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LEISA

Magazine on Low External Input and Sustainable Agriculture

Changing farming practices

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Woman weeding rice, Port Loko, Sierra Leone.
Photo: Jeremy Hartley, 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 specialised 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.

28 Economic benefits of a transition to ecological agriculture

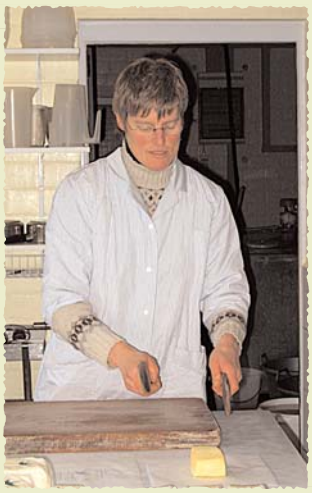
Sílvio Gomes de Almeida and Gabriel Bianconi Fernandes

José and Silvia Licheski have been farming together since 1983. In 1996, following the devastating effects of heavy rains, they decided to abandon the use of agrochemicals and make the transition towards a system based on agroecological principles. Their farm is now much more diversified, and uses different methods for maintaining and regenerating the agroecosystem's fertility. They benefit from having a wide range of products to sell, protecting themselves from the possibility of low prices for any particular product. With lower costs and adding value to their production, the family's financial situation is not only stable, but significantly better. Their decision in 1996 to change to a farming system based on agroecological principles, now shows clear economic benefits.

30 Organic farming increases independency and creativity

Lieve Vercauteren

A case of swine fever within one kilometre of their farm made Dirk and Ria Mouton reflect on the farming practices in their native Belgium. In 1998, the Mouton family decided to start producing organically, developing a complete farm plan which included the necessary steps towards an organic feed production scheme. By June 2000, the first organic milk was delivered to the local cooperative, receiving a higher price than conventionally produced milk. Production is stable, providing a good income for the Mouton family. Of equal importance to them, their farm contributes to a healthy environment: "I decided to become an ecological farmer because I feel that the environment should no longer be rated below economic importance".



DEAR READERS

The editorial team is pleased to announce that, as from March 2006, ILEIA is ISO 9001 - 2000 certified by Lloyd's Register Quality Assurance, Rotterdam. This is a certificate of quality assurance relating to our administrative procedures, as well as to our planning, reporting, monitoring and evaluation procedures. It ensures efficient and effective working practices within ILEIA. At the same time, we are happy to say that, worldwide, the LEISA magazines are now reaching more than 36 000 subscribers. We are very proud of this record number. But we are still interested in reaching new individuals or organisations. Do you know of somebody who would like to receive this magazine? Recommend a friend or colleague, sending his/her name in the subscription coupon in this issue. Subscriptions are also welcome at ileia@ileia.nl or on our website, http://www.leisa.info

The articles in this issue describe and analyse the ways in which the transition to a more sustainable agriculture takes place in different parts of the world. The contributions we received showed that this transition involves many different factors, and that it can be seen and analysed from many different perspectives. We are therefore very interested in your opinion. Please send your comments by post, e-mail, or via our website.

The Editors

Changing farming practices

Editorial

Over the past 50 to 60 years, the focus of agricultural development and research has mainly been on maximising yields, coupled with increasing specialisation of production and ever larger farm sizes. Although yields have increased substantially, contributing to raising total production, farmers and the environment have had to pay the price for keeping up with this development. During the last two decades, many farmers have chosen to make the transition to practices that are more environmentally sound and that have the potential to contribute to the long-term sustainability of agriculture.

Photo: Jan Vannoppen

Tree fodder for dairy cows of a farmer organisation, near the town of Mbale in Eastern Uganda. This organisation owns a cooling tank and the milk is sold daily to customers in Mbale.

Across the world, the factors that encourage individual farmers to begin this transition process share some similarities. The continuing drop in prices of farm produce and the rising costs of agricultural inputs have made farming increasingly unprofitable, leading farmers to seek new ways to increase the farm returns and incomes in order to stay on the land. Farmers and supporting organisations have been developing new practices that provide viable alternative options, and also working to find new and stronger markets for products grown and processed in a more ecologically sound system. Last, but not least, there is an increasing environmental awareness among all actors: consumers, producers and administrators.

Yet, the conversion process from conventional practices to more sustainable farming systems can be rather complex. It is not a simple task for large-scale or industrialised farmers to move away from a farming pattern that depends heavily on external and chemical inputs, and put their trust in a farming system which relies instead on the optimal use of natural processes. A conversion to a more productive and a more sustainable agriculture is also not straightforward for small-scale farmers. They are often marginalised, lack secure access to land and the natural resources available are commonly degraded, quite often by their very own farming practices. They lack access to resources and information, which makes it difficult for them to invest in improving farming systems. Efforts to improve farming practices, therefore, need careful planning and implementation. For that reason, it is crucial that we explore and analyse ongoing conversion processes globally, with the intention to learn from them and so be able to better support farmers in their transition processes.

Redesigning the farming system

There is no single recipe to follow when developing a sustainable farm. The move towards more sustainable ecological practices depends largely on local agro-ecological conditions and on local socio-economic circumstances, as well as on farmers' individual needs and aspirations. As such, the transition process can vary greatly from case to case.
However, there are general ecological principles which farmers can build on. One of the characteristics of sound ecological farming is that instead of focusing on the solution of problems, the main aim is to prevent these problems in the first place. Diversity on farms is one way to achieve this; with a range of crops and/or animals, farmers will suffer less from price fluctuations or drops in yield of single crops. Maintaining diversity will also provide a farm family with a range of products to eat or sell throughout a large part of the year.

Diversity of tree, crop and animal species on farms helps to establish a more balanced ecosystem and avoid the spread of pests and diseases. It also helps farmers to increase their sources of livelihood and avoid taking large economic risks. Other principles of ecological farming include maintaining a healthy soil, recycling nutrients on the farm, and utilising approaches such as integrated pest management (IPM).

A conversion to ecological farming requires farmers to learn about such ecological principles and to have access to innovative ideas, information, insights, and additional skills. Conversion to ecological farming requires a shift in thinking, and probably the most important conversion has to take place in the mind of the farmer. To the farmers' advantage, there are many organisations promoting ecological agriculture, which provide ample reflections and inspiration for conversion to a more sustainable agriculture (see Sources on page 38). In addition, learning about useful natural processes can also be facilitated through training courses, visits to experienced ecological farmers, studying suitable educational materials and consulting professional advice. The Farmer Field School approach has also proven to be a very effective tool for cultivating farmer learning and developing capacity for critical thinking (see also *LEISA Magazine* – March 2003; vol. 19 no. 1).

Several cases presented in this issue show that it is important to assess the opportunities and risks of the intended changes in farm practices, before starting the conversion process. This includes an analysis of the resources available on or close to the farm, and some creative planning of how these resources can best be utilized by the family. Some key questions here address the type of activities which should be developed. Which of these should be implemented first and which only at later stage? How can the different components of the farm be better integrated so that they support each other? Should new components be introduced to further complement and build up the agro-ecosystem? These may include, for example, animals for economic reasons and for manure production (Ntapi and Njakoi, page 14), *Rhizobium* strains for nitrogen fixation by leguminous species, or woody species in developing agroforestry systems. Vercauteren (page 30) discloses that introducing the growing of fodder grains mixed with a grass/clover combination solved one of the main worries of the transitional farmer -labour requirements for weeding- while the new feed production scheme also substantially cut down on commercial feed expenses.

The examples from Beechenhill farm in the U.K. (page 16), Cabiokid in the Philippines (page 24), and the Mouton family farm in Belgium (page 30) show that a conversion to ecological farming can be realised without involving many outsiders and within just a few cropping seasons. In the case of seeking organic certification, the length of this process is often defined more by the regulations set by the certifying organisation than by technical difficulties associated with the conversion. Such difficulties, however, often play an important role in the case of resource-poor or isolated smallholder families, for who it is generally more complicated to oversee all potential difficulties and risks of such a transitional process: where to get the required knowledge and skills, how to overcome existing socio-cultural barriers to change, how to survive if yields (temporarily) drop. In these cases, it is often advisable to follow a process that proceeds in slower steps and involves support from members of the local community as well as outsiders.

Laying a foundation for change

All over the world, there are projects or programmes working together with farmers on the development of farming practices that can provide a foundation for a transition towards more ecological farming systems. The focus is usually on introducing practices that are essential for the development of a more sustainable agriculture which at the same time involve low risk. An example of such a "best bet" technology is soil and water conservation. It is very difficult to develop a sustainable farming system where rampant soil erosion problems exist. Farmers who have managed to prevent the loss of soil nutrients, soil life and rainwater by investing time and energy in developing proper soil and water conservation structures (for example terraces, ditches, and vegetation strips on sloping land), experience immediate gains in crop production. Other relatively simple changes include better timing of operations, improved crop spacing and densities, using more appropriate tools and machinery, pest monitoring for more sensible pesticide application, and precision farming for manure or compost and water application based on local conditions. In some cases, conventional agricultural research has also focused on reducing the use of costly, scarce, or environmentally damaging inputs and some interesting agricultural technologies and practices have been the result. Such efforts can increase the efficiency of conventional practices and are widely promoted by development initiatives all over the world.

