mexico City), Europe and the USA. Each of the coffee shops is financially self-sufficient and maintains high sales levels. It is planned to increase the number of coffee shops to 40 by 2008.

Unión de Ejidos de la Selva, together with *Vínculo y Desarrollo* have developed a unique marketing channel for the direct sale of organic coffee, allowing for the commercialization of a volume of approximately 3 tons per month, at the best possible price. Farmers now deal with the Union directly, so no intermediaries are needed and incomes are consequently higher. This has been of great value to the members of the Union, allowing them to receive direct payment for their coffee at good prices, during a time when the coffee prices have been at their lowest.

Conclusions

The experience of the Union has shown that it is necessary to develop and promote community-owned models that are socially accepted, that guarantee food availability, and that generate resources to invest in the improvement of the standard of living of the families and the community. Ecological agriculture is only possible if people shape it, if it offers tangible benefits, and if the benefits are equally shared.

The point of departure and the backbone of such a strategy is, without a doubt, the social organization and the linking of the community to social cooperation networks. The organic and agroecological management of the resources has enabled the further development of the communities without dependence on the external inputs which will ultimately destroy the resource base. A development like this is possible if communities manage to link up with the market, and are supported by consumers that are conscious of the repercussions of their purchasing power.

Despite their successes, coffee producers in Chiapas still face many challenges: creating employment for their young people; maintaining a direct and solid relationship with their consumers; improving the productivity in an ecological way; improving the quality of social services; and education of the members of the organization.

■

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Photo: Author

Dropping off produce at Horta e Arte for packaging.

More than profit: Horta e Arte

Tracy Perkins

Standing amid the cover crops of vetch and oats at the highest part of João Dias's farm, it is possible to see most of rural Verava. In this part of south-eastern Brazil, small agricultural valleys lie below lush tree-covered hillsides. Close to São Paulo, Verava is one of the few places with a covering of native forest. What is even more unusual is that almost all its farms have been certified organic. In fact, the entire watershed is largely free from agricultural chemicals.

João Dias, an innovative local farmer, was the first in Verava to go organic. About eight years ago, he volunteered his hilly property for use as a demonstration area for cover crops and other organic techniques in a project funded by the Kellogg Foundation. His success motivated others to follow his example. Today many changes have taken place in the way natural resources are being managed in the area, and agriculture has re-emerged as a viable livelihood. An important agent in this transformation has been *Horta e Arte*.

Unique business

Towards the end of the 1990s, a number of different organizations started to encourage farmers in Verava to convert to organic agriculture. *Horta e Arte* is now the main organization in the area and works with a core group of some 135 farmers who work about 900 hectares of land. Many of the farmers live in Verava close to *Horta e Arte*'s central warehouse and offices some two hours from São Paulo.

Horta e Arte is a for-profit business. It supports small-scale farmers in organic production, buys their produce, packages it and then re-sells it to the supermarkets. Over the years, *Horta e Arte* has provided farmers with the technical assistance they need to introduce organic agricultural practices, as well as the commercial and administrative infrastructures necessary for effective marketing and sales. *Horta e Arte* staff have also been responsible for ensuring that supplies to shops and supermarkets are well coordinated and that quantity, quality and variety is sufficient to meet consumer demand. *Horta e Arte* agrees to sell as much of a farmer's produce as possible. What remains, the farmers have to sell themselves. However, a good deal of work goes into predicting consumer demand and directing the farmers they work with to plant accordingly. Crops are divided up amongst farmers in order to spread risk and ensure that farmers produce the amount of vegetables required. *Horta e Arte* also conducts awareness raising events about organic foods, targeting the consumers who shop at the supermarkets that sell their organic products. They also train shop assistants on the management and care of organic fruits and vegetables to ensure maximum quality and freshness.

Horta e Arte agronomists are the link between production and sales. In addition to organizing periodic group training sessions on particular management subjects, they also visit each farmer twice a month. During these visits they help farmers to work with organic technologies and guide them in record keeping – essential for the certification process. Independent inspectors need reliable and careful records of crops, soil preparation techniques, pest-management practices and the dates of planting and harvest in order to justify organic certification. In the case of *Horta e Arte*, the agronomists' detailed records provide certifiers with the information they need to justify certification. This means that certifiers need less time to inspect a farm and makes it possible to keep the cost of certification low.

After harvesting, farmers send their produce on designated farmers' trucks to the *Horta e Arte* warehouse, where it is packaged and labelled with the *Horta e Arte* brand name, the stamp of the certifying organization – the *Instituto Biodinâmico* (IBD) – and a small code indicating the name of the producers. The IBD stamp is important because it indicates that the product meets international standards.

What makes *Horta e Arte* unique is that, although it is the largest organic vegetable seller in Brazil, it works with small-scale farmers. It ships the farmers' produce to supermarkets hundreds of miles away in Rio de Janeiro and Brasilia. The *Horte e Arte* system enables vegetables produced by small-scale farmers to get on to the shelves of stores like the French-owned *Carrefour,* a global multinational and one of the world's three top food retailers.

In Brazil, three quarters of all food sales now come from supermarkets. But supermarkets do not just show up and sell their products according to local marketing structures and culture. They bring their own structures and business culture with them. They buy in bulk and not from individual farmers; they standardize the size, weight, and appearance of the produce they purchase; they have accounting systems that may delay payment to the seller for up to several months after the product has been delivered, and they negotiate prices and terms of business by phone, fax and e-mail. The whole interaction takes place in the "technified" world of the literate.

The leaders at *Horta e Arte* are taking an approach of social inclusion, trying to include small-scale farmers in the profits being made in an increasingly concentrated and unequal world. Their strategies have had considerable impact on the lives of many of the small-scale farmers associated with the organization. Profits from organic farming have enabled the farmers to build new houses, send their children to school, lease more land and invest in equipment and tools. This is particularly important at a time when large, corporate supermarket chains are quickly replacing corner stores and open-air markets as primary food vendors all over the world. It is in this world that *Horta e Arte* has negotiated a place for small-scale producers.

Organic conversion builds on existing relationships

Verava's conversion to organic production built upon pre-existing relationships in the area. For example, most farmers get their irrigation water from streams and natural springs. However, this water must be free of toxic contaminants in order for the farming that uses it to be eligible for organic certification. When one farmer wanted to become organic, he or she had to talk about the problems of polluted water with upstream farmers who might be using chemicals. Through these informal conversations people began to share information about the new production methods they were starting to use and to discuss how one person's actions affected their neighbours' livelihoods. In this way, the certification process built upon the ecological web of interrelatedness by strengthening the social fabric of the community as well.

The higher profits of organic farming compared to conventional farming played a key role in motivating farmers to convert to organic production. But many were pleased with the new system for other reasons. Some had suffered skin rashes and other health problems from the use of pesticides in the past, and were relieved to find a way out of dependence on agricultural chemicals. Others were able to come back to farming after long periods of unemployment and menial labour, necessitated by produce prices so low it didn't make sense to keep farming. Since conversion, some farmers have sought out training in the management of small-scale businesses or taken on additional roles as environmental leaders in the community. The whole area has seen a revival. Farmers have found a way to re-vitalize the livelihood they grew up with in a way that is profitable, safe and sustainable. ■

Alternative organic certification in Brazil

Experience in the USA and more recently in Brazil has shown that legal definitions of the term "organic" do not always correspond with the way the word was originally used in the alternative agriculture community. When the US government adopted one of the many definitions of organic agriculture, it fractured the organic community.

Brazilians are now in the process of creating their own federal organic standards. The big producers, particularly those who export their goods, tend to support the full adoption of codes that match international standards. This path would regulate by law a process already largely defined by the demands of multinational food vendors and importing nations such as the USA, Japan, and the European Union. Because they want to engage in the global marketplace, Brazilians cannot simply create their own unique legislation on organic agriculture. Even so, a considerable section of the organic community in Brazil argues that adopting standard international procedures and criteria will limit local responses. They demand legislation that includes creative approaches to certification more appropriate to the Brazilian context. These approaches include the possibility of "participatory certification", which has already been successfully pioneered by farmers in southern Brazil, and "group certification". Both make it easier for farmers to enter the organic market by reducing or eliminating the heavy price of paying third-party inspectors to come look at their land. Such procedures are particularly relevant in countries like Brazil that have large populations of small-scale farmers who cannot afford the high cost of third-party certification.

In participatory certification, farmers form groups to certify their own properties on a collective and free basis. In group certification, an independent certifier works with a group of farmers. During the first year, the certifier inspects each property separately. If all of the farms in the group are in accordance with the certifier's standards, the group is awarded organic status. In subsequent inspections, the certifier inspects one of the group's farms at random. If that farm is found to be in violation of the standards, everyone in the group loses their organic status. This causes the group to internally monitor and support its members to ensure continuing use of the organic label to maintain higher prices for their food products.

At the moment, the proposals being made for Brazilian federal organic standards have made allowances for a degree of participatory certification. These alternative certification models will probably only be used locally or regionally where consumers know and have confidence in farmers. Independent, one-on-one certification remains the marketing structure most recognizable internationally, and is therefore the most successful at placing alternative agricultural products in a conventional marketing system.

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Organic coffee: a better life?

Lena Wietheger

For nearly 150 years coffee has been the main source of income for small-scale farmers in Kagera, Tanzania. Although Kagera is a major coffee producing area, farmers have had problems making a living from coffee production, due to low volumes and low and fluctuating market prices. The low remuneration has discouraged young people from becoming involved in this "old man's crop". In 1999, with the aim of improving the livelihoods of small-scale farmers in the region, the *Export Promotion of Organic Products from Africa* (EPOPA) programme began assisting two local rural cooperative societies to produce organic coffee for export. This article, based on a recent study by the author, shows how EPOPA's activities have affected the members of Kachwezi Primary Society, one of the cooperative societies.

Coffee in Kagera

Kagera, the North Western region of Tanzania, is quite isolated from the rest of Tanzania and one of the poorest areas of the country. Roads are badly maintained, there is a lack of electricity and a poor water infrastructure. Malaria and HIV/Aids cause major health problems. Illiteracy levels are high and local incomes are well below national average. Farmers' main source of income comes from producing coffee for export but people also sell plantains and alcohol brewed from bananas and engage in brick making, carpentry, tailoring, and other off-farm activities.

Photo: Author

Mrs Balemwa spreads her coffee cherries to dry in the sun.

Kagera is the most important coffee producing area of the country in terms of volume. Most of the coffee grown there is Robusta, which is considered to be indigenous to the area. Farmers usually have at least a couple of coffee trees on their farmland and these are intercropped with plantains, maize, beans, cassava or yams. Production in the area is "organic by default" because farmers are too poor to buy fertilizers or pesticides and because they have had negative past experiences with the use of agrochemicals on bananas. Farms are small – between 0.5 - 2 hectares – and this limits the number of coffee trees that can be planted. Within the rural cooperative Kachwezi Primary Society, 60 percent of the households own less than 400 coffee trees. Production figures from 1997 to 2001 show that over 50 percent of the households produce between one and five 60-kg bags of unhulled coffee annually, while 20 - 30 percent of the households produce between five to ten bags annually.

The coffee is marketed through the Primary Society and the Kagera Cooperative Union (KCU). Farmers who are members of the Primary Society pay a fee to become member of the Union and in addition, around two percent is deducted from the price they receive for each kilo of coffee. Member farmers bring their coffee to the Union-owned coffee store and from there it is exported to importers or processors in Europe. The price of the Kachwezi coffee is set at the coffee auction in Moshi.

EPOPA

The EPOPA programme was established by the *Swedish International Development Cooperation Agency* (Sida). Its aim is to improve rural livelihoods by developing the export of organic products from Africa. At present about 30 000 farmers in Uganda, Tanzania and Zambia participate in the programme and produce dried fruit, pineapple, cashew nuts, honey, essential oils, ginger, safflower and coffee for export.

The programme is implemented by the Dutch organic consultancy Agro Eco and the Swedish organic consultancy Grolink. Organic certification is carried out by international bodies. The consultants identify suitable products and growing areas, farmer groups and exporters. They prepare feasibility studies and assist exporters in building up a system to contract farmers and provide extension services for organic agriculture. Processes for certification are built and market contracts established to reach importers in Europe, the US and Japan.

EPOPA's activities in Kagera

Two primary societies in Kagera, Ibwera and Kachwezi, were selected to take part in the programme. Some 3500 farmers are involved in these societies and they were selected because they are part of the Kagera Cooperative Union which expressed interest in working with EPOPA. The KCU covers about 126 primary societies and was already exporting some coffee under Fair Trade certification. Organic certification was seen as a way to provide not only financial benefits, but social and environmental ones as well. During the first three years of the project, certification costs were covered by the programme, but thereafter they were taken over by the Union.

A project supervisor was recruited and trained by the Agricultural Research Station in Maruku and Agro Eco. Three field officers were recruited to provide village-level support to farmers in Kachwezi. Forty male and female farmers were selected and received farmer-to-farmer training. To be selected, farmers had to be registered as an EPOPA farmer, have an affinity with training, be communicative and interested and willing to train other farmers. Trained farmers had to sign a contract with the project committing themselves to acting as contact persons and to passing on the training they had received to 20 other farmers. Farmers were trained during village-level assemblies.

The conversion to organic coffee can be characterized as from "organic by default" to "certified organic". The objective of the extension programme was to improve agronomic practices as well as post-harvest activities. Farmers were advised to prune, stump or uproot old and unproductive coffee trees in order to rejuvenate the plantations and increase the quality and quantity of coffee beans. For the same reason, they were advised to handpick instead of stripping the berries, sun-drying them on a mat rather than on the ground, and finally carefully hull, hand sort and screen them.

Photo: Author

Local coffee processing in Kachwezi: sorting and screening.