Finding alternatives

Going a step further than just trying to reduce the negative effects of conventional agriculture, conventional external and chemical inputs can be replaced with environmentally friendly alternatives. Examples of such "substitution practices" include the use of nitrogen-fixing plants and rotations to replace synthetic nitrogen fertilizers, the use of biological control agents rather than pesticides, and shifting to reduced or minimal tillage of the soil. This typically involves experimentation by farmers with locally available materials. Complemented with meetings and discussing with other farmers, these activities can be very enlightening and inspiring and help in building new knowledge and skills. In addition, they boost the farmers´ curiosity to experiment with more different options, as well as a feeling of solidarity between members of a farming community, all important aspects for ultimately developing sustainable farming systems.

However, as mentioned by Funes (page 10), the experiences in Cuba show that many of the problems that exist in conventional systems also occur in farming systems where changes are characterised by input substitution only. It is therefore imperative that smallholder farmers make the ultimate move to redesigning their farm in such away that maximum benefit can be derived from integrating different ecological principles. Some issues require special attention for farmers to be able to make that step.

Incentives for changing

Farmers are often prepared to experiment with, or adopt new farming practices, when they feel that they are in a position to carry out such practices, and when they perceive that some benefit will be gained from it. It is therefore crucial to include several socio-economic considerations in the process of changing farming practices with smallholder farmers.

As the different examples in this magazine show, there is clearly a need for farmers to become better organised. By developing local groups and community institutions, the creation of "social capital" can play a role in learning activities, in participatory planning, in experimentation and development, and in creating healthy, effective relations with external organisations and professionals who are willing to work in good partnerships with the local people (see Bakewell-Stone, page 20). Whereas a single farmer may not be able to provide a sufficient quantity to markets or buyers of ecological produce, forming producers associations can be advantageous.

Other encouragement for farmers can include the free provision of some initial tools and materials, which in some cases can be transferred to other farmers in a revolving scheme. The conversion process generally also requires financial investment and this implies that making some credit facilities available to farmers could be advantageous. It might be possible to develop such credit facilities within the local community or involve farmers in building financial reserves for in case unforeseen costs arise (see Ntapi, page 16). McClintock (page 26) and Peeters (page 22) show that, for some of us, educating and inspiring others can provide the lasting motivation for developing sustainable systems. Lastly, we believe that providing information is an essential incentive: showing that it is possible to make the transition to more sustainable farming practices, and that there are many advantages in doing so. ■

Photo: Author

Making the most of every available space – urban horticulture in a vacant plot in Cuba.

Cuba's enforced ecological learning experience

Julia Wright

In the early 1990s, Cuba was plunged into crisis as it lost its major source of food, fuel and agricultural input supplies with the end of the Soviet bloc. These losses hit Cuban agriculture particularly hard for four reasons. First, its agricultural system was highly industrialised, so much so that it was using more tractors and applying more nitrogen fertilizer per hectare (192 kg/ha) than similar production systems in the U.S.A., while mechanised irrigation covered over one quarter of cropped land. Second, Cuba was importing most of the inputs and foodstuffs it required for survival: in 1988, for example, it imported 100 percent of wheat, 90 percent of beans, 94 percent of fertilizer, 82 percent of pesticides and 97 percent of animal feed. In comparison, farms controlled by the Ministry of Agriculture were producing just 28 percent of nationally consumed calories. Third, just as Cuba was forced to enter the global sugar market, international commodity prices dropped sharply. Before that time, it had received, from friendly regimes, three times the world price for its sugar. Fourth, over the previous few decades the country had developed very little in the way of diversified agricultural products or light industry, either for export or for domestic consumption.

In 1990, trade with the Soviet bloc collapsed, leading to severe shortages of all imported goods. Over the space of two to four years, the availability of agrochemicals fell by 80 percent, while the drop of fossil fuels was 47 percent for diesel and 75 percent for petrol. Food imports were cut by half. The overall result was that both agricultural production and food availability fell to critical levels. By 1993, the nation was close to facing a huge food crisis.

Since colonial times, Cuba had never fed itself, and as early as the mid-1980s there had been some awareness of the negative impact of industrialised agricultural practices on food quality and human health, particularly of high nitrate intake in certain foods. Other negative impacts of this farming model included large scale deforestation, salinisation, erosion, compaction of soils and loss of soil fertility. Yields of the major commodity crops were also decreasing. At the same time, the complex structure of agricultural research was not very effective. There was a growing realisation that this approach to agriculture (which tended to consider the various elements separately rather than looking at the system as a whole) did not favour increased self-reliance, and that dependency on inputs should be reduced. Unfortunately, before plans for reform could be further developed, the crisis had begun.

Cuba's successful coping strategies

Yet, within a decade, the country recovered sufficiently to double agricultural production, increase calorific availability by 25 percent, and maintain a consistent and equitable social food programme. Major changes put in place by the State, or developed by lack of choice, included a focus on technologies based on local knowledge, skills and resources, instead of imported inputs. This emphasised the diversification of

agriculture and markets; downsizing of large farms; increased post-harvest efficiency; the development of regional food action plans, enabling greater access to land; the development of a strong urban agriculture movement, raising farm gate prices; investment in agricultural research, extension and training; and a reversal of the number of people leaving rural areas by improving rural conditions and opportunities. Total State subsidy to the agricultural sector fell dramatically, with estimates of drops between 50-90 percent between 1993 and 1996 onward.

Despite the centralised planning, the State gave up much direct control over management of food production and distribution. Initiatives and activities at the grassroots level were now encouraged, and production and food distribution became more localised. Production and yields of staple foods doubled and continued to increase, while most importantly, food availability was restored to acceptable levels. At the end of that decade, Cuba held more sovereignty over its food system than at any time in its recent history, and this new production system showed exceptional resilience throughout the 1990s.

The steady increase in food production, and other gains in the food system, were not only due to using more sustainable production techniques, many other factors contributed: crop diversification and switching to hardier and staple crops, increasing farm efficiency and autonomy through improved tenure and management arrangements, developing more localised production-consumption linkages, recognising the contribution of smallholder production, and increasing the range of incentives on offer to food producers.

Stages of transition

Contrary to popular belief, up to the year 2000 there had been no official State policy to adopt an agroecological or organic production system. Nevertheless, many individual parts of such a system were being employed, such as the development of production centres for biological pest control products, agroecological demonstration farms, ecological training courses, urban *organopónicos* (raised-bed gardens), and a social organic movement (Cuban Association for Organic Agriculture and Organic Agriculture Group). However, the driving force for the increase in agroecological approaches in Cuba over the 1990s was not a deliberate change in people's thinking about agricultural production, but was enforced by the lack of agrochemicals and petrol, and the need for self-sufficiency. There was no policy "gel" to hold these approaches together, nor to prioritise them over more industrialised strategies. Funes (2002), in tracking the development of agroecological farming in Cuba, identified that the principal agroecological techniques receiving widespread application have only been "input substitution". He refers to the period of the 1990s as the "first phase", the basis for further widespread consolidation of agroecological agriculture.

In practice, some farmers, groups and institutions in Cuba were still operating along industrialised lines. Some were substituting agrochemical inputs for biological inputs, whilst a minority had gone further to give up relying on any type of input, and instead focusing on balanced interactions with nature. There was a tendency for ministerial institutions to be more industrially oriented, compared to the few more dynamic, ecologically-oriented projects organised by pioneering farmers, researchers, extension groups or NGOs.

Yet not everyone started from the same position. Some groups, such as the organic movement, or pest and disease research groups, were already working along agroecological principles even early in the 1990s. At this time, other groups, such as the old State farms which had transformed into cooperatives, had been more highly industrialised, and these had since made huge changes in the 1990s to take on ecological techniques. There were also differences in the transition made in the production techniques for different crops. Certain crops, such as maize, had remained low-input, whereas production of crops such as banana had changed from high chemical input to a more ecologically-oriented approach. High-priority cash crops such as sugarcane had remained relatively industrialised throughout. Thus, although the agricultural sector as a whole may have been in the early substitution phase of an ecological transition, many individuals and groups had undergone huge transformations towards a more agroecological approach from their starting points at the beginning of the decade.

Challenges to scaling up ecological agriculture

The Cuban experience highlights that a lack of agrochemicals and fuel does not necessarily lead to a widespread agroecological production strategy. Further supporting mechanisms would need to be in place, including strong policies. Without this, the existing ecological components of the agricultural system may remain fragmented, while the positive interactions possible with a more integrated approach may not be developed. According to the perspectives and opinions of farmers and agricultural professionals, several key factors would be required to increase and mainstream ecological agriculture. These factors can be classified into three groups: those relating to knowledge, those relating to resource and technology access, and those relating to political and social factors.

The need to develop ecological knowledge systems

The extent of ecological innovation and experimentation was dependent on the availability of relevant knowledge. Almost all farmers interviewed identified the lack of knowledge and training as one of the main limitations to the increased use of ecological approaches. Overall, increasing "ecological literacy" would also serve to avoid some common misunderstandings surrounding ecological agriculture. For example, organic or ecological agriculture was directly equated with low-input agriculture or a system for the poor; in fact it was also referred to as "low-income" agriculture, while agrochemicals were associated with more affluent times. This perception lead to hesitancy over promoting ecological agriculture: ecological agriculture would mean low input and therefore low output, and thus be "anti-revolutionary" for not supporting Government policy to maximise yields.

Those farmers who associated ecological agriculture with a lack of agrochemicals had several concerns. Stopping using agrochemicals, for them, meant an increase in incidence of pests and disease, which would give them lower yields. In turn, this would mean a drop in product size and quality; increased workloads due to the lack of tractor fuel; increased risk taking; and fears that the degraded soils would only respond to chemicals. Ecological techniques were felt to be inappropriate for larger farms.