Changes in quality, yield and income

The training programme has had positive results. Although a number of farmers were reluctant to prune or uproot their coffee trees because they feared lower yields, many planted new trees and carried out other rejuvenation techniques. These interventions have led to increased yields. Changed post-harvest practices have resulted in cleaner coffee beans and these are now sold to the local coffee store instead of the unhulled coffee that farmers had sold previously. Improved processing results in a better coffee quality, and this has paid off: During the IFOAM organic coffee conference in Uganda in October 2004, Kagera Robusta coffee was awarded the prize for the best organic Robusta coffee.

During the current coffee season of 2004/05, organic farmers received a 50 percent higher price than their conventional neighbours. In addition, organic farmers are paid immediately when they deliver their coffee to the store. In spite of these clear advantages, many farmers are unwilling or unable to process their berries as prescribed because of the amount of work involved. These farmers take part or all of their coffee to non-organic stores or sell it to private buyers.

The money farmers earn from coffee sales is mainly used for purchasing sugar, salt, fish or kerosene. It is also used to pay school fees and improving houses. The extra income through the premium also leads to a trickle-down effect. Most farmers can now afford to buy fish, bricks and other products from their fellow villagers and even hire some labour.

Environmental effects

It is generally expected that organic farming leads to environmental improvements. In Kachwezi, where farming practices and the level and type of inputs did not change much with the "official" conversion to organic, it is not surprising that no major changes were found. The farmers themselves do not think of their environment as having changed, but this could still happen. Recently established demonstration plots are beginning to show the beneficial effects of planting shade trees and cover crops. Hulling coffee locally also helps keeping nutrients on the farm because coffee husks, often in combination with animal manure or banana peels, are frequently used as fertilizer.

Social changes

In general, the EPOPA programme has brought Kachwezi farmers into the spotlight and farmers appreciate this. The farmers, especially those who participated in the farmer-to-farmer training, have improved their knowledge and skills. EPOPA is also concerned with the young farmers in the community. Four young members of the Primary Society have been given special training and this "youth group" can be hired by farmers to help them manage their coffee trees.

Because the primary societies as a whole, rather than individual farmers are contracted under the organic programme, farmers have to cooperate closely with each other. The quality of the harvest as a whole depends on the quality of each individual farmers' contribution. Farmers take responsibility for each others' work and there is a high level of social control.

Improving the programme

The programme has had a number of positive results, but several aspects deserve closer attention and where possible, improvement. In the first place it is striking that farmers are lacking, or have limited knowledge of the (organic) coffee chain, the role of the different actors involved and the route the coffee follows once it has left the store. Being better informed would help the farmers understand the context of and the reasons behind the programme and its activities and would allow them to visualize their own position and role. Secondly, the extension methodology needs improvement. Currently farmers are recipients of "orders from above", and the extension methods used do not always take into account their realities. Participatory approaches are needed to actively involve farmers so that they are the ones who shape the implementation of the programme.

Outlook

Village and agricultural life has taken a new turn due to the programme. But benefits have not come equally to all farmers: Those with more land and many coffee trees have benefited more from the premium prices than farmers with few trees. Unfortunately, the majority of the farmers in Kachwezi fall into the last category. Even if their yield potential could be further increased by rejuvenating existing coffee trees, planting more of them and by applying the best management practices, there is a limit to coffee production per family unit because of the land scarcity. Farmers in Kachwezi can benefit from three market price premiums – Fair trade, Organic and Best Quality – but in spite of this, many farmers cannot obtain sufficient income because they do not have enough trees.

Photo: Author

EPOPA recommends the hulling of the coffee for better quality.

The future and scale of coffee production in Kachwezi also depends on factors outside the control of the villagers and the programme. One of the most critical variables is the organic coffee market itself. One way to protect farmers from price fluctuations on the world market is to stimulate the production of instant coffee at the local TANICA factory, largely owned by KCU. Diversification of crops for cash income might be another option. A few farmers have started to plant vanilla or timber trees with this in mind and these efforts should be supported. ■

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More information about EPOPA: http://www.epopa.info

Holding on to the family farm

Laura Sayre

As a fifth-generation Northeast Iowa farmer in the USA, Jeff Klinge has been producing mixed grains, forages, and livestock all his life. His father and grandfather were farmers, his brothers and nephews are farmers. He got interested in organic farming when he realized that the increased returns from organic produce would enable him to keep farming his 150 hectares fulltime and still make a decent living, something which was not possible with conventional farming.

Klinge's first season as a certified organic farmer was in 1997. Since then he has realized that farming organically brings not just independence from chemical companies and the ability to stay small without taking an off-farm job, but also the ability to farm the way he thinks is right, without relying heavily on federal subsidies. 'When he first got into organic farming, it was mostly about saving the family farm,' says Jeff's wife, Deb Tidwell, '…but since then it's become more of a philosophical thing. I don't think he could go back.' Today both of them value the independence, the intellectual challenge, and the sense of community that come with organic farming.

The Klinge family.

Managing the transition

Transitioning to organic farming was relatively easy as he had always grown small grains like barley and oats, as well as forages, and was used to working with longer and more diverse crop rotations. He was happy to give up chemicals because he regarded them as an unnecessary input expense and also because of environmental and health concerns. 'I worked for a chemical company while I was in college,' he explains. 'I got burned by herbicides once, and it left me with a bad feeling.'

Having experimented with a number of different rotations, Klinge is currently following a three-crop, five-year cycle of soybeans/maize/soybeans/barley/alfalfa. He plans to reverse the maize and soybeans (maize/soybeans/maize/barley/alfalfa) because he thinks growing more maize and fewer soybeans will help control erosion. He prefers barley among small grains because it ripens earlier, it is easier to market and it produces a better-quality straw. He also uses rye and oats as cover crops, for weed control and to protect and build his soil.

Klinge usually saves his own barley seed and is thinking about trying to do so for his soybeans as well, but says he will need to do some research on varieties first. For weed management in his organic fields, Klinge relies on crop rotations, cover crops, a flex-tine harrow and a rotary hoe. 'My weed pressures are different than they were before transitioning,' he notes. Whereas his fields used to sprout hemp dogbane (*Apocynum cannabinum*) and wirestem muhly (*Muhlenbergia frondosa*), now the troublemakers are mainly foxtail (*Setaria* spp.) and pigweed (*Amaranthus* spp.).

Klinge says he finds weed management more challenging for soybeans than for maize. He also stresses that 'every year is different'. Last year, 2004, was a wet year, making cultivation difficult and narrowing the advantages of organic farmers over their conventional neighbours. It's widely recognized out here that 'organic does better in dry years, conventional does better in wet years', as Klinge puts it.

As for pests, Klinge says he believes his crop rotations and other whole-farm organic management strategies do a lot to minimize damage. In 2003, for instance, most Iowa farmers had aphids in their soybeans, but his were not so bad, suggesting that his fields harboured higher populations of beneficial, predatory insects to keep the aphids in balance. He has also developed a few specific practices for specific pests, like leaving an uncut strip to serve as a trap crop for leafhoppers when he swaths his alfalfa. For a 20 to 30 hectare field, Klinge leaves a strip about 8 metres wide by 30 to 50 metres long. 'One year the leafhoppers were really bad, and they ate through that and then re-established in the field, but generally it seems to work', he says.

Doing the numbers

Klinge can speak with authority about the profitability of organic over conventional farming on his farm, because he has the data to prove it. Beginning in 1997, his first certified year, Klinge and Tidwell have tracked expenses and returns on their organic fields versus their conventional fields, while the farm was still in transition, and then on their organic fields versus Jeff's brother's conventional fields on a neighbouring farm. In 1997, for instance, Klinge made a net profit on his organic maize of US$511 per hectare, versus US$72 per hectare on his conventional maize. In 2003, his net profit on organic maize was US$364 per hectare versus US$34 per hectare on his brother's conventional maize. For soybeans in 2003, the figures were US$240 net profit per hectare for organic versus a net loss of US$132 per hectare for conventional. In the same year, Klinge made US$495 per hectare on his organic alfalfa and US$51 per hectare on his organic barley, neither of which is grown on his brother's conventional farm.

In general, Klinge's records confirm what most organic grain farmers understand: Machinery and labour costs are higher in

organic farming, but these costs are more than balanced out by the costs of herbicides and fertilizers in conventional farming. Yields are somewhat lower on the organic side, but this is more than offset by higher sale prices. Other expenses – land, crop insurance and seed – are usually about equal.

Getting political

The missing factor in such a cost comparison, of course, is federal farm payments, which compensate conventional farmers for their lack of market profitability, courtesy of the U.S. taxpayer. Although there is nothing stopping organic farmers from collecting these payments on their maize and soybeans, organic farmers sacrifice much of their eligibility for subsidies by adding non-payment crops like forages and small grains to their rotations. In other words, the current structure of U.S. farm programmes forces farmers to choose between farming for good stewardship and farming for maximum federal income.

Federal subsidies play an enormous role in shaping agricultural practice in the United States. Commodity payments constitute the major subsidy, and include price support programmes for key commodities such as maize, soybeans, cotton, rice, and milk. Originally intended to give farmers a measure of protection from commodity price fluctuations, USA farm subsidies totalled more than US$16 billion in 2003, with the top 20 percent of recipients receiving 84 percent of payments.

Faced with the social and environmental effects of such a system throughout his neighbourhood, Klinge has gotten politicized. He has travelled to Washington D.C. for meetings and briefings and stays abreast of agricultural legislation and appropriations as they move through Congress. Klinge advocates the creation of a rule requiring farmers to have a minimum of a three-year, three-crop rotation to be eligible for any federal agricultural programme, as well as modest incentive payments for farmers transitioning to organic. 'I've taken some young farmers around here to meetings about organic farming, but it's hard. It's hard to talk a banker into supporting what they would need to do to transition.'

'The soils around here are some of the best in the region', Klinge says, '... but they're also fragile, subject to erosion and poorly suited to continuous cropping of maize and soybeans'. The growing popularity of soybeans over the past few decades – encouraged by commodity payment programs – has been particularly damaging, he notes. 'When I finished high school in 1968, if you didn't know where the soybean fields were around here you couldn't find them,' he says. 'Now they're everywhere.' Although soybeans are not as demanding of nutrients as maize, they leave behind little residual plant material to protect the soil after harvest.

Subsidies hurt rural communities in indirect ways as well, Klinge adds: 'Farmers produce all this grain below the cost of production, then we ship it overseas, which drives farmers in those countries out of business, so they move to the cities in search of jobs, and because of that jobs here get moved overseas.'

Market issues

Klinge actively encourages other farmers to consider transitioning to organic and does not waste time worrying about the potential narrowing of price premiums. 'I think there will always be a premium. Demand is picking up too, which should balance increased supply. More and more, we're selling to the U.S. market instead of overseas, which I'm glad to see, because I think those markets will be more stable.'

In addition to his organic crops, Klinge raises non-organic feeder cattle in a small feedlot for Laura's Lean Beef, a "natural beef" company based in Kentucky. He finishes about 500 head a year, feeding them on purchased non-GMO conventional maize and his own organic alfalfa. 'They're not organic, but I'm getting a good price', he explains. 'If I was purist... I might insist on doing organic cattle, but I think you've also got to watch the bottom line.' The cattle also supply the manure that Klinge composts and spreads on his fields, mostly in the autumn on ground going into maize the following year.

One of the couple's goals for the future is to help expand local markets for the food they grow. 'This is a very poor county, and it's tough to have to choose between marketing locally or figuring out transportation to markets farther away', says Klinge. 'Locally-produced meat should be locally available', Tidwell adds. 'We should have community-based facilities where local people can have good careers and serve local markets.'

With that goal in mind, Klinge and Tidwell joined with other community members to work on a feasibility study for a regional, state-of-the-art organic meat processing facility. So far, those plans have yet to come to fruition, but the project is representative of the practical idealism of the organic community in this area. Tidwell emphasizes that the cooperation and idea-sharing among organic farmers and activists is a major factor in their overall quality of life. 'If you're in organics there's a community of people that get together regularly to talk about what's happening, what's working, and that's exciting.'

Klinge agrees, adding that he finds organic farming more challenging and more rewarding than conventional farming. 'There's always problem solving in farming, but there's more in organic farming. I think we've seen more wildlife and less erosion since transitioning', Klinge concludes, looking out over his fields at the end of harvest. 'It's a nice feeling to put in cover crops, to get the soil covered up for the winter.' Fifteen years ago he might not have thought about that, he says; but being an organic farmer 'changes how the farm looks, and how you look at the farm.'

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An alternative to slash-and-burn

Daniel Elkan

Mike Hands, a British tropical ecologist, was constantly seeing forests destroyed by slash-and-burn farming. Farmers had cut down and burnt the forest to grow crops to feed their families. After only a year or two the land had become infertile, forcing the farmers to move on. Why did the soil become infertile so quickly? Wasn't there another method of cultivation that would keep the soil fertile, so that the farmers could stay on the same land? As a keen organic gardener he was convinced there had to be a simple, non-industrial solution to the problem.

Hands wanted to hear about the kind of problems farmers faced. The best place to go, he decided, was where fertility was failing fastest: the acid soils of the Costa Rican rainforest. 'I asked the farmers about cropping sequence and yields', says Hands. 'They were tremendously patient. They showed me the different textures of fertile and infertile soil; how, as soon as they cleared the land for cropping, weeds and grass would invade. One of them had spent 160 days a year hacking at grass with his machete just to be able to get a crop to eat.'

From everything the farmers had said, it seemed likely that the problem was nutrient levels in the soil. Hands suspected phosphorus might be depleted and contrary to what previous research had claimed, he discovered that the soils cleared by slash-and-burn quickly lost masses of phosphorus. Only a fraction of the phosphorus available in the ashes after burning was used by the crops; the rest of it was being wasted – washed out of the soil by rain.

He knew that alley-cropping allowed nutrients to be retrieved from the soil and recycled by the crops. But Hands also knew that for alley-cropping to work on rainforest soils, it would not only have to stop phosphorus and other elements getting leached out of the soil, it would also have to fix nitrogen, control weed growth, and be practical for some of the world's poorest farmers.