Similarly in the research sector, ecological agriculture was associated with low yields, subsistence farming, and a resource-poor situation generally. Low-input research strategies frequently involved not only zero chemicals but also zero irrigation or mechanisation, and were directed for use on marginal lands. Ecologically oriented projects in Cuba tended to select farmers seen as having lower potential as the target beneficiary group, and this would obviously affect project performance over time. As one extension officer explained: "We will select the producers who have received less benefits and who have less potential, to show that if these farmers can achieve success, then anyone can."

Yet, during the more than three hundred interviews, a huge range of opinions were expressed about the actual performance of agroecological practices. Some felt yield potential to be high, others low. Concrete changes which were suggested to increase understanding and knowledge on ecological farming included using the term "appropriate" rather than "low input" or "resource poor"; publicising research results on the performance of ecological agriculture; increasing understanding of the scientific basis for, and achievements of, ecological agriculture; and education on the targeted role that agrochemicals could play within a nationwide ecological system, such as in dealing with a rare pest plague.

Farmers also requested more strategic development projects to encourage both diversification and some regional specialisation, and to develop alternative energy sources on-farm. Generating knowledge in-country, with new research, was particularly important given the isolated circumstances of Cuba, where it was difficult to access knowledge and information from abroad. Recovering and incorporating traditional knowledge into this process was seen as being very important. To stimulate learning and innovation on cooperative farms, traditional knowledge within the work team, and the practice of one team (or individual) being responsible for the production cycle of a specific plot of land (rather than be continually rotated around the farm as was the old system) were seen as being useful.

Another way to speed up innovation was to provide support to innovators or "ecological pioneers". These individuals were found on farms, in research institutions, or were founders of organisations. It was noticeable that the most successful and innovative efforts and projects were initiated by such "pioneers" who held a clear vision on appropriate ecological approaches for specific situations. These efforts and projects were continually used as examples of success for others to follow, yet the individuals concerned had frequently worked on their own initiative with little official backing.

In Cuba, dissemination of agroecological techniques was often carried out in the same way as for industrialised agriculture, through top-down and technology transfer methods. This approach was still effective to a certain degree, however, methodologies were also starting to change, and these early attempts at introducing new approaches were yielding interesting insights as well as challenges to their further mainstreaming. Some of these are described in Box 1.

Box 1. Challenges encountered to the introduction of participatory research and extension approaches

- Trained individuals encounter challenges in trying to explain and apply their new knowledge with untrained colleagues.
- Researchers remain distrusted by farmers, because of previous experiences.
- Participation is easier to introduce into the less hierarchical co-operative structures.
- New approaches may threaten the establishment – both older individuals and institutions.
- Playing the role of facilitator makes it more difficult to take direct credit for successes and therefore to justify one's impact.
- With participatory approaches, the indicator of success is no longer purely yield.
- Farmers are less willing to experiment if they have to meet State production plans.
- Agricultural researchers do not understand social science.

The need to increase availability of and access to appropriate resources and technology

The second major consideration for ecological up-scaling, prioritised by almost all farmers, was the need for increased access to organic inputs, such as biological pest controls and manure. In fact it was not only access but also availability, price and delivery which were of concern to farmers. Lack of resources and technology was also seen as a constraint by agricultural support professionals, who recommended increased investment in the production and quality of biological inputs and their storage times.

The need to ensure supportive political and social factors

While in many respects the political response to the crisis of the early 1990s favoured an agroecological approach, other policy elements worked against this. These elements included the following:

- Environmental legislation was implemented by the Ministry of Science and the Environment but not yet internalised within the Ministry of Agriculture;
- The nationwide policy objective of increasing yields in the short-term conflicted with longer term sustainability objectives;
- Cuban farmers saw petrol fuel as being crucial to the success of their production systems, and there was little being done to develop alternative energy resources. Unless ecological alternatives could address farmers' concerns of irrigation and traction limitations, they were less likely to be accepted;
- More integrated ecological planning was required. State production plans frequently recommended growing crops which were not suitable to the local climate. Their "intensification" designs also often discouraged the use of green legumes, intercropping and fallows. Similarly, the conventional, centralised seed distribution system worked against farmers developing their own skills and expertise in seed saving;
- There was little incentive for farmers to produce quality products. Food quantities were still unstable, and low cost and high quantity were the most important factors in the market place, while much food was still being channelled, ungraded, through the State ration system.

Certain social factors were identified as being key influences in the scaling-up of ecological agriculture. One discouraging factor, according to farmers, was theft from their fields or stables. If they could not afford a guard, this limited them in the crops they chose to grow, their seed drying and saving, and their keeping oxen. Farmers were also unwilling to adopt technologies and practices that they felt were unproven, particularly in view of the previous top-down extension system that had, to some degree, encouraged dependency and mistrust. Some farmers, for example, were not attempting to search for biological pest control products but were waiting for the State to introduce them.

Some restructuring of organisations appeared to assist with the progress of ecological approaches, such as the integration of previously specialised farms and farm enterprises. Further restructuring was required, such as for the State seed supply service. It was often mentioned that practical change required a corresponding change in mentality, and that "attitudes take time to change". This perception tended to slow down any attempt to encourage change, because of the long time it might take. In addition, individuals generally did not identify themselves as needing to make a mental shift or receive training; the resistance to change always lay with some other group or individual. In fact, supporters of ecological agriculture in Cuba emphasised the need for a shift in thinking, in order to move from the stage of input substitution to that of agroecological management.

Photo: Author

With increased awareness of the importance of organic practices, there are many possibilities for the future of sustainable agriculture in Cuba.

Scaling-up ecological production systems

From the above we can conclude that the removal or absence of agrochemicals (or of private sector agribusiness) does not necessarily imply an ecological production system; such a conversion requires a conscious decision. Yet emerging evidence from Cuban projects and research is suggesting that ecological production is technically feasible and economically viable as a mainstream component of a nation's food security strategy.

Cuba's successes in improving food security and sovereignty, and overall agricultural productivity, demonstrate what it can do when the political will is there. It has yet to apply this will to developing integrated policy measures and an enabling environment for ecological agriculture. One motivation for doing so might come from analysing another aspect of Cuba's transition. Over a period of ten years it has moved from facing serious food deficits and shortages in calorific intake, to a situation where more than one third of the population of Havana is considered to be overweight and related diseases are increasingly common. High pesticide residue levels continue to be found in those crops prioritised by the State for high-input production.

Whilst Cuba has been able to ensure food for its people using a mixture of ecological and industrialised production techniques, it is the broader implications of these strategies that affect the health of the nation, and of the environment. Soil degradation remains a huge problem for the agricultural sector, as do the repeated droughts for which more adaptive and resistant crops and cropping patterns, and sustainable water management systems, are required.

Some positive side effects of the modest changes towards agroecological approaches are already emerging. Indirect environmental and health benefits of the reduction in agrochemical use have already been noted by farmers. Research which has been forced to refocus on ecological approaches has come up with a number of sustainable innovations. The Cuban food system is already benefiting from a more diverse range of fresh food. For the future, other benefits of agroecological production, such as developing a commercially viable organic export sector and producing high quality produce for the growing internal tourist market, also holds potential.

Cuba is distinctive in its mode of centralised governance, and some might argue that because of this it is difficult to compare these experiences to other situations. However, in many parts of the "free world" decisions over agricultural resources and the food supply chain are centralised amongst a few corporations, reducing the extent of real choices for the consumers or producers. One feature of western farming and food systems in recent years has been that they are becoming more mechanised and uniform. These systems, with long food supply chains, play a large role in how fossil fuels are used. By contrast, Cuba has been moving in the opposite direction, towards more decentralised, less mechanised, regional production and consumption systems, with greater levels of independence, diversity, and complexity. As and when the predicted global fuel supply crisis happens, Cuba's example provides lessons as to how it might be addressed. ■

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The research that formed the basis for this article was undertaken out of the Social Sciences Department of Wageningen University, the Netherlands, supported by the Marie Curie Research Awards of the EU and by WOTRO. Fieldwork was undertaken in Cuba between 1999-2001, including interviews with over 350 farmers, researchers and extension workers, and Ministry staff from the sectors of Agriculture, Education, Environment and Health.

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Input substitution or ecological agriculture?

Fernando Funes Monzote

In the fifteen years since the agricultural crisis struck, Cuba has gained extensive experience in how to change towards a more sustainable agriculture. The basis for this agricultural transition was already laid at the beginning of the 1980s when some of the national agricultural research focused on finding ways to substitute agrochemicals with organic inputs. The main objective at this time was to reduce production costs in commercial agriculture as agrochemicals were expensive and therefore unsustainable from an economic point of view. As a result, a wide range of bio-fertilizers were developed. These efforts were later complemented with more focused research and action, leading to extraordinary results at a national level.

Bio-fertilizers

Most of the bio-fertilizers developed were bacteria such as *Rhizobium*, *Azotobacter* and *Azospirillum* which fix nitrogen in association with legumes and thereby could replace inorganic nitrogen. In some cases the use of these bacteria replaced up to 80 percent of the inorganic nitrogen usually applied. Other technologies later developed to substitute for the use of agro-chemicals included mycorrhiza, bacteria which increase the availability of phosphorus, and the use of green manures and leguminous cover crops. Some traditional practices were also revived: oxen teams were used for soil cultivation, to avoid soil compaction, and which also replaced herbicides through mechanical weeding.