Conventionally, alley-cropping systems use fast-mulching, small-leaf trees, but in these Latin American tropical conditions the trees would need to be adaptable to very shallow acid soil. Furthermore, falling leaves would have to provide a thick blanket of mulch to protect the soil from the heat of the sun allowing the roots to rise to the surface and into the mulch itself. In effect, the alley-cropping would have to mimic conditions found in virgin tropical forests. With the right type of tree, the system could be made to simulate what rainforests do naturally: stop weed growth by a combination of shading and smothering and recycle nutrients through slow leaf decomposition.

Hand's plan was to plant seedlings of fast-growing, thick-leaved trees in long rows a few metres apart. When the trees had grown, the leaf canopy formed would shade the alleys between the rows of trees. Light-hungry weeds and grasses would not survive these conditions. Once the ground was weed-free, the trees could be pruned and the leaves spread on the ground to form a decomposing leaf layer several centimetres thick. This leaf layer would smother any further weed growth and stop the sun from drying out the ground. Finally, holes could be made in the leaf layer, and crops planted in the holes. The crops would get nutrients from the decaying leaves, while excess nutrients would be absorbed by the trees' roots and returned to the ground when the trees were pruned.

With the help of a botanist friend, he selected an Amazonian tree, *Inga edulis*, which had the required qualities: thick, tough leaves, fast growth, and the ability to fix nitrogen in the soil. But most importantly it was intensely mycorrhizal, symbiotically using fungi to absorb phosphorus into its roots. He set up a range of study plots. Areas of slash-and-burn stood side by side with virgin forest and alley-cropping test plots sown with thousands of *Inga* seeds. He was sure that instead of the crops feeding on the most recent deposit of leaves, they would feed on older decaying leaves.

It was to be another four years before Hands would have the evidence that *Inga* alley-cropping really worked. The maize crop was in its second year, weeds were being stopped, and the *Inga* was recycling nutrients, including phosphorus. More importantly though, Hands was able to find out just how crucial phosphorus was to the plants. After three years of cropping, the soil on the slash-and-burn patch was infertile with plants struggling to survive. Hands divided the area into smaller plots, and to each plot he had added a different soil nutrient. Three weeks later he returned to find that no plot had changed – except the one to which he had added phosphorus. On that plot, every kind of plant had suddenly flourished.

Explaining phosphorus loss

In his efforts to understand the reason for phosphorus loss, Hands analyzed hundreds of soil samples taken at every stage in the slash-and-burn process. His results were surprising: the level of phosphorus in the soil only a few weeks after the forest had been burnt was exactly the same as the level before burning had taken place. Natural rainforest contains little readily available phosphorus, but the ash left over after from burning contains a massive amount. It had been thought that the ash provided the crops with the phosphorus they needed. However, Hands' data showed that the phosphorus contained in the ash was being washed out before the crops could absorb it.

This created a puzzle. The farmers were getting decent crop yields for the first year or two, so the extra phosphorus needed must be coming from somewhere. Hands realized what was happening. Ash on the soil has the same effect as liming a compost heap: It speeds up the process by which soil microbes decompose organic matter such as dead leaves and branches. It was this process which was releasing the phosphorus.

The data showed that this process only lasted two years after which there was a dramatic drop in phosphorus levels and inevitable crop failure. Again, Hands had an explanation. Phosphorus is released as a result of microbes in the soil feeding on fallen organic matter. When the farmers clear and burn the forest, this supply of organic matter is cut off. For two years, the microbes feed on the organic matter that has already fallen but when this runs out they die and phosphorus is no longer released. With no phosphorus-retrieving trees to take it up, any remaining phosphorus is washed out of the soil by the rains.

This explained the success Hands had had with the Inga alley-cropping system: The continuous supply of leaves provided by the Inga trees feed the microbes while the trees themselves absorbed and recycled the phosphorus before it could be leached out of the soil.

Despite the success of his experiment, Hands wanted a further series of trials. He knew that farmers had been let down too many times by "magic solutions". However, the Honduran NGO *Pico Bonito* encouraged him to go ahead without further experimentation.

He started to look for Honduran slash-and-burn farmers who would be interested in trying out the alley-cropping system. Victor Coronado from Atlantida in northern Honduras was one of the first. Coronado's initial response was sceptical. 'The first thing I thought was it doesn't make sense to plant maize or beans under the trees', he recalls. However, as he was only asked to give up a small part of his land, not large enough to risk his livelihood, he agreed to give it a try.

Six years on, Coronado stands surrounded by proof that the technique works. Where there used to be grass and weeds, tall, leafy maize plants now rise above his head. In a field nearby, alley-cropped pepper plants are flourishing, while in Coronado's kitchen there is plenty of the vanilla that he grew last year. More than 30 farmers have adopted the scheme, each with a plot of *Inga* alley-cropping located only metres from their homes. With the crops so close by, they are easily guarded from wild animals, and the rest of the family members are able to help in the field. 'When I go out it does not worry me now, because my wife, my daughter or a neighbour can look after the crops,' says Coronado. In fact, Coronado's wife took over the running of the pepper crop completely. After harvesting and grinding, she mixed it with cumin and sold it in the town square. 'She has made US$900 for the family', Coronado beams. 'All of us can produce crops that are 100 percent organic. If more farmers get involved, between us we could even sell some of the crops abroad.'

Once it is set up, say the farmers, *Inga* alley-cropping requires less time and effort than slash-and-burn. From the second year of harvesting onwards, they save at least 40 days work a year, because they do not have to deal with weeds. In addition, the trees produce a good supply of fuelwood which otherwise takes many days to gather from the forest.

Converting to the system costs the farmers almost nothing. For each hectare of alley-cropping, farmers need to plant 5000 *Inga* trees. Once these are grown and the system is up and running, farmers can replace the phosphorus the crops use up by adding rock phosphate to the soil. This organic supplement is cheap: An US$8 sack is enough to supply a hectare of land for a year. 'The low cost makes it sustainable', says Hands. 'Farmers need to invest their time in the beginning, but they don't get into debt.'

Although many farmers want to try the new system, only a few have been able to do so because there is a shortage of *Inga* seed. Although each tree produces about 2000 seeds, those used in alley-cropping are pruned before they produce fruit. Some trees need to be left unpruned so they can produce seed. In the beginning farmers pruned all their trees, a problem that Hands had not foreseen. 'I realize now we should have told the farmers to keep some trees aside for seed production,' Hands says. '…but at the time we just wanted them to be interested enough to try the system.'

Hands and *Pico Bonito* have recently set up seed orchards. Within a couple of years these will provide enough seed to meet the steadily growing demand. At the moment some 4000 farmers have seen *Inga* alley-cropping plots at demonstration farms in Honduras. The response from farmers has been overwhelming. They want seeds and technical assistance. Unfortunately until the seed orchards mature there is only a handful of seeds for distribution.

This is Reuben Mendoza; a member of the Pech Maya tribal community in Olancho, Honduras. Reuben is standing among mature maize plants between rows of recovering Inga trees. He states that it is many years since this site could produce any crop. The trees required over 2 years since planting as seedlings to "capture" the site from the invasive grass and other weed species that had dominated it. There are no weeds within the maize itself; their growth was smothered by the deep mulch. The soil had become much degraded following a slash-and-burn operation many years before. This plot produced a large maize crop; its second in consecutive years. The site is close to Reuben's house... a very important factor. Shifting agriculturalists will commonly walk for 2 - 3 hours daily to a temporarily-available swidden site; often high in hilly country. The ability to achieve food security close to the dwelling is of supreme importance in their lives. This factor also opens the possibility of producing cash crops close to where they can be nurtured, guarded and cropped. This in turn opens the farm economy to other members of his family.

With money provided by an individual donor, *Pico Bonito* has set up seed nurseries in the Olancho Province. 'We have 8000 seedlings there,' says the organization's Gerado Vasques. '…but we desperately need more money to expand. The eagerness of the indigenous people is encouraging. They want to try *Inga* alley-cropping not only on small plots but on bigger plots as well because they want more maize and beans.'

All across South and Central America, seed orchards are desperately needed, but so far there are no funds available to support their development. 'Even without seed orchards, *Inga* alley-cropping will eventually spread from neighbour to neighbour,' says Hands. '…but this would be a painfully slow process. If we just sit and wait, we will lose the chance to save what remains of the rainforests.'

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Supporting the local economy

Peter Moers

COMAL *(Alternative Community Marketing Network)* was established in 1997 as a result of discussions between small-scale producers who were worried about the lack of market access and the precarious state of food security in Honduras. It set out to improve the rural economy by training farmers to increase the value of their products through processing and by establishing a marketing programme under the slogan "Marketing at a fair price and weight: supporting the economy".

Some 42 farmers associations and NGOs participate in the COMAL network and its membership and target group are small rural producers and consumers. COMAL buys basic consumer goods from farmers at a fair price and distributes them through 400 community shops to some 16 000 consumer families. It operates a central buying unit, has several regional distribution centres and is a part of RELACC, the *Red Latinoamericana de Comercialización Comunitarial* (Latin American Network for Community Marketing), a wider network of community marketing organizations representing 623 grassroots and federations of organizations throughout Latin America.

Most conventional development organizations focus on production and ignore consumers. COMAL, however, recognizes that farmers are both producers and consumers and tries to include as many internally produced products as possible in the assortment it markets. Currently it is inventorizing the types of products that can be produced locally to meet consumer demand and strengthen the local agricultural economy.

Productive chains

COMAL has received investment funds from Strohalm, a Dutch organization committed to supporting local economies, to initiate new agro-industrial enterprises and expand existing ventures. Its aim is to make local production chains longer and replace imported items with locally produced goods. A sugar processing factory, for example, established locally at a time when the demand for sugar is increasing, could complete a missing link in the chain linking producers to consumers and strengthen the local economy.

COMAL's criteria for supporting investment proposals include:

- Evidence of consumer demand;
- Use of local inputs including labour;
- Integration into local economy and links with other local economic activities;
- Situated near COMAL shops to increase the chance that purchasing power returns to the COMAL network;
- Use of locally appropriate technology, locally built and maintained.

In its efforts to reduce the dependence on external inputs, COMAL tries to "plug leaks" in the local economy. Local economies are like buckets: If they are not filled with water – or in this case money – their productive potentials remain unused. However rural economies, like buckets, often leak allowing money to seep away in the form of interest on debts, imported goods and the investment of capital and skills outside the local economy. COMAL is concerned with finding ways that stimulate local development and plug such leaks.

Agro-industrial integration

Coffee is the second most important export product in Honduras and is very important to small-scale farmers. In response to intense international competition and unstable prices, COMAL activities have centred on diversification and the creation of new employment opportunities. In the Taulabé region in central Honduras, for example, coffee is mainly sold in raw form to commercial middlemen or "coyotes". Little value is added locally. In an attempt to stimulate agro-industrial development, COMAL is providing local producers with a loan, not only to help them increase production and improve quality but also to buy equipment and learn to process and sell the coffee themselves. Currently, a women's group is preparing to establish a small processing unit that will enable them to roast, mill and package coffee products which will be sold locally and through the wider COMAL network. Some 225 people including coffee farmers, employees of the processing enterprise and shop keepers are benefiting from this initiative.

Sugarcane is also widely cultivated by tens of thousands of small-scale Honduran farmers. The juice from the cane is generally dried into blocs and either sold to middlemen or directly to end consumers. COMAL realized that the sugar cane chain and its end product – brown sugar – could be developed for the benefit of the local economy. Brown sugar is an important input in the coffee roasting process. Sugar processing and coffee processing plants are located close together and there is a significant and constant demand for sugar. Small-scale coffee enterprises like those being set up by producers in Taulabé are potential outlets for local sugarcane and COMAL has decided to invest in strengthening this linkage.

Once the coffee beans have been extracted, the waste pulp is discarded and can cause major environmental and health problems if not disposed of correctly. In Aldea El Caracol, COMAL is helping the local community converting coffee pulp into organic fertilizer. This business venture has obvious ecological advantages and the availability of organic fertilizer is enabling some farmers to take the first steps to producing for the profitable niche market in organic coffee.

Linking ventures

Each of the enterprises described are part of larger production chains. COMAL's aim is to stimulate trade relations within and between production chains in order to improve the rural economy and stimulate the flow of basic consumer goods at a fair price for both producer and consumer. It acts as a catalyst identifying and funding opportunities for agro-industrialization, and ensuring that surplus products that cannot be consumed locally are marketed through its wide network of community shops. By adopting an integrated approach, COMAL aims to keep scarce money circulating through the local economy for as long as possible. For every time money goes to a local producer, some employment or income is created. ■

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Strohalm has extensive experience in the use of complementary currencies that encourage consumers to buy internal rather than external products. This plays an important role in the COMAL initiative. For more information on this and other Strohalm methods and projects see http://www.strohalm.org

Microcredit, poverty and the environment

Michael Hooper and Menka Parekh

Thailand's mountainous Khao Yai National Park has a history of poaching and unsustainable agricultural practices. Through a community-led microcredit initiative, however, local people are turning the situation around and showing how creative micro-finance can support both livelihoods and biodiversity.

Situated in northeastern Thailand, the park was established in 1962. It covers 2168 km^2 of forested land and harbours many species of animals and plants. As altitudes increase, evergreen forest gradually gives way to mixed deciduous forest. Secondary forests dominate the park's borders.

This part of Thailand is one of the poorest in the country. Low levels of income, limited land management skills and lack of medical care characterize communities in the region, especially those bordering the park. The agricultural potential is low and economic options are few. Sub Tai village typifies this situation. For many years, villagers depended on loans from an informal network of money-lenders who often charged more that 60 percent interest and happily took farmers' land and property if they could not pay back their loans. In this way many farmers were driven onto public lands in the neighbouring park. Struggling with debt, villagers increasingly resorted to poaching, illegal logging and land encroachment. The situation in the park worsened and soil erosion and flooding intensified.