Worm humus and compost are currently applied on a large scale. By 1998, the national production of these two organic fertilizers had reached a total of almost 700 000 tons. *Cachaza* or "filter cake" (a by-product from the sugar industry containing impurities removed from cane juice) is now used instead of chemical fertilizers in most of the important commercial crops, especially sugar cane. With one application of 120 to 160 t/ha, this organic fertilizer can completely replace chemical fertilizers for three years in sandy soils.

Biological pest control

Research on biological pest control had been going on in Cuba since the 1960s. The knowledge generated made it possible to shift to a biological pest control strategy on a national scale in response to the crisis. More than 270 biological control reproduction centres (known as CREEs) were established throughout the country. The production of bio-control agents (fungus, bacteria, nematodes, and beneficial insects) is small scale and decentralised, resulting in, among others, the production of 1300 t/year of *Bacillus thuringiensis* sprays (used to control lepidoptera), 780 t/year of *Beauveria* sprays (for controlling beetles), and 200 tons of *Verticillium* (for whitefly control). Integrated pest management (IPM), combining biological and limited chemical pest control together with cultural management, has been the most commonly applied strategy. Nationally, applications of pesticides to cash crops were reduced twenty fold in a 15-year period, from 20,000 tons in 1989 to around one 1,000 tons in 2004. Today the use of pesticides continues to decrease and many biological control methods have proved more efficient than inorganic pesticides.

Animal traction

Since 1989, the number of tractors in Cuba dropped dramatically due to a lack of spare parts, maintenance, and fuel to keep them working. This stimulated the revival of the traditional practice of using oxen for ploughing and transport. About 300 000 oxen teams were trained, leading to a much reduced fuel dependency in the new production systems. The traditional knowledge, skills and practice of oxen management has been largely recovered, contributing to achieving many agroecological goals.

The sustained use of oxen therefore led to changes in land use patterns, requiring more integrated systems. Many livestock farms that previously specialized in milk or meat production started using oxen to transport fresh forage and plough land that would grow crops. Many cooperatives previously dedicated to specialised crops such as potatoes, sweet potatoes or vegetables created "livestock modules", using dual purpose bovines to produce milk for farmers and their families, as well as to replace oxen teams over time.

Cropping practices

Crop rotations and polycultures (mixed or multiple cropping) have been used increasingly in order to stimulate natural soil fertility, to control pests and to restore the productive capacity. Research results, as well as actual production figures, showed an increase in the yield of the majority of the economically important crops. Experiments confirmed that the use of soya bean in rotation with sugar cane increased sugar cane yields from 84.4 to 90.6 t/ha with an additional production of 1.7 t/ha of soya bean. Polycrops of cassava and common beans under different cropping systems also resulted in higher total production when compared to cassava or beans grown as a single crop.

Beyond the input-substitution strategy

These examples of input substitution in Cuba had a very positive effect on national food self-sufficiency as well as on the environment. The experience is considered the first nation-wide attempt at converting a national food system. However, the resulting production systems may still have many of the same problems that occur in conventional systems (i.e. the monoculture patterns). In order to achieve a sustainable production system, the input substitution strategy needs to evolve into an agroecological production systems approach. Only by making more far-reaching changes towards regenerative agricultural systems than those based on inputs –even if these inputs are biological or organic– will it be possible to increase sustainability in the longer term. The integration of crops and livestock into a more diversified production system is one example of a system based on agroecology which allows for increasing food production while regenerating the environment.

The strategy followed by Cuba created conditions such as better infrastructure and knowledge about more sustainable low input and input substitution technologies. This provides an exceptional starting point for the development of an integrated, sustainable agriculture. Even more important is the high level of awareness and understanding of ecological agriculture developed among the population and the organisational and human capacities developed for innovation and exchange of experiences. Never before has Cuba (or any other country) had such opportunities for developing and implementing a nationwide agroecological model for rural development. ■

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Photo: Authors

Coffee producers and NGO staff discuss producing organic honey as part of their diversification strategy.

The transition process to ecological agriculture in Chiapas, Mexico

Teresa Santiago and Max García

The southern Mexican state of Chiapas is the country's largest producer of coffee. It is grown mostly by small scale farmers, with land holdings of 2 hectares or less, and more than 90 percent of the total production is exported to the United States and Europe. During the last two decades, more than 10 000 of these farmers have opted for organic production systems, and have since benefited from a better price for their coffee. The main motive for this transition has been the general belief that there is a large market "out there", willing to pay higher and more stable prices.

The change in production systems has taken place without any specific governmental support, and the State has not defined a particular policy related to organic agriculture. On the other hand, this change has been supported by the work of many NGOs who, for more than 30 years, have promoted alternatives to the intensive conventional agriculture predominating in the country, and to the market mechanisms associated with it. Their work has been shaped by their interest in the local population's natural resource management and in their local knowledge.

Arte Natura

One of these organisations is *Arte Natura*, a small Mexican NGO working in the region known as Meseta Comiteca, near the border with Guatemala. *Arte Natura* aims at strengthening the capacities of the local population towards sustainable development, providing specific advice and also organising training workshops and courses. As part of a broad programme, it promotes a low external input agriculture, with the aim of promoting local production, consumption and sale.

Having been working with many farmer organisations over the years, its staff was well aware that many farmers are interested in organic agriculture and the possibilities this brings, and that many of these organisations had effectively "become" organic. They also knew that the transition to an organic production system is not necessarily easy or straightforward, and that there are many more aspects than just trying to follow the organic production

standards, getting a certificate and selling the produce abroad. To improve and further develop its own extension and advisory work, *Arte Natura* did a small study in the state of Chiapas, trying to identify the most important aspects involved in the transition processes, and the attention each of these aspects received.

They selected 5 farmer organisations of different sizes, working in different regions of Chiapas. Three of them are coffee producers, one produces lychee (*Litchi chinensis*, fam. Sapindaceae) and the fifth makes use of the forest resources (timber production). Two of these organisations are relatively new, while farmers in the other three have been working together for almost eight years. Coffee production in the oldest organisation has been certified as organic for more than two years. And although these organisations are different, they have some common features: members are smallholders, and all of them belong to the Maya ethnic group. They all share a common interest: to earn a better price for their produce by being certified organic, and so improve their household's financial situation. Representatives of the five organisations expressed their interest in fulfilling the requirements for getting a certificate of organic production, and in actually getting it, as a necessary first step.

Research started in April 2004, with field visits, interviews and group discussions with farmers from the five organisations, and with staff from other NGOs who are supporting their work. *Arte Natura* also planned a meeting to present the preliminary observations and results to all those involved, hoping to get feedback.

Unión de Productores Maya Vinic

This is one of the organisations selected for the study. Maya Vinic is a cooperative of small scale coffee producers from the districts of San Pedro Chenalhó, Pantelhó and Chalchihuitán. It was founded in July 1999, during a meeting organised to discuss the difficulties farmers face in selling their products. It builds on a local organisation founded a couple of years before, "Las Abejas", set up to defend the rights of the indigenous population in Chiapas.

Maya Vinic's mission is to get a fair price for its coffee, and they always work to ensure the coffee is of high quality. Organic production systems are "the way our forefathers did it". The cooperative also organises training courses, and is now interested in new activities, such as the production and commercialisation of organic honey.

During the following 18 months, farmers and extension workers willingly cooperated with this study, although in some cases it was not easy to get their opinions. Some farmers complained when they felt they were being evaluated, as if the study had been commissioned by a certification body to assess their progress or failures. Others were clearly unwilling to share the difficulties they experienced or the mistakes they might have made. At the same time, some extension workers expressed their dislike about discussing themes they feel are not their main field of expertise. In spite of these limitations, the discussions held and the subsequent analysis proved very interesting and valuable. It showed some common patterns, clearly reflecting that, whatever the differences in the farmer organisations, their transition process to certified organic production involves some common factors.

More than just technical aspects

All those interviewed mentioned the need to work on various technical aspects as an essential part of their transition to an organic production system. The first of these is the management of pests and diseases, considering the large impact these can have on production and productivity, and that under an organic system farmers cannot use the chemical products they have become used to relying on. Farmers and extension workers mentioned their interest in live barriers, which protect their plants against the wind, and also help to minimise the attack of the most common pests. They also highlighted the importance of further crop diversification, something directly related to an ecosystem's resilience. Representatives of all organisations also expressed their interest in reducing soil loss. This was seen with the use of cover crops, construction of terraces or contour ditches.

In general terms, all interviews showed a sincere concern for a more balanced system as a whole, and not just being concerned with the need to fulfil the criteria for obtaining an organic production certificate. But the analysis showed that farmer organisations also take other aspects into consideration, as the transition process involves a combination of ecological, social and economic elements.

Organisational aspects

Of the five organisations surveyed, four regarded organisational aspects as being the most important issue, even more so than the need to improve or change technical production aspects. Looking back at their own transition process, organising themselves was the first step in all cases. The need for farmers to work together is due to the size of their farms. As smallholders, only small quantities are produced individually, while traders prefer to work with bigger volumes. Fortunately, farmers are used to working together, and to being part of a larger entity: in Chiapas, as in Mexico in general, there are many different local organisations in every village, with farmers working together for many different reasons.

The analysis, however, also showed that many of the existing farmer organisations are not large enough to be economically efficient, and thus encounter the same difficulties as individual producers. The need to get together with other organisations can easily result in them being "absorbed" by a larger organisation, thus losing their independence and autonomy. In addition, small organisations coming together or coordinating their activities has also lead to the formation of a bureaucratic entity in charge of the coordination itself, with the risk of generating an elite group of farmers or leaders with access to information and with greater opportunities to present their ideas or interests.

Commercialisation

This aspect relates to marketing and trade. This seemed particularly relevant, as all five organisations aim at selling their produce at a higher price or to a more steady (and thus "safer") market. But the survey showed that these points, although relevant, are not the top priority for farmers or their organisations. Three organisations considered this as the least important aspect, while the other two ranked it as next-to-last.

One of the explanations given is that Chiapas is already known worldwide for the production of organic coffee, and thus their produce is well received by those in the Northern markets willing to pay a higher price. But discussions with the different

stakeholders showed that the picture is not so simple, and that a lot of effort is required to get the products to these markets. This inevitably means that farmers need to obtain a certificate of organic production, and then form part of the organic commercialisation chain. The problem is that farmers in Chiapas constitute only a small group of actors within this chain, and that any new farmer organisation has to compete with many others, and establish the necessary links. At the same time, the fact that most of the production is sold on international markets, disregards the importance and possibilities of selling in the local market. When looking at food security and self sufficiency, efforts at promoting the domestic consumption of local products face many difficulties.

Finance

Farmers and extension workers gave different answers as to the importance of this aspect, although all agreed that, together with commercialisation, this has been one of the aspects receiving least attention.

All farmers, regardless of the crop and of their farming technique, mention the importance of having access to loans or credit. As in most other regions and countries, farmers in Chiapas have many difficulties getting loans or credit. But farmers in the organisations surveyed mentioned that this is even harder for them, as banks or finance entities consider organic crops to be an even more risky enterprise than usual, as they are more likely to suffer losses through pest and disease attack. They also consider that farmers have fewer tools to fight this with, so production is not "guaranteed". More than showing that this is not important, the fact that this aspect is low on every farmer organisation's priority list just shows how difficult it is for them to do anything about it.

Relationship with others

One of the most common observations mentioned in relation to the transition process is that it takes place in virtual isolation. Farmers interested in modifying their production systems generally do so without referring to any previous experience, without analysing previous cases, or without knowing what happened to those farmers who went through the same process before them. This was seen to show that farmer organisations and supporting NGOs give little importance to analysing an experience, and to sharing their learnings with others. It also highlights the general communication difficulties which the rural areas face.

But the analysis also showed some weaknesses in the relationships established between the farmers and the NGOs. In spite of the strategies followed by most NGOs, extension and advisory work is not necessarily participatory. Extension workers recognise that farmers' knowledge is valuable, but seem to consider it being at a lower level than the knowledge "brought from outside" by the NGOs. Consciously or not, farmers assume a passive role themselves, as if expecting to be told what they need to know. The development of an extension programme, as a result, depends more on what the extension workers have to say, or offer, that on what farmers actually require or need.

Final remarks

This study confirmed that in Chiapas, as in many other places, the decision to change, or the transition process towards organic production, is not always based on environmental concerns, but that it is mainly motivated by economic interests. There is no doubt that a better income is the main driving factor, but both farmers and the institutions that support them do have broader interests. Farmers' practices, for instance, show concern for the farm's biodiversity, water and soil conservation, sowing patterns or the association of certain crops. At the same time, the programmes of local NGOs include much more than just production for export, looking at local practices and techniques, food security, crop diversification or even human rights.

Another key issue resulting from the analysis carried out is that the transition process in this region does not follow a particular model or strategy. Both farmers and extension workers were seen to be solving problems as they appeared, depending on the external resources available (labour, money, external support). At the same time, the different organisations surveyed showed that, even under similar circumstances and with similar motives, each experience of a transition process for will be different,

Photo: Authors

Organic coffee production is based on the Maya culture and traditions.

depending on the importance attached to the different aspects mentioned here. *Arte Natura*'s study thus showed the importance of planning the process thoroughly, as a first step for both farmers and the institutions that support them.

The organisations' experience has shown that the transition to organic agriculture is not an easy process. But, in spite of the difficulties, it must also be said that the processes taking place in Chiapas have been successful, as a large percentage of farmers in this region can now be described as organic producers. Looking into the future, it is important not to limit the transition process to the technical aspects of production. On the contrary, the sustainability of the process can only be ensured by considering all the different aspects together when planning future activities. ■

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Towards more sustainable livelihoods

Jackson Ntapi Nk. and Henry Njakoi

Livelihoods in Bamendjo, in the Bamboutous Division of West Province, Cameroon, are based around agriculture. This area in the western highlands has a rather cool climate and abundant rainfall, and is characterised by an extremely high population density that greatly limits the availability of land. As a consequence, farmers cultivate the same small piece of land for many years without fallowing. Maize is the staple food in the whole region, and, with rapid developments in the commercial poultry sector, its price has increased sharply over the years. But farmers have not been able to benefit much from the increased demand for maize and its higher price, as most families can hardly produce enough for their own consumption, basically because of the poor soil conditions on their farms. Farmers here cannot afford farm inputs like fertilizers. Some people move to urban areas in search of alternative means of making a living.

Integrating animals on farms

Many development organisations in Cameroon promote the use of organic fertilizers in order to improve crop productivity, and one way to do this is by keeping farm animals for food or for economic reasons, with animal manure as a useful by-product. Intensive pig-rearing is most often suggested to farmers in densely populated areas where lack of land is a barrier to the traditional, free-range systems of keeping animals. Pigs were already common farm animals in Bamendjo when some NGOs, in collaboration with the Ministry of Fisheries and Animal Husbandry, started working on introducing small-scale intensive pig-keeping to farmers. The rearing of pigs has, in recent years, experienced a rapid move from the traditional free range systems to a management system in which greater numbers of pigs are kept permanently in the pigsty. Compared to the traditional systems, there are many advantages of keeping pigs in proper enclosures. For example, they cannot destroy crops, diseases can be controlled more easily, manure can be collected and used more efficiently, as well as there being fewer cases of the animals being lost or stolen. However, farmers who started keeping their pigs in enclosures also experienced a lot of challenges, which in some cases even threatened the continuation of the project.

Small-scale farmers encountered technical as well as socio-economic constraints during implementation of the more intensive system of pig-rearing. Animal health programmes were not functioning well and regular vaccination of animals, nor parasite control could be guaranteed. Diseases, such as African swine fever and *Erysipelas*, had a devastating effect at times. Equally, feeding the animals posed challenges to intensive pig-keeping. Small-scale farmers were not able to produce a lot of feedstuff themselves, nor could they afford the high cost of feeding pigs commercial feeds all year round. Marketing opportunities for pig products were also not assured. The main factor here was that some villages or areas are dominated by Muslim people who do not consume pork. But there are also great differences in dietary preferences between different groups of non-Muslims. Therefore, market outlets for pig products were not always available to farmers and prices for pork varied largely from one area to another.

Holistic approach

Heifer International has been promoting the integration of animals in local farming systems in the fight against hunger and poverty in Cameroon. However, for this international development organisation, farm animals are the entry point for their work with communities interested in moving towards more sustainable farming systems. They use a comprehensive approach to rural development, considering all the different aspects of local livelihood systems, and involving farmers right from the start. This way, Heifer Cameroon has been able to understand the major constraints experienced by local communities, and develop appropriate measures to counter them. In all their activities, women are encouraged to participate and a substantial number of the farmers who received attention, training, and animals from the project are women. More importantly, a family centred approach is encouraged, which promotes full participation of all family members.

Photo: Heifer International

The programme actively involves women in breeding or fattening pigs.

Heifer Cameroon works with farmer groups who have shown an interest in developing sustainable agriculture on their farms. When a new application by a farmer group is received, a Heifer project officer in charge of the zone where the application comes from will assist the group members in making a comprehensive assessment of their farms. Together they examine, for instance, the available resources, like land for food and fodder production, existing bottlenecks such as the prevalence of pests and diseases, but also what opportunities there are for selling farm produce in local markets. Another important consideration during this assessment is the management capacity of the group leaders. Proper management, as well as good collaboration and understanding between members in the group, are seen as very important factors. The group as a whole is expected to be in charge of monitoring and evaluating certain criteria, of planning new activities and taking decisions where needed.

In Bamboutous Division, Heifer is supporting four farmer groups. One of these groups is common initiative group *Eleveurs Agriculteurs Solidaires de Bamboutous*, consisting of 10 local farmer families. Keeping pigs and eating pork is part of their culture. Most families in this area have long-term experience with

keeping pigs, but productivity has been low. Only 2-6 piglets were born per sow, while fattening of the animals could take up to 16 months before they could be sold. Generally, they kept their animals in fenced areas, sometimes with cemented floors. Often, the animals were allowed to roam free after the crops were harvested. While in confinement, the animals were fed only with some kitchen waste, grass and, if within their means, sometimes a little bit of concentrate feeds. There was often no money for vaccination or routine deworming of their animals and African swine fever was rampant. The manure produced by the animals was rarely used to improve crop production. Consequently, in the past, pig-keeping did not contribute much to improving the livelihoods of farm families here.

Providing new knowledge

After the farm assessment with Heifer staff, the members of *Eleveurs Agriculteurs Solidaires de Bamboutous* participated in a training on technical issues in sustainable livestock and crop production. This training included how to make compost from animal dung and crop residues, which could then be used by farmers to fertilize their crops. The use of compost has indeed increased crop yields; maize yields in particular are now much higher. There were also training sessions on leadership capacity, and building cooperatives in order to improve the functioning of farmer groups and their ability to compete with other producers. Family focused trainings included awareness raising related to HIV and AIDS, as well as training on gender issues, with the aim of promoting participation by all, irrespective of sex and age.