Escaping a downward spiral

The local *Community-Based Integrated Rural Development* Centre (CBIRD Centre) realized that the problem of debt had to be dealt with if livelihoods and the park's biodiversity were to be protected. In 1985 – under the guidance of Thailand's *Population and Community Development Association* PDA and the *Wildlife Fund of Thailand* – CBIRD Centre helped the community establish an innovative credit cooperative open to all villagers: the Sub Tai *Environmental Protection Society* (EPS). The EPS's committee is democratically elected and efforts are made to ensure that half the committee members are women. Its goal is to promote sustainable income-generating activities and reduce illegal use of park resources.

The credit system is part of a wider programme of enterprise support, capacity building and sustainability training led by CBIRD Centre. Financial resources and support are provided by outside organizations which collaborate both with the PDA and the community. The Centre's activities are intended to improve livelihood sustainability and increase farmers' capacity to repay loans and help them remain solvent.

The microcredit system operates on quite simple principles: Villagers get loans for ecologically beneficial and income generating activities if they do not poach or log illegally. Annual interest rates range from 9 - 14 percent and are established in collaboration with villagers through the EPS. Criteria for selecting loan recipients include the viability of the proposed activity, repayment capacity, and market demand. EPS also establishes what actions will be taken if members fail to pay back loans or meet environmental criteria. Very few fail to repay, however, because members wish to avoid embarrassment.

Beneficiaries of the microcredit system focus on mixed cropping and on cultivating products with high market value but low environmental impact. An example of such a mixed cropping system is the CBIRD Centre-supported *Community Forestry Management Programme*, in which participants plant and harvest a combination of hardwood and fast-growing tree species on marginal lands. This allows them to obtain a consistent minimum income from the fast-growing species while the high-value, but slow-growing hardwood species are given time to mature. A more measured and sustainable long-term cultivation cycle also allows the land to restore itself. The microcredit initiative also supports a system of local mini-farms for cultivating high-return products with low impact on the fragile mountain environment. The most popular product is the oyster mushroom, the key ingredient in many Lao curries. Because mini-farms are not as physically demanding as other agricultural activities, many elderly, handicapped and HIV/AIDS affected members of the community can become involved and obtain an income.

These are excellent examples of how microcredit initiatives can be interwoven with wider efforts to improve incomes and sustainability by aligning environmentally friendly agricultural products with the actual demands of the marketplace.

Working for the future

Since the initiation of the EPS, Sub Tai community has escaped from debt, doubled its income as a group, and reduced illegal deforestation by 75 percent. Conditions have been created that facilitate long-term conservation of the park. The *Community Forestry Management Programme* is now being implemented in 134 other north-eastern villages supervised by the PDA. Sub Tai community members are now able to turn to mainstream private credit providers as their incomes and the financial well-being of the community have improved. CBIRD Centre is now focusing on entrepreneurship support and enterprise development activities, as local people make the transition from the small-scale loans offered by the EPS to the mainstream Thai banking sector. The Sub Tai experience shows how having confidence in the financial abilities and credit worthiness of local people can help transform a community from a state of economic dependence to one of financial independence and innovation.

In 2002, CBIRD Centre Sub Tai was one of 26 finalists for UNDP's Equator Prize 2002 – because of its work in reducing poverty through the conservation and sustainable use of biodiversity. As a finalist the Centre was awarded US$30 000 for capacity development by the Equator Initiative's partner, *The Nature Conservancy*. The award was used for training and to further engage youth in the work of the CBIRD Centre and to build sustainability education and activities into the community starting with the very young with the future of coming generations in mind.

A major challenge will be taking the successes the project has achieved in the late 1990s and deepening them over the coming years. Questions of scaling-up are critical and the CBIRD Centre will have to grapple with how to ensure that successes will persist.

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Organizing access to local seeds in a context of crisis

Joachim Schröder and Mathias Mogge

Natural disasters such as long spells of drought can cause crop failure, food shortages and shortage of seeds. In these situations, foreign seed is usually brought in as emergency aid, with little consideration for agro-ecological and socio-cultural factors. When a crisis hit the Dogon people of Mali a few years ago, however, local actors successfully identified, bought and redistributed locally-adapted seeds, a process that avoided farmers becoming dependent on external seed suppliers, enabled them to recover from the crisis and strengthened the sustainability of their agriculture.

Crisis

The Dogon are renowned for their rich culture and traditions. For centuries they have cultivated the rocky lands and plains around the plateau area on the border between Mali and Burkina Faso. Local agriculture is based on millet, a rainy season crop, and vegetables produced during the dry season on the remaining soil moisture. The Dogon have developed seed varieties that are well adapted to the thin soils and arid climate of the region and they depend heavily on these varieties for the success of their harvest.

In late 2002, after two consecutive years of drought, the state services in charge of agriculture were distributing cereals for free to overcome the severe food crisis on the Dogon Plateau. They observed that many farmers lacked seed and that millet stocks for home consumption had run out. Farmers had used up a lot of seed because they had to re-sow their fields due to poor germination caused by drought. As a result, the German NGO *Deutsche Welthungerhilfe* (German Agro Action), responsible for the food aid programme, decided to establish an additional programme that dealt specifically with seed aid.

Strategies

Before it launched a seed aid programme, German Agro Action decided to make an inventory of the agronomic and socio-cultural context of seed procurement and use amongst the Dogon. It found that farmers have a marked preference for local seeds. There are three different agro ecological zones in the Dogon region, each with its specific climate and soil. Over time, specific local varieties have been developed which are adapted to the conditions in each respective zone. The preservation of these varieties is of critical importance to the local population. Farmers were suspicious of seeds brought in from outside the area: 'When we heard that we would get seeds everybody was afraid that they would bring in seeds from other regions which will not yield here.'

German Agro Action also found, however, that cultural factors blocked the free flow of local seeds. Farmers were reluctant to acknowledge their lack of seed and there was a taboo on trading local varieties commercially. Seed might be bartered, for example cowpea against millet, or in extreme case, seeds might be exchanged for a piece of land. However, transactions were carried out with great discretion and by family elders.

The study indicated that the Dogon did not have a system that, given the severity of the current crisis, could satisfy the demand for seed of sufficient quality and quantity. The only way to improve the availability of seeds of locally-adapted varieties with the particular characteristics valued by local farmers was to mobilize the seed stocks that were still available within the communities themselves. German Agro Action made an inventory of the need for seed in different parts of the region and the extent to which seeds could be supplied from local sources. They also inventorized local cultural practices in seed management.

Adaptations

Dogon communities are spread over a wide geographical area. There are more than 400 villages and the total population is over 300 000. Based on the results of the study, it was estimated that some 50 tons of millet seed was needed in order to plant the 10 000 ha of farmland at the normal rate of 5 kg/ha. For the farmers to have seed in time for planting, it would have to be distributed within three months. Also, the distribution system would have to be transparent. German Agro Action's local partner MOLIBEMO, a federation of village producer organizations representing 85 farmers' groups, voiced its concern regarding two issues in particular: Firstly, the difficulty of collecting enough seed of guaranteed quality, and secondly, how to achieve an effective re-distribution of seeds in spite of the strong cultural taboos prohibiting sale.

The first issue was tackled by bringing the seed suppliers, i.e. those Dogon farmers who kept sufficient seed stocks, in direct contact with those in need. This put the responsibility for seed choice with the beneficiaries rather than with German Agro Action. The second issue was dealt with by involving village and regional institutions, such as the mayor and the district council, religious and traditional leaders, and the agricultural extension service. Mediating persons or "caste men" who play a special role in village life, especially in times of crisis, were also involved. They encouraged a sense of confidence amongst farmers as well as cautioning them against the outright sale of seeds.

Village committees of "wise persons" including village chief, religious chief and respected individuals, identified and negotiated with potential suppliers about seed supply and distribution. They assessed the quality of the millet panicles on offer and supervised their packaging and labelling. They certified seed quality and origin before distribution took place. They also verified the list of beneficiaries and the mayors took on the responsibility of supervising activities at village level. Regional committees were charged with the collection of seed from different villages and were responsible for creating a central list of suppliers and beneficiaries. They also participated in the planning and distribution of the seeds. MOLIBEMO staff, using their long local experience, coordinated the overall process and ensured it was well executed.

The issue of the taboo on the sale of seed was dealt with by introducing a voucher system. This approach was inspired by the earlier experiences of the *Catholic Relief Services* (CRS) in East Africa. CRS used seed vouchers and fairs to overcome seed shortages and this had proved to be an effective alternative to the more standard approaches to agricultural rehabilitation that rely on importing certified commercial seeds.

The approach adopted in the 21 districts of the Dogon region consisted of collecting local seeds and controlling and certifying

their quality. Distribution was supervised and took place through administered markets where vouchers replaced cash. The use of seed vouchers encouraged transparency and ensured control over a distribution system operating over vast geographical distances. Participatory processes had been used to develop a schedule or calendar to guide the timing of distribution to the main villages in the districts.

Those involved in the organization of the seed markets had been appointed by the local population. Farmers who owned seeds organized themselves into a group and selected their own representative. People who did not have seed also sent a representative to collect the seed. In large families, a representative took responsibility for collecting the seed quota of all the households in the family unit. This increased the efficiency of the exchange and was in keeping with local culture and traditions.

Seeds were distributed to beneficiaries for free. Each beneficiary received a receipt stating his or her own name, and the names of the seed supplier, the committee representatives and the local NGO. The seed suppliers were "paid" by the local NGO on presentation of the receipts acknowledging that the seeds had been delivered. A reference price for the vouchers was fixed by the local NGO at one third above the local market price of high quality millet destined for consumption. The price was announced beforehand. Overall, 45 tons of millet seeds from local varieties were collected and distributed over a three-month period. Local producer groups and organizations benefited both directly and indirectly from this newly created seed market while the seed aid funds boosted the local economy.

Conclusion

The success of the local seed aid programme was the direct result of involving local structures and actors; and of the leading role they played in the organization of the seed market and the voucher system. They defined the modalities of exchange and took care to respect local habits and ensure transactions were transparent. They also guaranteed the quality and origin of seeds. This increased the confidence of beneficiaries in the system. The involvement of mediating persons and structures was critical to the communication process and ensured strong links were established between the local NGO, the local structures and the population.

Seed aid operations in other contexts and areas may wish to build on the lessons of the Dogon experience. These were fivefold:

1) Study the local traditions, habits and customs regarding seed exchange, to learn about any possible taboos concerning the sale of seeds;
2) Identify and work with experienced local partners;
3) Have farmers monitor and evaluate the quality of the seeds for distribution, and search solutions regarding issues of seed supply;
4) Adapt the general approach to the local context by building on the participation of local actors; and
5) Rely on the population to put the operation in practice in order to ensure transparency, creating a climate of confidence and encouraging a dynamic exchange between the project and the target groups.

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Community seed banks

SEARICE in the Philippines works with rural communities to re-establish the role of farmers in the conservation of traditional seeds and the development of new varieties. Prior to 1970, farmers played a major role in conserving, developing and spreading plant genetic resources. During the Green Revolution, however, small-scale rice farmers were offered credit if they planted high-yielding rice varieties recommended by the government, and purchased prescribed pesticides and fertilizers. This led to a rapid loss of indigenous rice varieties.

In an effort to restore farmers' inherent right to save, use, exchange and sell seed, SEARICE supports the establishment of community seed banks. Building on farmers' knowledge of seed conservation and traditional practices in seed selection, varietal adaptation, seed storage and the rehabilitation and domestication of wild crop species, it encourages the restoration of a diversity that satisfies gastronomic, socioeconomic and environmental needs.

In Mindanao, the country's southernmost island, SEARICE established Participatory Plant Breeding and Participatory Varietal Selection projects. Centre-based and community-based seed banks were established to support community efforts to systematically collect, conserve, develop and utilize plant genetic resources. The community seed banks give farmers access to and control over seeds and strengthen local seed supply systems.

In simple terms, a community seed bank is a seed collection where farmers deposit seeds for the benefit of the community. It is owned by the community and ensures that seed supply and diversity are maintained. Materials and varieties stored in community seed banks are often offshoots of materials used by farmers in communal trials.

Farmers select varieties for planting in their fields and seeds from each new harvest are stored in the community seed bank to replace those distributed at planting time. This ensures that stocks and seed viability are maintained and that the genetic materials stored will evolve to meet changing environmental conditions.

Community seed banks are managed in different ways. Often a committee of farmers – trained in seed management – are responsible for record keeping, maintaining distribution lists and collection forms as well as updating inventories and reports of meetings. Agreements between members of a community seed bank are informal but SEARICE also advises farmers on current plant genetic resource legislation including Plant Variety Protection laws and the implications of Intellectual Property Rights.

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Recovering biodiversity knowledge

Gerdien Meijerink, Hans Smolders, Sokha Sours and Sovann Pou

Generating financial returns is an important function of farming systems but not the only one. Other functions, such as providing food for the farm household, sustaining (agro)biodiversity, and maintaining ecosystem health also contribute to the economic value of a farm.

Agro-biodiversity is extremely important to individual farmers and farming communities, but also to scientists and (plant) breeding institutions. It enables farmers to grow crops under varying environments, allows breeders and farmers to select for better crops and varieties, and makes it possible for households and consumers in different cultural settings to access commodities that satisfy their specific needs. Achieving a continuous and improved supply of food, medicines, fibres and other products depends on the presence of a robust agro-biodiversity.

Destruction

Since 1975 Cambodia has experienced two far-reaching political revolutions and the country and its people have suffered from more than two decades of destructive civil war. These years of violence have had far-reaching consequences for the country's agro-biodiversity and on farmers' traditional knowledge of how to preserve the rich variety of species nurtured, cultivated and handed down by their ancestors. Farmers who had previously managed and conserved different species of a range of agricultural crops, were forced to abandon them and much was lost as seed stocks were left behind or eaten. Traditional cultivars were mixed and known cultivars with specific traits disappeared. At the same time knowledge stored in universities, research stations and in researcher's minds also fell victim to the violence of war and political repression. The result has been a dramatic narrowing of genetic diversity.