Before they received any animals, the members of *Eleveurs Agriculteurs Solidaires de Bamboutous* were also trained by Heifer staff on proper animal rearing techniques, taking animal welfare and the impact on the surrounding environment into consideration. During this time it became clear to the group that the intensive system of pig-keeping does not require so much financial investment, but more time and effort needs to be spent on the pigs, while the farmers will need some new technical knowledge. After the training, some members who were selected by the group received four weaned piglets (2-3 months old) of a strong breed from Heifer Cameroon, and also some specific feed ingredients, some seeds, and certain agricultural equipment. At a later stage, these first farmers pass on four piglets to other farmers in the group, and this will be repeated until all group members have received piglets.

Improving the system

Because animal diseases are a major problem, several adaptations to the traditional pig-keeping system were designed together with farmers. Observations had shown that stray pigs are a serious infection hazard and farmers are now encouraged to build a fence around the sty to prevent all contact between their animals and stray pigs. Many farmers are now also keeping their pigs in the sty on a raised slatted floor at between 0.7 and 1.5 meter above the ground to reduce the contact that the animals have with their own droppings.

Heifer also provides training to some selected farmers in each farmer group on basic and low risk health care operations like deworming, external parasite control, and administration of antibiotics. This has greatly reduced the costs for such preventive operations. Strengthening existing indigenous knowledge on animal health care forms the basis of Heifer Cameroon's ethno-veterinary project which aims at promoting local knowledge on the use of plants in the treatment of animals, and to help farmers establish special gardens of medicinal plants. All these measures have considerably reduced health problems and pig mortality.

Another way for families to save on production costs in the intensive pig-keeping system is by substituting commercial feeds with maize they grow. Feeding costs can account for more than 60% of total pig production costs. By using compost made with pig manure, yields of crops, including maize, have considerably increased. As farmers master the techniques of compost making, they will soon be able to further reduce expenses for animal feeds, and the compost can also be used when growing other crops.

Improving returns

Heifer Cameroon has encouraged farmers to specialise in specific products and activities in certain areas. As far as pig-rearing is concerned, farmer groups located in areas with little demand for pork meat, such as villages with large Muslim populations, are encouraged to focus on the breeding of pigs. Because of a relatively low pig population in such areas, and consequently low incidence of diseases, these farmers are best able to produce healthy young animals that can be sold to other farmers who, in turn, concentrate on fattening the pigs. These farmers are found where people like eating pork meat and where selling pork is no problem. Heifer Cameroon has some project groups in Koutaba, in the Noun Division, who are focusing on breeding while the four in Bamboutous Division, including *Eleveurs Agriculteurs Solidaires de Bamboutous*, are fattening groups. Several members of this group now generate substantial income from the sale of pigs for slaughtering as well as from selling any excess crop produce such as maize, cocoyam, potatoes and vegetables produced using pig manure as fertiliser.

In order to ensure that these successful pig-keeping enterprises can be sustained by the farmer groups after the project ends, each group has been encouraged to start an account into which each member pays 30 percent of the costs of feeds, drugs, or seeds received for free from the project. Such a "savings account" or "insurance policy" belongs to the group and is managed exclusively by its members. Heifer Cameroon only ensures, through training and some follow up, that there is a participatory leadership in the group to prevent money being mismanaged and to promote the participation of all members in deciding how the funds are used or invested. Apart from building financial reserves, the groups are also encouraged to develop into small cooperatives. The main aim of this is to be able to buy feeds in bulk at lower costs and have the possibility of developing other economic activities.

This Heifer approach to community development, with intensive pig-keeping as its central concern, has managed to support farmers in Cameroon in the transition to more rewarding and sustainable farming systems. ■

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Beechenhill Farm finds an organic future

Sue Prince

We live at Beechenhill Farm, an organic dairy farm situated on a south facing hill in the Peak District, in the centre of England. It is 25 miles south of Manchester and lies at 300 metres above sea level. The farm is in the Peak District National Park, Britain's first and busiest national park, a beautiful landscape with 22 million visits per year! It is the second most visited national park in the world; only Mount Fuji in Japan gets more visitors.

The soil type is a good loam on limestone, light with a tendency to drought. Rainfall varies between 1000 - 1300 mm per year. The climate is frost free from April to October. The farm has running tap water and no natural water source other than two rainwater reservoirs, both built in early 1900s.

People

We are Terry Prince, farmer (and farmer's son) and me, Sue Prince (not from a farming family), rural entrepreneur, artist and small tourism business operator. Our two daughters have grown up and left the farm, although they would like to come back one day. As well as Terry and myself, we employ three ladies who help with cleaning the tourist accommodation, and several people on a contract basis (gardeners, a relief milker, stone-wall builders), who help with manure spreading and other farming activities.

The Farm

Beechenhill Farm is 37 hectares of grass in 16 fields, all surrounded by 7 km of pale grey limestone dry-stone walls.

The farm has a range of traditional limestone buildings, two of which have been converted into tourist accommodation, a romantic hideaway for two and a wheelchair accessible cottage for six. We also offer bed and breakfast holidays in our farmhouse. Every year we get about 700 tourists staying at Beechenhill and 20 farm visits, bringing the annual total of visits to approximately 1200. Being in the Peak District National Park is a definite advantage to our tourism business.

We have 40 organic cows and 15 followers (cows which are not yet producing milk, but will replace those from the main herd when necessary). The cows are milked by machine in a herringbone milking parlour. They stay inside from October to April and eat our own silage (grass which is cut when green to be stored for feed) and organic concentrated cow food. In June each year half the farm is mown and then in August a quarter of the farm is mown again, to make silage. Silage is stored in large, black plastic bags. The cows drink mains water and water warmed by the heat exchanged in the parlour's milk cooling system.

Reasons behind conversion

Between 1990 and 1995 Terry stopped using organophosphates on the farm. Organophosphates are very powerful nerve agents, used in many products, including fertilizers, pesticides, sheep dips, wormers, and insecticides. We were hearing too many tales of farmers badly affected by sheep dip (a liquid mixture containing pesticides in which sheep are dipped to kill parasites). Then in 1995 he was suddenly affected by asthma while dipping the sheep.

Photo: Author

Terry Prince showing a visitor how to milk a cow.

In 1997 I heard a radio programme about globalisation - how ultimately, things will be made wherever in the world it is cheapest to produce them. Suddenly I realised that means milk too! He was actually citing consumer goods like fridges and washing machines, but the principle would surely relate to milk as well! It seemed crazy to continue to try and compete with huge industrial farming enterprises, we needed to specialise and create distinctive products.

The whole ghastly experience of BSE (Bovine Spongiform Encephalopathy, also known as "Mad Cow Disease") in the U.K. made us feel angry and out of control. For example, we were unable to find out what our cow food consisted of. Then, as I investigated other systems, I discovered for myself that nitrogen fertilizer started off as a waste product from chemical companies during the Second World War. Just looking through the U.K. farming press I realised that modern agriculture is addicted to the products of multi national companies - we were junkies! Terry was becoming more dissatisfied with the conventional way of farming. He was feeling under pressure from many outside influences. The farm was not big enough to be a large commodity producer, and in 1997 farmers didn't see themselves as purely "food" producers.

As someone not from a farming background, an "in-comer", I was trying to understand why we were doing what we were doing. Why were we buying nitrogen to put on the land when, if we plant clover we get it for free from the air? Why were we routinely treating our cows with antibiotics? I knew how antibiotics messed up my own system; surely they did the same for our cows? As we learned more and more about organic farming, it seemed an intelligent way to regain control of our life, to work with nature and not to fight it. We fell in love with the organic philosophy, and the more we learned, the more sensible it became to try and understand how the planet works and live in sympathy with its systems.

We had to decide to be different - not just follow the herd. We needed to take decisions for us and not mind that we were regarded as being eccentric by some local people.

The process

We needed confidence and information and role models. We had farmed conventionally for 20 years and when Terry's uncle heard we were going organic, he said "Oh well, I suppose it's OK, but please tell me you don't believe in it!" To his generation it seemed a crazy decision; to turn our backs on the amazing scientific advancements in modern agriculture.

Farmers like looking over other farmer's walls. Terry was nervous about a sudden increase in thistles (regarded as a weed on most conventional farms in the U.K.) making the farm look bad. It gave us a real boost to visit successful organic farms during our conversion period and see robustly healthy cows, healthy milk yields and, yes, healthy thistles that nobody minded.

We had advisory visits but then spent far too long agonising over the conversion plans and documents. One adviser suggested systems that would work for our land. Because the farm is small and high up, with thin soil, we couldn't run a rotation, so a grass-only system was the answer. Sheep were to be an important element, producing organic lamb for sale, and eating ragwort (*Senecio jacobeae*), a common British plant which is poisonous to cows.

We decided on a loose housing, straw yard system for over-wintering our milking herd, which meant that the roof on the barn had to be raised to enable tractor access for cleaning out. We also extended the new roof over the loafing area to reduce rain water diluting the manure.

The second free adviser helped with our financial planning. He showed us how to prepare our conversion plan, register with the Soil Association (the U.K.'s largest organic certification body, also linked to a charity, promoting organic food and farming) and apply for the government's Organic Farming Grant Scheme. We took soil samples from all our fields and discovered that even though we were on limestone, they had become quite

Photo/painting: Author

Gentle Food : inspired by Swedish folk art, Sue Prince's artwork here depicts the production of organic milk.

acidic, so the whole farm was dressed with lime. We were also advised to spray herbicide on some fields to reduce the amount of dock (*Rumex* spp., a common plant often regarded as a weed) before conversion. This was partially effective and gave us opportunity to cope with all the other issues, without also having to deal with an excessive weed problem at the beginning.

Difficulties

The preparation to convert took us about one year, while the conversion process itself took two years. We had to carefully choose the best time to start, so we could maximise the amount of silage we could make. Because we wouldn't receive the organic premium on our milk price until we were fully converted, another crucial factor was to time the conversion of the production of milk (the last three months) to be as inexpensive as possible, with the cows eating grass rather than large amounts of organic concentrate. So we decided to do this in June, July and August 2000, and therefore started the conversion in June 1998.

Conversion cost a considerable amount of money. We had to change the shed roof (18 000 pounds sterling), and we needed a better tractor to lift silage bales (£8000). The organic cow food cost £230 per ton compared to £130 for non-organic. Over five years from 1998, we were fortunate in receiving £12 000 from the Organic Farming Grant Scheme.

During our conversion the whole Genetically Modified Organism (GMO) issue arose, bringing with it more paperwork and effort ensuring that no GMOs came on to the farm. Some farms who had organised really successful sustainable systems, collecting vegetable waste from urban areas to compost and spread on fields, had to stop because of the risk of GMO contamination.

Handling the manure on the farm is our biggest difficulty. The manure from the straw yard is easy to deal with; it is stacked,

composted, turned and spread from April to September when the soil bacteria are active. However our system still produces quite a bit of semi-liquid manure. We have tried to reduce the amount by roofing the loafing area, but one load per day has to be dealt with. This is a mixture of semi-liquid manure and some straw so it can just about be stacked; currently we stack it outside and spread it after six months.

Early organic years 2000-2005

We finished conversion in 2000 and joined the Organic Milk Suppliers Co-operative. Our initial milk price went up from 15.5 pence per litre to 29 pence per litre. This lasted for six months, then the organic milk price started to drop. The problem was that so many farms had converted to organic, due to the grants available, that the organic milk market became over supplied. The organic milk price fell to 21 pence per litre, so bearing in mind that it costs about 21 pence to produce a litre of organic milk, this was no longer profitable. From 2001 until 2005, the tourism business at Beechenhill, and my outside work subsidised the farming business.

Even though the organic system was unprofitable, we never considered reverting to conventional farming. We had learned too much to go backwards, it would have been like poisoning our children! The organic status of the farm gave the tourism business a unique selling point that became more and more important. Because I wanted to make the organic philosophy work for us, I tried to buy organic and local food for our guests, instead of processed supermarket goods, but found it almost impossible. So, in 2001, with great support and backing from the Peak District National Park Authority's New Environmental Economy Programme, I started a project called Peak District Foods for Tourism, to try and use tourism as the mechanism to build a local food economy in the Peak District. The idea was to encourage the trade in food and related goods and services produced in the area, supporting small local producers and businesses rather than buying from large companies based outside the area. The Peak District is a valuable economic landscape that attracts many tourists, and it is 80 percent privately owned. To keep it in good condition and keep the tourists coming, the farmer/owners have to be profitable. So we needed to try and get money earned from tourism to the food-producing farmers.

Photo: Author

Healthy animals is one of the many benefits of organic farming.

With help from the Soil Association, I initiated a local food group: Peak District Foods. Now we have almost 40 members, including a delivery business. Other schemes have developed to involve restaurants and cafes: Peak District Cuisine, and Peak District Butchers (see *http://www*.peakdistrictfoods.co.uk). The Peak District Environmental Quality Mark was developed to reward businesses that take special care of the Peak District environment.

As a result of that work, I developed new products for Beechenhill Farm, some in collaboration with other small, local business:

- Ready-meals and puddings created by local farmers sold to visitors staying in our cottages;
- Beechenhill Honey for sale from hives kept on the farm, belonging to Mark, a local bee keeper;
- Biscuits created from a local historic recipe by a small business;
- Beechenhill Organic yoghurt and porridge for our B&B guests;
- Beechenhill Organic lamb sold to our guests to take home from their holiday.

Then other developments happened - Mark the bee keeper now offers "Meet the Bees" to our guests; he dresses them in bee keeper's gear and takes them to the hives, where they have a unique experience of finding the queen bee and checking the hives. He earns £25 per visit and I have an added experience to offer my guests. More ideas like this are developing all the time.

This all happened during the period of unprofitable organic milk production, starting in 2001. Many of the original farms who had converted as part of the government's Organic Farming Grant Scheme, went out of business or left organic farming. At the same time, the Organic Milk Suppliers Co-operative reviewed the way it worked and became more successful in marketing organic milk, so that supply and demand regained some balance, and in late 2005 the organic milk price went up to 26 pence. Now that milk had become profitable again we needed to increase our production. Over the last five years the herd had reduced to 29 cows, so it was necessary to buy more cows but also to reduce the large number of sheep who were eating a lot of grass. So in early 2006, we sold 35 pregnant ewes and bought 8 cows. We will continue to keep about eight sheep just to manage the ragwort.

Successes

Over the last seven years we have had some successes:

- Both holiday cottages have been full for 48 weeks per year;
- In 2003 we won the Gold Award for the best tourism website in England, with *http://www*.beechenhill.co.uk beating some very large national institutions;
- We have won some awards for sustainable tourism and conservation;
- We have hosted a visit from HRH Prince Charles, who wanted to meet the members of the Peak District Foods group;
- We have been awarded two Peak District Environmental Quality Marks, one for the farm and one for the tourism business;

A comparison of conventional management systems and the organic system at Beechenhill Farm 2006

Subject	Conventional	Organic
Winter cow accommodation	Cubicle housing, concrete floors	Straw yard and loafing area, improved animal welfare
Medical treatments	Routine antibiotics-dry cow tubes. Problems treated with antibiotics then milk withheld for 74 hours. Wormer, Ivomec used	No routine antibiotics used, antibiotics only used to respond to serious problem then milk withheld for minimum 14 days. Uddermint and homoeopathy used. Routine health visits by vet. Worms avoided by careful grazing
Food	Maize gluten, hipro soya, rape seed, maize, molasses, wheat, sunflower meal, brewers' grains, breakfast cereal, salt, minerals, calcium carbonate, veg fat coating. £130/t	Organic wheat, organic oatmeal, peas, distillers' grains, linseed meal, prairie meal, maize gluten, molasses, calcium carbonate, magnesium oxide, minerals. £230/t
Fertiliser-manure	one or two loads of slurry (liquid manure) spread every day from Oct to May	Muck from straw yards composted and turned for 3 months, then spread on fields when soil bacteria are active, March to Oct
Fertiliser-other	Compound fertiliser- 23N 10P 10K applied on 36 ha, spring and midsummer, 500kg/ha, £60/ha. Lime when necessary.	Clover planted - it extracts nitrogen from the atmosphere, makes it available to grass. Clover naturally proliferates if not sprayed or fertilised. Lime when necessary.
Weeds	Sheep eat ragwort. Spray thistles, docks and nettles with systemic hormone weed killer.	Sheep eat ragwort also pull ragwort. Hand dig spear thistles and docks. Cut nettles and creeping thistles.
Sheep	Dip sheep in organophosphate systemic insecticide annually for sheep scab.	If a problem occurs, treat with organically permitted remedy.
Milk	Milk sold to Zenith Dairy Company. Average 1999 price of 15p/litre. Subject to collection charges, seasonality, quality price variations.	Milk sold through Organic Milk Suppliers Co-operative. Average 2006 price 27p/litre. Subject to seasonality.
Rainwater	40 percent of roof rainwater collected for use in ponds and troughs	80 percent of roof rainwater collected for use in ponds and troughs

- I was awarded an OBE (Officer of the Order of the British Empire, awarded by the Queen) for services to farming and tourism in the East and West Midlands;
- I was appointed to the Peak District National Park Authority, the Regional Development Agency for the West Midlands and on to the National Land Use and Access Panel for the National Trust.

I think everything we have done and achieved has been because of our organic conversion and the understanding of the organic philosophy. That has informed our thinking with an appreciation of the importance of sustainability.

The Future

The future is a mystery! We are getting older and need to plan for our different abilities in the future. So far our life and work has been constantly re-assessed and constantly changed, because "if you are not moving ahead in business, you are going backwards".

Now I am looking for new ways of doing things that may be more efficient and less dependent on Terry's continued ability to run fast (after sheep!) and heave heavy things about. However, we realise that our tourism business is dependent on us being here to share our lives and philosophy with our guests, so we have to think carefully about how to get more time for ourselves. I want to do more painting, particularly now I have been inspired by Swedish folk art from 1730 to produce my own "organic art". Terry wants to rest sometimes and not work so hard all the time. Who knows what will happen, maybe our children will come back?

The future is also a worry. In the U.K., 90 percent of the population is urban, and only 10 percent rural. The 90 percent lives in 10 percent of the land. The urban population has lost its connection with food and land and it feels like we farmers have more in common with farmers from Africa and India than with the U.K. urban folk. Farmers all over the world understand the importance of soil, sun, rain, the health and breed of their animals, where our food comes from, and most importantly, the care needed, year on year to feed the soil and ensure a sustainable future. The majority of our urban population has no link with the countryside and many are scared by it. This is of great concern when our future leaders will probably come from the urban population: how will we ensure the sustainability of our country and our planet if our leaders don't understand how it works?

■

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Photo: Author

"Our children were born in amaranths", proclaimed one of the members of the Jipe Moyo group in Kerekese village.