The work of the *International Rice Research Institute* (IRRI) in the early 1970s had ensured that some 500 different traditional Cambodian rice cultivars were preserved. This seed has now been returned to Cambodia and, together with the results of more recent in-country collection efforts, has been used to breed many recently released varieties. However, because no inventorization or conservation efforts were made with other crops, it is difficult to calculate how much genetic diversity has been lost.

Cambodia's current commitment to a market-orientated and open economy has added urgency to the need to rebuild genetic resource knowledge and inventorize its agro-biodiversity. A market-led economy poses its own threats to agro-biodiversity. Local varieties are now being threatened by improved, exotic varieties and species and when farmers introduce these varieties into their fields, old varieties disappear or fall victim to new pests and pathogens.

Photo: G. Meijerink

Vegetable trading is often done by women.

Reconstruction

The main concern of the project PEDIGREA, *Participatory Enhancement of Diversity of Genetic Resources in Southeast Asia*, is the status of on-farm agro-biodiversity conservation in countries like Cambodia. Several pilot projects to link the preservation of genetic diversity to markets have been launched in the region. In Cambodia the PEDIGREA project is focusing on vegetable diversity.

Crop cultivation in Cambodia depends largely on the few traditional cultivars, old varieties and land races that remain. Almost 80 percent of the area is cultivated with local unimproved varieties of rice, maize, sesame, vegetables and potatoes. Efforts to conserve what remains of Cambodia's agro-biodiversity include taking stock of the landraces currently used by farmers. However, limited funds and a serious shortage of trained experts make inventarization difficult. Cambodia does not have proper *ex-situ* conservation facilities. There are no national genebanks for the long-term conservation of germplasm and existing germplasm collections are maintained under uncertain field conditions.

In-situ conservation

In Cambodia, the project works with two villages in Kandal Province and Kampong Speu. Both represent typical rice-based farming systems with vegetables. Using a Farmer Field School (FFS) approach that includes participatory plant breeding, the project is stimulating agro-biodiversity conservation in farmers' fields. Farmers are encouraged to select varieties, improve them through crossbreeding and store their seed. Locally-adapted technologies are being developed for crop improvement and results of experiments are shared with local farming communities. Strategies to improve farmers' marketing opportunities are also being developed and the project is supporting efforts made by local agencies to generate genetic resources and empower farmers.

The villagers of Kandal and Kampong Speu had already been through a Farmer Field School on Integrated Pest Management and were keen to participate in the PEDIGREA initiative. The majority of farmers had had little schooling and saw the initiative as an opportunity to learn. The project started in 2002

with a base-line survey that included marketing aspects. In 2003, the plant breeding training was launched and in 2004 marketing training was started.

One surprising result from the base-line survey was the amount of vegetables the farmers could specify. In Kandal villagers identified 102 different vegetables and in Kampong Speu 124. Some of these are collected from the wild, others are propagated either by seed or vegetatively, while for some species planting materials are traditionally purchased outside the community (see Table 1).

Table 1. Vegetables known and used by farmers

	Kandal	K. Speu
No. of vegetables identified:	102	124
Collected herbs and weeds	17%	19%
Collected from trees	26%	22%
Vegetatively propagated	19%	25%
Seed propagated	27%	24%
Always purchased	10%	9%

Source: Smolders, 2002

Farmers actively manage between 46 - 49 percent of vegetables through vegetative or seed propagation. It is encouraging to see such diversity still present. However, the surveys say very little about the *genetic* diversity known to farmers or present in the field. Subsequent meetings with farmers showed that they had little knowledge about the wider genetic diversity within vegetable species. They know and plant one or two varieties per vegetable species, an indication of low diversity levels.

Germplasm for plant breeding was obtained from *The World Vegetable Center* (AVRDC) in Taiwan, as Cambodia has no collections itself. During the base-line survey farmers used agronomic, economic and marketing criteria to select the vegetables they wanted to work with. The FFS began with a season-long training during which farmers learned about plant growth, breeding techniques and how to compare varieties, for example. During the second year, after the hybridized seed had been harvested, farmers continued the selection process based on locally preferred traits.

In 2004, marketing training was started amongst farmers in Chress Village, Takeo Province. During the FFS, a marketing analysis not only revealed the marketing problems farmers faced but production and genetic resource constraints as well. Farmers realized they lacked information on market prices and this made it difficult for them to calculate the profitability of vegetable and rice production. Usually they sold their vegetables to the village collectors at harvest time. Not knowing current prices, they could not decide to sell to the village collector when prices were high. They also realized that the village collectors would prefer to buy in larger quantities whereas farmers were used to selling their produce in small amounts. With these insights in mind, the FFS members decided to keep records of prices – which can fluctuate substantially in a short period of time – and keep each other informed. They also started coordinating their vegetables sales, so larger amounts were available for sale to the village collector who, it was recognized, had a great deal of marketing knowledge and contacts. The need to build up trust and work together was mentioned several times. This may be an issue particularly relevant to Cambodia, with its history of repression and betrayal – even within families – during the civil war.

Farmers discussed the need for good seed. Generally they used their own stock of vegetable seeds but gave little consideration to quality, management or storage. As a result of the knowledge gained during the participatory plant breeding training they are now managing their seeds and selecting and conserving good varieties and selections. It was even suggested that the village could be transformed into a regional pumpkin and wax gourd seed production and marketing centre and plans were made to organize a seed fair to exchange and compare different seed varieties within the region. A major outcome of the Chress Village FFS was the establishment of a farmer research group to produce and manage seed resources and diversity as well as a marketing group to coordinate the pooling of vegetable production area and information.

Conclusions

It is too early to say what wider impacts the project will have on the communities involved or genetic diversity in general. But the results show that the FFS approaches are working well. Working with farmers and with researchers at national level, as research capacity is gradually being re-established, the project is helping to reconstruct the knowledge so essential for maintaining genetic diversity in the field.

A crucial element in PEDIGREA's Cambodian experience has been the link established between genetic resources conservation and marketing. In selecting seeds, the farmers have been encouraged to think not only of production potential – high yield – but also of marketing potential: traits that sell well. In addition they have gained a better understanding of markets and marketing strategies. These new insights have resulted in farmers agreeing to work and plan together in new ways.

Marketing in an open economy with vegetable imports from neighbouring countries such as Thailand and Vietnam pose new challenges to the marketing strategies of farmers. In this time of rapid change, it is even more essential that farmers can rely on their own knowledge, make use of their genetic resources and have the information they need to meet challenges, make decisions and seize opportunities.

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More information on: http://www.pedigrea.org

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Bringing farmers together

Joshua Zake, Charles Walaga and Andre de Jager

Farmer Field Schools (FFSs) have been used in many countries in Asia, Latin America and Africa as a way to deal with constraints such as crop pests, soil fertility depletion, health issues like HIV/AIDS and the communal management of natural resources. They often work in partnership with local NGOs or Government institutions to develop solutions to complex problems facing farmers. In Lukwanga parish, Wakiso District, FFSs have encouraged the creation of new institutions and led to the development of stronger and more cooperative relationships within the community. This has put farmers in a better position to tackle their financial difficulties and to deal with two major agricultural constraints: environmental degradation and depleted social capacity.

Difficult living conditions

Most farmers in Lukwanga are smallholders who grow crops and rear livestock. Crop yields are low and soil fertility depletion is recognized as a major problem. There is a serious and growing threat to livelihood opportunities, food security, nutrition and health. The HIV/AIDS epidemic continues to have a profound impact on the community and has severely weakened the ability of the families to work on their fields. As the number of orphaned children, widows and widowers grows, food insecurity intensifies.

The social structures in the area are not very strong. Before the introduction of the farmer field schools, there were 18 farmers' groups consisting of 5 - 10 persons each. These groups were the result of previous development activities in the area and their main aim was to facilitate the access to credit from micro finance institutions. The cohesion of the farmers' groups was weak and their bargaining power was limited. As a result, the micro finance institutions charge high interest rates and apply very strict payback arrangements. The absence of a mechanism for rescheduling loans was a serious problem for the farmers if their harvest failed. The weak social structures, together with the degraded natural resources, made the farmers very vulnerable.

Establishing Farmer Field Schools

Between 2002-2005, a transformation took place in Lukwanga. The catalyst was the NGO *Environmental Alert* (EA), which was already working in Uganda as part of the larger East Africa INMASP (Integrated Nutrient Management to Attain Sustainable Productivity increases in East African farming systems) initiative. During the course of four seasons this NGO facilitated the establishment of Farmer Field Schools in Lukwanga. The farmers involved in these FFSs were drawn from groups established during earlier development efforts. This was done to establish a group of farmers in the FFS who were interested in improving soil fertility, but also to avoid weakening existing structures or undermining ongoing development activities.

Two FFSs were set up: the *Alinyikira Farmer Field School* and the *Nabukalu Demonstration Farm School*. For the last two years integrated nutrient management technologies have been tested and evaluated and, based on a participatory needs assessment, farmers have been trained in specific aspects of integrated soil and nutrient management.

Each school had about 25 participants and although men, women, youth and the elderly were represented, the majority of participants (90 percent) were women. In contrast to earlier

Photo: Solomon Semakula

FFS participants conduct field analyses on the Nabukalu central learning plot sown with groundnut.

farmers groups, the FFSs had a formal leadership elected by their members, and specified rules and regulations were laid down in the form of a constitution. The FFSs were also registered with the District Directorate of Community Services. This meant they were able to open and maintain operational savings accounts. Membership fees of up to USh4000 (US$2.20) and monthly fees of USh500 (US$0.25) were deposited in these accounts together with money earned from the commercial plots established by FFS members. In this way, farmers were able to raise money to buy inputs for their commercial plots and to accumulate capital that could be loaned to members on terms that farmers themselves considered realistic.

In contrast to the previously existing farmer groups, the FFSs and the later community-based organizations (CBOs) have been characterized by a strong group dynamic and sense of common purpose, as well as a holistic approach to dealing with community issues such as health and nutrition, credit management, general household development, group marketing and the care of orphans.

From FFSs to CBOs

After four seasons of experimentation, training and evaluation of integrated nutrient management technologies, farmers and facilitators of *Environmental Alert* discussed strategies to facilitate the smooth exit of the NGO. The facilitators enquired whether farmers wished to continue with the FFSs. Farmers reacted positively. They wanted to go on meeting together to share knowledge, information and skills on agricultural production and

livelihood issues as well as continue their experiments with integrated nutrient management technologies. They also wanted to encourage FFS members and non-FFS members to put into practice what had been learnt from the school plots.

It was decided that that both FFSs would form associations that had clear objectives and were legally recognized. This would strengthen their dynamics and cohesion and enable them to follow the facilitators' advice and start tackling problems such as the lack of access to farmer-friendly credit, the low prices paid for farm products and the need to arrange care for the community's orphans.

FFS members developed a constitution capable of guiding their activities and they were given leadership training. They elected a chairperson, secretary, treasurer and committee members and registered the FFSs as community-based organizations with the Directorate of Community Services. After that, a savings account was opened at a reputable local bank.

Working with a facilitator, the new CBOs developed work plans for a period of six months to ensure that specific objectives would be met. Members meet once a fortnight and at the end of each month they evaluate the progress made. Currently *Environmental Alert* is playing a backstopping role. It puts the CBOs in touch with agricultural input service providers and community development agencies such as *National Agricultural Advisory Services* (NAADS) and the *Buganda Cultural and Development Foundation* (BUCADEF) that can help them improve their sustainability (see Table 1).

Impact in the community

The impact of FFSs in Lukwanga is visible and can be seen in the increased capacity of farmers to analyze their farming systems and apply practices that ensure good nutrient management. Participating farmers are now able to present their opinions with confidence during regular village meetings and there is a more deliberate attempt by farmers to exchange experience on planning and development. In addition, the FFS experience has enhanced the community's social capital. Social relations have been strengthened, especially amongst participating farmers, and there is a greater readiness to help each other in good times and bad.

Currently the community-based organizations are developing commercial crop plots of up to 0.8 ha, testing proven integrated nutrient management technologies on members' farms and – in a programme of general household development – each member donates a gift to another member of his or her choice in sequence until all members have received some benefit. Through the CBOs, farmers have been able to raise substantial amounts of money from their group contributions and these funds have made it possible to buy improved seed and farm inputs without having to resort to external sources of credit. Development agencies have been very ready to recognize the CBOs, considering them to be easier to work with and more reliable and organized community structures than smaller groups of farmers.

Table 1. Benefiting from social networks

Name of networking organization	Alinyikira FFS	Nabukalu Demonstration Farm School
NAADS	Training in group dynamics. Advisory services on crop & livestock enterprises.	Training in group dynamics. Advisory services on crop & livestock enterprises.
Soil Science Dept, Makerere University	Access to Rhizobium (Nitrogen-fixing organisms).	Access to Rhizobium (Nitrogen-fixing organisms).
BUCADEF	Advice on bean, maize and rice production. Improved seeds for these crops to all members.	
Alinyikira FFS		Exchange visits, learning from each other.
Nabukalu Demonstration Farm School	Exchange visits, learning from each other.	

Lessons learnt

Introduction of FFSs to farmers in Lukwanga required much discussion, explanation, education and practical exposure. Farmers were not used to this form of extension. Rather they were used to being provided with new technologies and solutions by researchers and scientists. The Lukwanga experience has shown how FFSs can overcome this type of dependency. Some farmers did drop out of the FFSs when they realized they would not get any free inputs. However, it appears to have strengthened the sense of cohesion and common vision amongst those who have committed themselves to the FFSs and the CBOs.

The consistent use of participatory approaches continues to make the collective identification of community problems possible in Lukwanga. Strong and productive working relationships are being consolidated and farmers are acquiring the tools and skills they need to achieve their common goal. However, this process is not without challenges. Amongst these is the need to develop ways of dealing with those in the community who have different objectives and ways of working to those being promoted by the CBOs; and the difficult task of encouraging the new and more cooperative attitudes required to effectively develop organizations like marketing associations. ■

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Opportunities for farmers: "safe" vegetables for Hanoi

Maarten Siebe van Wijk, Regina Engels, Tran Huu Cuong, Nguyen Anh Tru and Pham Van Hoi

When Vietnamese farmers returned to their family-based farming systems in the 1980s after long years of working in a centrally planned economy, their farming practices changed dramatically. Responding to market demand rather than planning orders from the government, the area under vegetable production has increased from an estimated 274 000 hectares to almost 600 000 hectares.

Today, vegetables provide small-scale farmers with a higher income than rice. Farmers, whose land holding averages 0.25 hectares, rely on cheap and accessible but often hazardous chemical pesticides to maintain intensive vegetable production. In 2002, a twelve-month study by the VEGSYS project amongst 64 farmers in two villages close to Hanoi showed that they had used 152 different pesticide formulations, three percent of which were highly hazardous, 33 percent moderately hazardous and 20 percent slightly hazardous.

Food safety and the environment

Toxic pesticides have caused many food poisoning scandals in Vietnam. Consumers are becoming increasingly aware of food safety problems and the damage caused by pesticide residues. However, although interest in buying safer vegetables is growing, little is known among the public about the environmental effects of agro-chemicals. At present, a team of VEGSYS researchers from Wageningen University and Research Centre and Hanoi Agriculture University is carrying out risk assessments to establish the effect of using combinations of pesticides on irrigated crops. Translating these studies into economic impacts will hopefully make stakeholders more aware of the hidden costs of pesticide use.

The Vietnamese government, as well as many other organizations, are working to make vegetable production less harmful to consumers and the environment. Initiatives such as FAO's *Regional Asian Vegetable IPM programme* and a similar initiative by the Hanoi Farmer Union have focused on increasing farmers' knowledge about the use and effects of chemical pesticides. In 1996, Hanoi's Department of Science, Technology and Environment (DOSTE) developed a protocol for "safe" vegetable production and set up a "safe vegetable" certification programme which allowed farmers and cooperatives to supply state-run "safe" vegetable shops and supermarkets. A "safe" vegetable is still produced using agro-chemicals, but farmers take care not to use forbidden pesticides and to follow pre-harvest interval prescriptions of the pesticides. "Safe" vegetables should also be produced with ground water and not with irrigation water. However, DOSTE did not monitor whether the "safe" vegetable cooperatives followed the protocol and consumers did not have much confidence in these so-called safe but very expensive products. The DOSTE programme ended in 2003 and has been replaced by a new certification scheme supervised by the Vietnamese Plant Protection Department (PPD). The Plant Protection Department is responsible for checking and improving vegetable safety levels. It has the equipment to carry out pest residue tests and can certify producers of "safe" vegetables.

"Safe" vegetable cooperatives

One of the most interesting reactions to these developments has been the formation of farmers' cooperative groups and New-Style farmers' Cooperatives (NSC) known in Hanoi as *To Hop Tac*. These developments have been made possible by the introduction of new legislation that allows farmers to establish their own cooperatives and provides for the transformation of old state cooperatives into Transformed Cooperatives (TC). There are examples of each of these three types of cooperatives in the villages where the VEGSYS team have been carrying out their research.

New-Style farmers' Cooperative

The most successful cooperative is Phuc Tinh, a NSC cooperative established in 2002 by a female farmer who took the initiative to invite the farmers in her village to form a "safe" vegetable cooperative. Twelve farmers, mostly relatives or good friends, got together and applied for official registration. They presented their management plan and regulations to the local Commune and the Department of Agriculture. Once approval had been received, they registered their cooperative with the tax office and were issued with official business documents. Each member of the cooperative pays an annual fee and five percent of the turnover is used to pay a very small salary to the cooperative's management team and to service a fund that members can use in cases of personal emergency.

The Phuc Tinh cooperative advertises itself as a producer of "safe" vegetables. It follows IPM principles, does not use banned pesticides and adheres to the pre-harvest intervals prescribed for any agro-chemicals it does apply. Farmers who have been unable to cultivate according to these principles do not sell their vegetables through the cooperative.

The cooperative's chairperson is responsible for finding new clients, making production plans and deciding which vegetables member should produce. The "assembler" of vegetables collects vegetables from members, processes them and delivers them to the cooperative's clients. For this he receives transport and processing costs. Currently, the cooperative has five institutional clients who buy 700 kg of vegetables daily for their canteens. This assures cooperative members of a steady turnover, and on average members sell 50 - 80 percent of all their vegetables this way. Any extra produce is sold through normal market channels, although usually for a lower price.

The cooperative does not have an official monitoring or internal control system to ensure that members produce according to the regulations, but there is a strong social control as farmers do not want to get the cooperative into trouble. Although no problems of bad quality or other complaints have occurred, the cooperative would be legally responsible if something did happen. The institutional customers store samples of the supplied vegetables so they can get them tested if there are problems. In general, everybody assumes that quality is good until someone gets ill. If this happens, action is taken to find out who was responsible. The disadvantage of this system is that small quantities of pesticide residues, which may cause health problems in the long term, are left undetected.

A Transformed Cooperative
A transformed cooperative in another local village – formerly a service cooperative supplying inputs to farmers – has also been registered as a "safe" vegetable cooperative. All 600 households in the village automatically became members and no fees were required. Today, although most members use and pay for cooperative services, only 50 farmers have committed themselves to "safe" vegetable production. Social control in this large organization is low and the TC is not registered at the tax office, which means it cannot operate as a business.

The active members sell about 600 kg of fresh vegetables per day to three clients: two state companies that supply vegetables to supermarkets, shops, schools and companies in Hanoi, and a privately owned "safe" vegetable shop. One of the companies has provided the TC with a detailed production protocol. It also supplies the TC with "safe" pesticides and takes samples of the produce for pesticide analysis.

So far, the quality supplied by the TC has always been good. Like the Phuc Tinh cooperative, the TC has no complete internal quality control system to monitor whether the members follow the "safe" vegetable production protocol. However, the TC has developed a simple tracking and tracing system. When farmers pack their vegetables for market at the designated post-harvest centre, they enclose a paper with their name, date of packaging and the name of the product.

Farmers' Cooperative Groups
In addition to the TC, the village also has three "safe" vegetable farmers groups supported by the *HFU/ADDA Vegetable IPM programme*. They work within the TC but unlike TC farmers, group members pay an annual fee. Because the groups have only about ten members each, social control is strong – an important safety guarantee for existing and potential clients.

Conclusion
New and profitable markets are the incentive most farmers need to convert to safer more sustainable vegetable production. The present marketing system in Vietnam makes it difficult to develop a 100 percent watertight "safe" vegetable supply chain but the efforts being made in this direction are clearly benefiting some small-scale vegetable producers. Farmers who work through the newer marketing channels of "safe" vegetable cooperatives and sell to canteens, restaurants, shops and supermarkets, stand a good chance of getting a higher price for their products. This provides an incentive for farmers to be more careful with the use of agro-chemicals.

Currently, most of the safe vegetables are sold through direct contacts between cooperatives and large institutions or company canteens. Much more coordination and cooperation between farmers, assemblers, wholesalers and retailers is needed to increase the demand for safe vegetables at all levels in society. An increase in demand from supermarkets, for example, might provide a strong incentive for farmers to produce high-quality and "safe" vegetables. This is already happening in neighbouring Thailand and China, where supermarket chains concerned about their image and brand are increasingly demanding food products free of pesticide residues. In order to win the confidence of consumers and retailers, however, contracts accompanied by strict protocols, internal control systems, input record keeping and simple tracing systems, as well as strict social control within the cooperatives themselves, will be needed. ■

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Acknowledgement
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Termite mounds as fertilizer

John Andrew Siame

Farmers in Zambia have traditionally used soil from termite mounds as fertilizer, but this practice was abandoned when subsidized inorganic fertilizers became available in the country. However, when – as part of the liberalization of the Zambian economy – all subsidies for agricultural inputs were removed and prices increased sharply, many small-scale farmers resumed traditional crop fertilization practices including the use of termite mounds.

In Southern Zambia, farmers select suitable termite mounds and clear them of vegetation. The soil is cut off taking care to leave the base of the mound intact so that the termite colony is not destroyed. This soil is then transported to the field by wheel barrow or oxen and, before the rains begin, farmers use ploughs, hoes or shovels to work it into the top soil. In areas where conservation farming is practiced, soil from termite mounds is put into planting basins.

Farmers apply termite mound soil to the field where they plant maize, soybeans, cowpeas and other local cereals and legumes. They do this once every three years. Field staff found that where termite mound soil had been incorporated, maize harvests were 33 percent higher than they had been when inorganic fertilizers were used and the positive effects were long lasting.

Literature indicates that termite mound soils generally have high clay content, enhancing water storage capacity. In the Southern Province of Zambia soils with low water retention capacity are common, so when termite mound soil is spread on these soils it results in a higher soil moisture content and improved crop growth. Literature also shows that termite mound soils have high levels of calcium, phosphorus and organic matter, which also contribute to better crop development, especially on the poor soils in the area. Plants also take up nutrients very easily from termite mound soil. Termite soil is proving a viable option to local farmers who can not afford to buy expensive inorganic fertilizers. ■

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Performance of SRI in Nepal

Rajendra Uprety

More than 65 percent of the economically active population of Nepal depend on agriculture for their living. Rice is the most important crop and Morang is one of the important rice-producing districts in eastern Nepal. Average productivity – just over 3 tons/ha – is low because farmers use older-generation seeds and cultivation practices are not optimal: Farmers generally use more than 60 kg/ha of seeds, transplant very old seedlings (30 - 45 days old) and plant many seedlings per hill.

In 2002, I read an article by Norman Uphoff on SRI in the *LEISA Magazine*. I thought that this technology might be useful for Nepalese farmers as well. I contacted Mr. Uphoff for more information on SRI, and in 2003 I established two small rice plots using SRI principles: planting young seedlings, wide spacing, less water, and some weeding. My healthy plants produced an equivalent of more than 7 tons/ha. This was very encouraging, and we started to share the results with local farmers through training, articles in our newsletter and personal and group contacts.

Many farmers wanted to try the SRI technology, but first they wanted to see the results on someone else's field! So three farmers volunteered to plant their early rice crop according to SRI principles. Two of these farmers harvested nearly 6 tons/ha. The third farmer, Mr. Udaya Narayan Nepal, transplanted rice seedlings of different ages – 8 days, 12 days, and 17 days – on different plots. In spite of the lack of irrigation and poor soil, the vegetative growth was very good with up to 130 tillers per hill. Even after evident water stress, his crop produced rather well, see Table 1.

After observing these good results in the early rice crop, farmers from 15 Village Development Committees and one Sub-Metropolitan City decided to plant the regular season rice crop using the SRI system on plots ranging from 500 m^2 to 2 hectares. Many of their neighbours were sceptical because the SRI plot which had so few tiny plants and no standing water looked so pitiful in the beginning. But after one month, most of them were surprised at the "magical" growth that occurred. After this more and more farmers started to come and see what was happening on the SRI plots.

Photo: Author

Farmers preparing a nursery bed for rice seedlings.

Nearly all SRI plots received very few inputs, small quantities of water and very few seeds (3 - 5 kg/ha). The rice plants in many plots started tillering 2 - 3 days after transplanting, and single seedlings produced up to 135 tillers per hill, showing their high potential. We realized that if we keep the soil just a little moist (and sometimes dry), even older seedlings would produce more tillers. In one case 21-day-old seedlings produced more than 40 tillers/hill with 350 - 400 grains/panicle.

Most of the SRI plots were planted with a wide spacing of 40 - 45 cm between plants in both directions. We based this decision on our experience of the early rice crop which had produced more than 100 tillers per hill, making us believe that plant spacing could be increased.

Table 1. Performance of SRI for early rice (Bansdhan variety) in Morang district, Nepal, 2004

	Plot no.1	Plot no.2	Plot no.3
Seedling age a time of transplanting	8 days	12 days	17 days
Planting spacing (cm)	40 x 25	40 x 25	40 x 35
Number of weedings	3	3	2
Average number of tillers	107	98	78
Insect attack situation	Normal	Normal	Normal
Disease situation	No disease	No disease	No disease
Average number of fertile tillers/hill (Min – Max)	37.8 (18 – 59)	37.4 (11 – 63)	31.9 (10 – 50)
Average number of grains/panicle (Min – Max)	201.5 77 – 295	167.9 69 - 362	265.3 85 - 407
Fertilizer application (kg/ha)	NPK: 25:22:11	NPK: 25:22:11	N: 22.5
Use of compost	No	No	No
Productivity (t/ha)	8.75	7.50	9.25

- Average productivity (t/ha) with improved practices (non-SRI) 4 t/ha
- Average productivity (t/ha) with farmers' practices (non-SRI) 2.5 t/ha

SRI - System of Rice Intensification

The System of Rice Intensification (SRI), developed in 1983 by Fr. Henri de Laulanie, has enabled farmers in many parts of the world to increase their irrigated rice yields to 6 - 10 tons/ha, and in some cases up to 15 tons/ha. SRI principles include capturing the plant's full potential for tillering by early transplantation, planting seedlings one by one and spacing them far apart, providing full potential for root growth by alternatively wetting and drying of the field, minimizing irrigation and early and frequent weeding. The differences between conventional with SRI practices are:

	Conventional	SRI
Seed requirement (kg/ha)	80 to 120	5 to 10
Transplanting after	20 to 30 days	8 to 15 days
Spacing (cm)	10x10 to 20x20	25x25 to 50x50
No. of seedlings per hill	3 to 4	1
No. of plants/m²	75 to 150	4 to 25

However, contrary to the early rice crop there was no water scarcity during the normal season. This decreased the tillering rate. While the yields were good, we could probably produce even more by using a somewhat closer spacing (30 x 30 cm).

We also found that SRI rice needed less time to mature than conventional rice: between 7 - 30 days less, depending on variety, soil type, water availability, and the age of the seedlings when transplanted. When young seedlings were under water stress, the period needed to reach full maturity using SRI was 15 days shorter that when traditional methods were used. SRI rice plants also started tillering 20 - 35 days earlier than 30 - 45 day-old seedlings grown in the traditional way. They reached each stage of growth earlier and matured earlier. These results are being verified this season.

All SRI crops with the exception of one, yielded at least twice as much grain as traditionally grown rice. The average SRI yield was about 130 percent higher than that of the traditional crop.

Besides higher production and an earlier crop another advantage of the SRI method was the reduced need for pesticides to control stemborers, leafhoppers, caseworms and other insects. The pesticides farmers normally use leave long-lasting toxic residues and have adverse effects on soil organisms. They also pollute water and affect useful insects such as spiders, tiger beetles, dragonflies, honeybees, and ladybird beetles. Our SRI farmers did not use any insecticide because the high number of tillers per hill compensate for damage inflicted on individual tillers. Some farmers did use fungicides for controlling leaf spots and neck blast, but these fungicide applications might be unnecessary if seeds are pre-treated with fungicide.

The experiences of Morang farmers with SRI was broadcast on national television and reported in national newspapers. Many farmers and development workers from different parts of the country contacted me after hearing the news to get more information about the SRI method. Since then we have published and distributed booklets and sent a special issue of our monthly newsletter on SRI to farmers, NGOs, District Agriculture Development Offices and others in the agricultural sector. All these efforts have created a very favourable environment for the development of SRI in Nepal. My proposal for a SRI promotion project was selected as one of the finalist in Nepal Development Marketplace 2005 organized by World Bank/Kathmandu, and awarded US$20 000. During 2005 and 2006 the project will be implemented in Morang and Panchthar districts. ■

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For more reading on SRI, see LEISA Magazine Issue 15, Dec 1999, pp 48-49; Issue 17.4, Dec 2001, pp 15-16; and Issue 18.3, Oct 2002, pp 24-29.

Call for articles

Issue 21.4 December 2005: "From practice to policy"

Agricultural policies have considerable influence on farming practices as well as on possibilities for change. They influence not only farmers and the way they farm, but also agricultural research and training institutions and commercial companies. At present most agricultural policies are supportive of conventional, export-oriented and large-scale agricultural production, and provide little support to small-scale family farming and LEISA practices. This makes it increasingly difficult for small-scale farmers to benefit from and further develop their small plots of land. In spite of this negative policy environment, there are examples where initiatives driven by farmers or local communities have influenced change at policy level, sometimes leading to further positive changes at local level. Showing how local initiatives have led to policy change can provide important insights into the process involved in creating a supportive policy environment for LEISA.
Deadline for contributions is 1 September 2005.

You are invited to contribute to this issue with articles (about 800, 1600 or 2400 words + 2-3 illustrations and references), suggest possible authors, and send us information about publications, training courses, meetings and websites. Editorial support is provided. ILEIA offers to pay on request Euro 75.00 per article published in LEISA Magazine.

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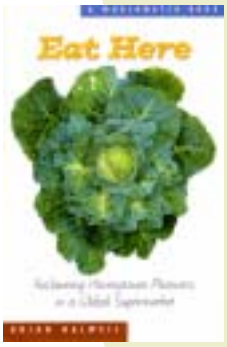
NEW BOOKS

Eat here: reclaiming homegrown pleasures in a global supermarket by Halweil B. 2004. 236 pp. ISBN 0 393 32664 0. US$13.95. Worldwatch book, Worldwatch Institute, 1776 Massachusetts Ave NW, 20036 Washington DC, USA. Email: worldwatch@worldwatch.org

Brian Halweil is a senior researcher at the Worldwatch Institute, where he focuses on the social and ecological consequences of the way we produce food, examining topics ranging from organic farming to biotechnology and from hunger to water scarcity. With this book he promotes eating local by arguing that securing your food from nearby farms and shops rather than distant agribusinesses, is better for your health, for farmers, and for the planet. The book is based on correspondence, interviews, and farm visits with people who are working to create a space for food raised close to home. It provides a wealth of examples from different places, mainly in (North and South) America, where people are struggling to build a living on growing and selling local food. This book is encouraging for everyone that wants to promote locally produced (slow) organic food.

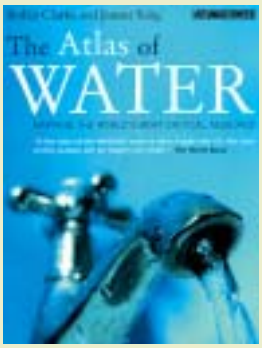


Understanding organizational sustainability through African proverbs - insights for leaders and facilitators by Malunga C., Banda C. 2004. 80 pp. ISBN 1888753366. US$18.95. Pact Publications, 1200 18th Street NW Suite 350, 20036 Washington DC, USA. Email: books@pacthq.org

African cultural heritage, passed on from generation to generation, has been a source of guidance for African communities in times of peace, uncertainty, birth, life, and death. In this book the power of traditional wisdom contained in African proverbs is directed at organizational development and change. The result is a new perspective on organizational management, with important lessons for leaders, consultants, volunteers and expatriates working or preparing to work in Africa. This book describes how African proverbs can be used to understand organizational growth and development over time. By rediscovering the power of these proverbs, readers are rewarded with new and creative ways to communicate organizational improvement efforts in a language that touches people's hearts and motivates them to personal and organizational transformation.

The atlas of water: mapping the world's most critical resource by Clarke R., King J. 2004. 126 pp. ISBN 1 84407 133 2. UK£12.99. Earthscan, 8-12 Camden High Street, London NW1 0JH, UK. Email: earthinfo@earthscan.co.uk

Clean fresh water is an increasingly scarce resource in large parts of the world. Humanity faces a bleak future unless it collectively faces up to the coming global water crisis. The answers to a water-secure world are known but neglected: water recycling; sustainable agriculture instead of industrial agriculture; massive infrastructure repairs; conservation and reclamation of destroyed water systems; strong laws against pollution; limits on industrial growth; locally appropriate technologies; an end to big dams; severe limits on groundwater extractions. Most importantly a water-secure future must be based on water equity, water conservation, and water democracy. This atlas, which graphically maps the contours of life-giving water, its realities, threats and connectedness to daily life, is intended as a tool for building social movements for the survival of the planet.



The pesticide detox: towards a more sustainable agriculture by Pretty J.N. (ed). 2005. 293 pp. ISBN 1 84407 142 1. UK£22.95. Earthscan, 8-12 Camden High Street, London NW1 0JH, UK. Email: earthinfo@earthscan.co.uk

Whereas once the risks involved with pesticide use were judged to be outweighed by the potential benefits, increasingly the external costs of pesticides to environments and human health are being seen as unacceptable. In response to this trend, recent years have seen millions of farmers in communities around the world reduce their use of harmful pesticides and develop cheaper and safer alternatives. The pesticide detox, edited by the well-known expert Jules Pretty, explores the potential for the phasing-out of hazardous pesticides and the phasing-in of cost-effective alternatives already available on the market. This book is a compilation of chapters written by different experts that together constitute a larger picture about the changes necessary for pest and pesticide management. It describes the current concerns about the side-effects of pesticides, and demonstrates the feasibility of change on the basis of a number of concrete cases from both developing and industrialized countries.

Seeds of knowledge: the beginning of integrated pest management in Java by Winarto Y.T. 2004. 425 pp. ISBN 0 938692 81 X. Yale Southeast Asia Studies, P.O.Box 208206, New Haven CT 06520-8206, USA. http://www.yale.edu/seas/Monographs.htm

This book examines the process of knowledge construction among rice farmers, the cultivators of lowland irrigated rice fields on the north coast of West Java, Indonesia. It tells how these farmers received, developed, and then transmitted knowledge over a period of two years between the 1990 dry season, when they had experienced a severe outbreak of white rice stem borers, and the end of the 91/92 rainy season. It is the story of how the introduction of integrated pest management principles led to changes in the farmers' knowledge of pests and diseases and subsequently, to the modification and development of their farming practices.

Poison vs nutrition: a briefing paper on pesticide contamination and food safety 2004. 74 pp. Centre for Science and Environment (CSE), 41, Tughlakabad Institutional Area, New Delhi 110 062, India. Email: cse@cseindia.org

With this dossier on food quality, public health and pesticide residues, the Centre for Science and Environment provides a policy document that can be of use for all Governmental and Non-Governmental Organizations that are interested in safety standards for food. CSE, an Indian NGO, had established the presence of pesticide residues in soft drinks in India. This dossier was developed by CSE in defence of their standpoint that food should be safe and that India needs safety standards for pesticide residues in food. It provides information about pesticide residues in general and the importance of safe food for public health and pesticide residue regulations across the world. The experiences of CSE with the parliamentary committee on pesticide residues in and safety standards for soft drinks, fruit juice and other beverages in India is a case study on how to break the poison-nutrition circle.

DDS Deccan Development Society

http://www.ddsindia.com

DDS, 101 Kishan Residency, 1-11-242/1, Street no. 5, Shyamlal Buildings Area, Begumpet, Hyderabad 500 016, Andhra Pradesh, India. Email: ddshyderabad@eth.net

The Deccan Development Society is an Indian NGO working with women's groups in the state of Andhra Pradesh. Its website provides information about the work of these groups on issues like food production, seeds (community gene banks), control over natural resources, and the marketing of organic products. A number of documents are available from the website, and deal with topics such as the need to protect traditional knowledge; agro-biodiversity; sustainable agriculture, food security and gender; and the negative effects of genetic engineering. Some can be downloaded in PDF format. Local control over food production has become the rallying point for the Deccan Development Society and a group of like-minded organizations make up the South Asian Network of Food, Ecology, and Culture (SANFEC), see **http://www.sanfec.or**g/p_d.htm. SANFEC has argued for its concerns at national, regional, and international forums such as the World Food Summit, the World Trade Organization (WTO), and the World Summit on Sustainable Development (WSSD).

International Center for Tropical Agriculture CIAT

http://www.ciat.cgiar.org

CIAT, A.A. 6713, Cali, Colombia. Email ciat@cgiar.org

Two new publications about emergency seed relief are available to download from the CIAT homepage. The first, entitled "Addressing Seed Security in Disaster Response: Linking Relief with Development", examines whether vulnerable farmers in Africa are actually being helped by seed relief efforts and how current practice can be improved. Download address: **http://www.ciat.cgiar.org/africa/seeds.ht**

The second publication, "Towards Effective and Sustainable Seed Relief Activities", underscores key principles for improving the effectiveness of seed relief efforts by the UN and other agencies, e.g. the importance of farmer choice about crops and varieties. Download address: **ftp://ftp.fao.org/docrep/fao/007/y5703e/y5703e00.pdf**

Local exchange systems in Asia, Africa and Latin America

http://www.appropriate-economics.org

Email: stephen_dem@yahoo.com

Community-based local exchange systems are appropriately designed social and economic networks which encourage cooperation and reciprocation, self-reliance and mutual aid, local production for local needs, socio-economic solidarity and economic justice. This website provides information and help to start a local exchange system, including a library of materials and a helpdesk.

The SRI knowledge-sharing community

http://ciifad.cornell.edu/sri/

Cornell International Institute for Food, Agriculture and Development (CIIFAD), 31 Warren Hall, Cornell University, Ithaca, NY 14853, USA. Email: ciifad@cornell.edu

This website gives information on the System of Rice Intensification (SRI), which is a methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water and nutrients. SRI practices are based on a number of agroecological principles and contribute to healthier soil, greater root growth and nurturing soil microbial abundance and diversity. The site gives information about the advantages of SRI above traditional practices, the activities per country, and manuals (downloadable).

Global Facilitation Unit for Underutilized Species

http://www.underutilized-species.org

Via dei Tre Denari 472/a, 00057 MACCARESE (Fiumicino), Rome, Italy.
Email: p.bordoni@cgiar.org

This website is intended to enhance communication and knowledge about underutilized species. The "Pool of Knowledge" provides access to various documents and websites, and gives information on all kinds of species (cereals, legumes, vegetables, forage crops and trees).

Agritrade

http://agritrade.cta.int

CTA, the Technical Centre for Agricultural and Rural Cooperation ACP-EU, P.O.Box 380, 6700 AJ Wageningen, the Netherlands. Email: cta@cta.int

Agritrade is CTA's web portal on international agricultural trade issues in the context of ACP (African, Caribbean and Pacific countries) – EU (European countries) relations. Agritrade covers issues like: economic partnership agreements; reform of the EU common agricultural policy and its implications on ACP countries; WTO agreement on agriculture; market access; and food safety. It also provides information on a large number of different commodities (sugar, rice, beef, banana, cotton, cereals) and provides news updates and news alerts including extended comments on hot topics; discussion papers; a calendar of events; and electronic discussions.

The New Farm

http://www.newfarm.org

Rodale Institute, 611 Siegfriedale Road, PA 19530-9320 Kutztown, USA. Email: info@rodaleinst.org

The New Farm website provides farmer-to-farmer know-how from the Rodale Institute. The Rodale Institute is devoted to innovative agriculture research, outreach and training. The Institute works with people worldwide to achieve a regenerative food system that renews and improves environmental and human health. The Institute's website informs, encourages, equips and inspires farmers with the support they need to take the important transition steps toward organic agriculture. It presents success stories and expert resources for crop and livestock production, direct marketing, local food systems, policy campaigns and community-building collaborations. The site has an international section with agricultural news from all over the world.

The Microfinance Gateway

http://www.microfinancegateway.org

The Microfinance Gateway Manager,
1919 Pennsylvania Ave. NW, Washington DC 20433, USA.
Email: webmaster@microfinancegateway.org

The Microfinance Gateway includes a searchable library of electronic documents, specialized resource centres, organization and consultant profiles, specialized discussion groups, the latest news, events, and job opportunities in microfinance.

Masipag

http://www.masipag.org

Masipag secretariat, 3346 Aguila St., Rhoda Subd.,
Los Baños, Laguna, Philippines. Email: info@masipag.org

Masipag is a farmer-led network of people's organizations, non-government organizations and scientists working towards the sustainable use and management of biodiversity through farmers' control of genetic and biological resources, agricultural production and associated knowledge in the Philippines.

The resilient family farm: supporting agricultural development and rural economic growth
by Burpee G., Wilson K. 2004. 170 pp. ISBN 1 85339 592 7. UK£11.95. ITDG Publishers, Bourton Hall, Bourton-on-Dunsmore, Rugby, Warwickshire CV23 9QZ, UK. Email: marketing@itpubs.org.uk
Why are some farm families more resilient in the face of hardship? What explains the modest cash income they earn that others only dream of? The authors of this book highlight the economic and ecological realities of the small farm enterprise and examine the role of the development organization in supporting farm families to cope with the difficulties they face. Examples of development successes and failures serve to emphasize the need for complete, rather than partial, responses and support. This nicely illustrated, easy-to-read book provides guidance for donors and practitioners whose work touches in some way on smallholder farm life or rural economies. Recommended.

Managing agrodiversity the traditional way: lessons from West Africa in sustainable use of biodiversity and related natural resources by Gyasi E.A., Kranjac-Berisavljevic G., Blay E.T., Oduro W. (eds). 2004. 266 pp. ISBN 92 808 1098 7. US$32.00. United Nations University Press, 53-70 Jingumae-chome, Shibuya-ku, Tokyo 150-8925, Japan. Email: sales@hq.unu.edu
This book reflects nearly ten years of participatory research work in West Africa, particularly in Ghana, as part of the United Nations University project on People, Land management and Environmental Change (UNU/PLEC). It shows how farmers traditionally cultivate and conserve biodiversity while also using the land for food production. The book will appeal to policy-makers, field practitioners, university students and teachers. Relevant research findings and their contextual background are presented in three parts, each containing a set of chapters written by different authors. Part I focuses on methodological approaches and knowledge systems. Part II contains case studies of cropping systems and part III looks at the social dimensions of resource management. Finally, Gyasi, the leading editor, brings the book to a conclusion by pooling lessons for sustainable management of agrodiversity and related natural resources, and highlighting possible directions for future research work.

Ploughing up the farm: neoliberalism, modern technology and the state of the world's farmers
by Buckland J. 2004. 264 pp. ISBN 1 84277 3674. US$22.50. Zed Books, 7 Cynthia Street, N1 9JF London, UK.
Email: enquiries@zedbooks.demon.co.uk
With this thorough and illuminating examination of the farming crisis, Jerry Buckland applies fresh eyes, sound data, and rigorous analysis to the paradox of deepening poverty among the world's food producers. Neo-liberalism has brought about rural de-population in the North, rising rural poverty in the South and environmental problems all around the farming world. The book tackles complex economic and political questions with a wealth of evidence and convincing logic. It calls for farm policies founded on farmer-led food security and democratization of the global institutions that have had such detrimental effect. The argument for a re-visioning of food policies in the context of healthy societies and environments is compelling and should be compulsory reading for policy makers as well as for all concerned with farming, food, poverty or development.

Farmer-controlled economic initiatives: starting a cooperative by Koopmans R. 2004. 75 pp. ISBN 90 77073 92 2. Agrodok 38, Agromisa, P.O.Box 41, 6700 AA Wageningen, the Netherlands. Email agromisa@agromisa.org
Agriterra, Willemsplein 43-II, 6811 KD Arnhem, the Netherlands. Email: agriterra@agriterra.org
Many farmers' organizations in developing countries see it as their task to support business initiatives, such as the development of an agricultural cooperative or an agri-business, owned and used for the benefit of their members. These business initiatives are undertaken in order to create solutions for common problems, for example in the processing and marketing of agricultural products and in gaining access to credit. This manual in the Agrodok Series is meant to assist agricultural organizations in the development of agricultural cooperatives. The manual was produced by Agriterra, the Dutch organization for international cooperation between rural membership organizations, which has a lot of experience with starting up farmer cooperatives both in the North and in the South. The first part of the manual describes what a cooperative is, why it is interesting for farmers to start a cooperative and what is needed to form a cooperative. The second part provides guidelines for establishing a cooperative.

Marketing for small-scale producers by De Veld A. 2004. 75 pp. ISBN 90 77073 89 2. Agrodok 26, Agromisa (address see above).
Many farming households set up income-generating activities and need to market the products produced. This Agrodok booklet explains how the market works and how small-scale producers can best take advantage of it. The level of income earned from secondary activities is partly determined by the way the activity is managed. Planning and organization of production is therefore discussed in the second part of the manual.
This Agrodok is also available in Portuguese and French.
Agrodoks can also be obtained from CTA, the Technical Centre for Agricultural and Rural Cooperation, P.O.Box 380, 6700 AJ Wageningen, the Netherlands. Email: cta@cta.nl. Applicants from ACP countries can apply for a free copy.

Cultivating a healthy enterprise: developing a sustainable medicinal plant chain in Uttaranchal, India
by Belt J., Lengkeek A., van der Zant J. 2003. 56 pp. ISBN 90 6832 8395. €11.50. Development Policy and Practice Bulletin 350, Royal Tropical Institute (KIT), P.O.Box 95001, 1090 HA Amsterdam, the Netherlands. Email: publishers@kit.nl
Supply chain analysis provides a powerful tool in designing actions that enhance sustainable economic development. In their commitment to "cultivate healthy enterprise" KIT, IAMR and CSD have developed an approach where stakeholders interact to construct a sustainable and equitable chain. A case study was conducted on medical plants in Uttaranchal, India. Medicinal plants play a role in health care, culture biodiversity and rural economies. Worldwide the demand for medicinal plants is growing. The mountains of Uttaranchal have the potential to become a major supplier, but the question is how this opportunity can be transformed into reality. This bulletin provides some answers and insights in the lessons learned from field research in Chamoli. The authors believe that a sustainable medicinal plant chain can be developed, creating livelihood opportunities for people in remote and marginal areas. This case study is of interest for similar initiatives, covering other regions and supply chains.

Ecosystems and human well-being: a framework for assessment by Alcamo J. et al. 2003. 245 pp. ISBN 1 55963 4030. Island Press, London.

Millennium ecosystem assessment, Ecosystems and human well-being: biodiversity synthesis World Resource Institute. 2005. 85 pp. ISBN 1 56973 5883. Island Press, London, UK. Email: orders@islandpress.org

The Millennium ecosystem Assessment (MA) is an international process designed to meet the needs of decision makers and the public for scientific information concerning the consequences of ecosystem change for human well-being and to analyze options available to enhance the conservation of ecosystems and their contributions to meeting the human needs. Leading scientists from more than 100 nations are conducting the assessment through working groups chaired by members of the Millennium Assessment Panel. The first book describes the framework for the assessment and the second book is the recently published final synthesis report. This report presents a synthesis and integration of the findings concerning biodiversity contained in the four reports of the MA working groups. Both publications can be downloaded from **http://www.millenniumassessment.org**

Community integrated pest management in Indonesia: institutionalising participation and people centred approaches by Fakih M., Rahardjo T., Pimbert M. 2003. 162 pp. ISBN 1 84369 4859. IIED, 3 Endsleigh Street, London WC1H 0DD, UK. Email: info@iied.org IDS, UK. Email: ids@ids.ac.uk

This study assesses the extent to which community IPM has been institutionalized in Java (Indonesia). Participatory research methods were used by multidisciplinary and inter-organizational teams of researchers to analyze policies, organizations and impacts. The aim of the inquiry was not only to conduct research, but also to bring about political change and the empowerment of those involved. The document can be downloaded from: **http://www.eldis.org/static/DOC17087.htm**

Radio and development: CTA's approach

The Technical Centre for Agriculture and Rural Cooperation ACP-EU (CTA) has always considered radio an essential role to play in rural development. It is immediate, cheap and accessible.

CTA has been preparing *Rural Radio Resource Packages* since 1990. They are available to journalists and broadcasters in ACP countries working on agricultural and rural development issues. Topics relevant to the problems of ACP farmers and rural entrepreneurs form the basis of these rural radio packages and more than 50 subjects have been covered. The most recent radio packages have been on youth and agriculture, marketing, organic farming and agro-biotechnology and food security.

Rural radio packages provide broadcasters with the background material they need to develop programmes on chosen topics. They give an all round view of selected subject and use interviews and presentations by farmers, specialists and others to bring across as wide a variety of opinions and experiences as possible.

CTA also encourages the adoption of a Community Radio approach. Taking advantage of recent developments in communication technologies, the community radio approach promotes participatory methods in rural programme making and broadcasting. It supports local organizations and agencies wishing to establish their own stations with information, training and technical advice. In West Africa Community Radio is well established and many small local stations exist alongside the larger national senders, who are progressively adopting the community radio approach. CTA is now concentrating its efforts on East and Southern Africa where it works with the SADC Communication Centre and the *World Association of Community Radio Broadcasters* (AMARC) network and the Caribbean and Pacific countries where it is inventorizing the status of local radio.

Experience has shown that information that reflects the cultural reality and experiences of local people has a strong local impact. This makes community radio a powerful rural development tool. People know the producers, broadcasters, technicians. Those taking part in the programmes are often their neighbours and friends. They go to them with their ideas, opinion and problems and discuss differences of opinion once a programme is over. Community Radio generates a sense of ownership and involvement and it is this that CTA is stimulating in information, its capacity building and awareness activities.

For a full list of topics and how to get the Rural Radio Resource Packages contact: Rural Radio Resource Packs (*Programme de Radio Rurale*). CTA, P.O.Box 380, 6700 AJ Wageningen, the Netherlands, or Andre Vugayabagabo, Email vuga@cta.nl
The Packages are available in English and French.

For more information on CTA's Community Radio initiatives contact Mrs Oumy Ndiaye, Manager Communication Channels and Services Department CTA, P.O.Box 380, 6700AJ Wageningen, the Netherlands, Email: ndiaye@cta.int

Globally Important Ingenious Agricultural Heritage Systems

Photo: Demetrio Innocenti

Rice terraces of the Ifugao in the Philippines are recognized by UNESCO as World Heritage.

David Boerma

FAO, together with governments, UNDP-GEF, UNESCO, international organizations, NGOs and civil society organizations, has developed a global initiative to safeguard the world's most valuable indigenous and traditional agricultural systems: the *Globally Important Ingenious Agricultural Heritage Systems* (GIAHS) initiative.

In many countries worldwide, agro-ecosystems and landscapes of outstanding value have been created, shaped and maintained by generations of farmers and herders through their agricultural and other livelihood practices. Such agri "*cultural*" systems testify to millennia of highly interdependent co-evolution of human societies with their natural environments. Their co-existence depends on the sustainable and often very sophisticated management and use of biodiversity, land and water through finely tuned forms of social organization. GIAHS harbour globally significant biodiversity, landscapes of remarkable beauty and valuable traditional knowledge systems and cultures. They provide essential ecosystem services and food security to millions of traditional and indigenous community members, but also well beyond their borders.

Many complementary and interwoven activities that take place in these landscapes are characterized by a gradual transition between fully domesticated space and wild areas. People consciously manage the interactions between parts of the landscape and between different species, to reduce vulnerability and risk and ensure long-term sustainability.

Photo: Author

Waru waru are an indigenous technology developed over centuries in the Peruvian Andes to mitigate the impacts of nightfrost on crops.

Today, this diversity is increasingly being recognized as a major resource for food security, poverty alleviation, and community resilience. However, many factors threaten the sustainability of these agricultural heritage systems, including: inappropriate international and national policy, legal and incentive frameworks; low community involvement in decision making; low priority given to *in-situ* conservation and local knowledge in development; demographic changes; replacement of customary institutions for natural resource management or contradictions between these and formal arrangements; and prejudice against traditional/indigenous knowledge systems, products and cultures.

To halt the rapid degradation of agricultural heritage systems, their dynamic nature must first be recognized. Their resilience depends on their capacity to adapt to new challenges without loosing their biological and cultural wealth and productive capacity. This requires continuous agro-ecological and social innovation combined with the careful transfer of accumulated knowledge and experience across the generations.

The GIAHS initiative has coined the term "dynamic conservation" indicating that the sustained existence of GIAHS depends on allowing their continued evolution. Dynamic conservation centres on strengthening the human management of these systems and its underlying social, economic, institutional, and cultural processes: e.g. innovation and transmission of knowledge, customary institutions for access to natural resources and benefit-sharing, social organization of labour and gender roles, as well as cosmovisions and value systems. The approach proposes in addition that where appropriate, science could strengthen traditional knowledge. Peoples' livelihood and economic viability can be improved through locking into niche markets for specific agri*cultural* products or responsible tourism, and other forms of livelihood diversification.

A key concern of the initiative is to strengthen the capacity of agricultural heritage systems to provide for peoples' livelihoods. To do this, the GIAHS seeks to understand the links between four factors: the drivers of change impacting on agricultural heritage systems; changes in human management of the agricultural system; changes in the provision of ecosystem services; and the impacts on human well-being. Participatory analysis of these factors is critical to the development of dynamic conservation strategies.

Since threats and opportunities relate to different levels of decision-making, the GIAHS initiative seeks to synergize community-based activities by improving policy, as well as legal and incentive environments at national and international levels. Considerable significance is attached to mobilizing national and international recognition of GIAHS, and new initiatives are being considered.

The GIAHS initiative is spearheaded by a global GEF Project. Selected pilot systems have been identified: Andean agriculture in Peru; small-scale agriculture on Chiloé Island, Chile; rice terrace systems in Ifugao, the Philippines; rice fish-systems in Zhejiang province, China; and the oases of the Magrheb. Participatory plans for their dynamic conservation are currently being developed as part of the long-term programme for the global recognition and dynamic conservation of GIAHS worldwide. ■

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For more information: http://www.fao.org/landandwater/giahs and Parviz Koohafkan, Director of the Rural Development Division, FAO. Email: Parviz.Koohafkan@fao.org