Organising for organic agriculture in Tanzania

Petra Bakewell-Stone

Providing children with good, nutritious food, healthcare, clothing and education is at the forefront of the minds of most mothers. The women farmers of Mkuranga district, 40 km south of the capital Dar es Salaam in Tanzania, are no different.

What makes these smallholders different is their ability to mobilise into grassroots organisations in order to overcome the harsh realities of survival in rural Africa. Since 2004, local women have been collaborating on organic vegetable production and processing activities. At least six groups have formed and associated under the umbrella of the organisation *Muungano* (which means "union" in Kiswahili), with the aim of producing organic vegetables for increased food security and incomes.

Traditionally, farmers on these relatively infertile sandy coastal soils have planted rice and cassava, and have been dependent on income from the sale of coconuts, or more recently cashew nuts, to sustain their families. Producing organic cashew nuts is a new opportunity for farmers in Mkurunga. With facilitation from the SIDA-funded Export Promotion on Organic Products from Africa (EPOPA) programme, a large Dar es Salaam-based company, Premier Cashews Industry Ltd. (PCI), has converted part of its system to be able to process certified organic cashew nuts. PCI has contracts with around 480 farmers in three villages in the district to grow and supply the organic cashew nuts.

Nevertheless, farming households remain highly vulnerable to changes in world market prices for cashews, and the unreliable climate and repeated droughts of recent years also place substantial pressures on limited household resources. The cultivation of organic vegetables has therefore been adopted as a strategy to supplement diets and low incomes, avoiding costly farming inputs. Locally, organic agriculture is understood as a system that promotes the use of natural fertilisers and botanical pesticides and prohibits synthetic compounds that cause environmental pollution. The women were motivated to adopt these principles by the desire to improve agricultural productivity for food security and income generation.

Forming community development groups

The local women's groups grew out of discussions between leaders of the sub-villages and representatives of supporting institutions such as the EPOPA programme, a government research institute and non-governmental organisations already working in the area. With support from external organisations in the form of training and inputs, the women established and strengthened community development groups, the names of which; "Unity is Strength", "Solidarity" and "Take heart", highlight the spirit of their formation. Helping one another financially during difficult periods, such as with school fees and medical expenses, was one of the main motivations for the project.

The women grow fruits such as bananas and papaya, and vegetables including amaranths, sweet potatoes, okra, cassava,

collard and tomatoes. Farming is carried out through a mixture of traditional and novel practices such as mulching and the use of botanical pesticides. An intimate local knowledge of the area's ecological conditions has been merged with new technologies such as sunken beds and contour planting for soil and water conservation.

Applying preparations of papaya and neem leaves, and planting marigold (*Tagetes* sp.) on the borders of the seedbeds, are some of the strategies used to reduce pests such as grasshoppers and caterpillars that attack the vegetables. Sunn hemp (*Crotalaria juncea*) is also being grown as a green manure. Whilst these represent promising beginnings, more research and on-farm experimentation is needed in natural plant protection and integrated nutrient management. At the farm level there are further opportunities for managing pests by making the botanicals more effective (for instance in terms of active ingredients, forms, doses, storability and biocidal effects), using plants such as *Tephrosia vogelii* and pyrethrum to deter pests, and also for improving soil nutrient status and moisture retention with compost.

The reliance on locally-available natural and social resources and the internalisation of organic principles of production have improved overall agroecosystem sustainability in Mkuranga. Organic vegetable production has helped to diversify sources of food and income which is particularly important in an area where relatively good prices for cashews have resulted in neglect of food crops.

Social capital

Cooperation between women around a common goal has created powerful momentum in the drive for community development. In addition to vegetables, the local groups are engaged in many other activities such as producing red palm oil, handicrafts such as grass mat-making and basketry, local chicken-rearing and cassava milling to make flour for baking cakes and doughnuts. Although these activities used to be carried out individually, the formation of groups has meant that production is more organised, which has also increased access to markets.

The key to the success of *Muungano* is social capital, or mutually beneficial collective action amongst the women. The groups are organising their own meetings and field visits, and coordinate amongst themselves in a network. Cooperating in this way, their access to financial capital has also improved. By organising and registering officially, groups can access loans under national development programmes. Furthermore, group formation gives the women a voice, which improves their participation in policy dialogue, price-setting agreements and other decisions that affect their lives. By improving the productivity of food crops, which are generally the domain of women, the transition to organic vegetable production has also helped to address deeper gender relationships.

Since they started, these groups have attracted substantial interest, and would undoubtedly expand in membership and acreage, if it were not for the seasonally limited water supply.

Challenges for expanding organic production

Organic production activities in the area have been encouraged through the transfer of information on organic practices, but also through the provision of farming inputs such as seeds of early-maturing varieties, seedlings, manure, botanical pesticides, hoes, watering cans, a cassava mill and chipping machine. However, while such inputs have been a great support to the farmers, the uncoordinated efforts of external organisations have not been helpful to the development of their farming systems.

The needs of the farmer would be better met if the stakeholders could foster trust through a healthy level of collaboration and communication on matters concerning the farming environment.

So, far, the women's groups have been selling at local markets and directly to local schools. Formal certification of organic production is generally of low priority where production levels are low and most of the produce is marketed locally. However, after a visit by the manager of the national certification body, TanCert, the groups have decided to certify their production as organic. Organic certification is a marketing tool that can bring added benefits such as quality assurance, secure markets and premium prices. Specialist and general stores in Dar es Salaam are increasingly demonstrating their willingness to market fresh and processed organic produce, and large hotels are also emerging as a potential market. The relative proximity to the main national market lends itself well to expansion of trading activities.

Whilst certification could have many advantages, it will not solve all farmers' problems, and there are number of points to be considered before seeking certification. There is a risk that the financial benefits of certified organic production do not reach the farmers themselves unless the internal control system (a system to guarantee compliance to organic standards through collective self-inspection) is developed in a genuinely participatory manner. Training is important to raise awareness amongst the stakeholders of the meaning of certification and to give them an understanding of the entire process of establishing an Internal Control System; its procedures, potentials and limitations.

One of the greatest challenges to exploiting the domestic market for organic products is ensuring consistency of supply. Sustainable growth of organic agriculture is also dependent on the simultaneous development of the local market through campaigns to raise awareness on health and environmental issues as well as the existence of the organic alternative.

Conclusion

Whilst there are many opportunities for improving the sustainability of smallholder livelihoods through organic agriculture, these depend upon adequate human and social capital. The introduction of technologies and establishment of market linkages is of limited assistance without a corresponding expansion of awareness about organic production and trade and new ways of working together.

Organic agriculture that integrates both a production and a community focus gives an opportunity to secure sustainable livelihoods for smallholders in Africa. This can enable them to make more efficient use of available resources within the current institutional context and to build upon existing livelihood strategies. If community organisations, commercial enterprises and other stakeholders were to collaborate on certification procedures, this would bring additional benefits by combining farmer empowerment with production of high quality products for the concerned consumer. ■

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Cabiokid, a successful experiment

Bert Peeters

Cabiokid is a permaculture development site located in Cabiao, Nueva Ecija, on the island of Luzon, in the Philippines. Its name is a contraction of Cabiao, bio, and *bukid*, which means field in Filipino. Found 90 km north of Manila, its mission is to provide ideas and inspire creative solutions towards sustainable development. The Cabiokid Foundation offers regular trainings and tailor-made courses, using permaculture as the guiding framework and its 5.5 hectare property as example. All sorts of vegetables are growing in abundance on the farm, while birds are common residents and reptiles and mammals can easily be seen in the surrounding areas. However, it has not always been like that. Only four years ago, the farm looked pretty much the same as the neighbouring fields, where rice is the only crop.

The Cabiokid project started on farmland where mono-cropping and chemical farming techniques had been common practice for many years, and whose only asset was that it was irrigated rice land. The concept took shape with the support of an engineer

Photo: Author

Making use of biodiversity- construction materials are also grown on the farm.

who had been farming in the past (and failed), an agronomist and a product developer, all of them frustrated with modern farming and the poor results of development work based on it. Five years ago, we decided to try turning the place into a more diversified and productive farm, and thus show that sustainable farming is not a myth, but a very realistic and achievable endeavour.

We realised that the right framework had to be applied from the start if we wanted to succeed and prove our point. We opted for permaculture, as a holistic approach to sustainable development which considers aspects such as economics, health, food production and politics as equally important in ensuring a productive system. Permaculture is a design system for human habitats which takes its knowledge and insights from nature and living things.

Preparing ourselves to turn Cabiokid into a successful permaculture site, we were particularly interested in acquiring the necessary skills and insights. We therefore considered a few key aspects as essential guidelines for achieving a sustainable and productive site in the fastest possible time, and without depending on external resources.

Paying attention to scale

When we started working on the fields, there were only five of us. And although we are now seven, a 5.5 hectare property is still very big to work on with this number of people. So, from the very beginning, we had to plan carefully how to use the available energy and resources that working intensively in the field would need. Since rice was the main crop, we needed to decrease our dependence on water from the irrigation system which we did not control. Since the nearby irrigation canal only brought water irregularly, we decided to add several water storage systems that would catch rainwater and drain off the excess water quickly. These were small water catchments dotting the landscape at several places throughout the farm, but well placed to serve their function as supply systems for the different zones.

With the subsoil gathered from digging the ponds we made the basis for various vegetable gardens, a forested area and an orchard. However, throughout this first phase of the farm development, we never stopped planting rice: the only difference was that we adapted our planting system to organic farming methods, and we stopped using any chemicals on the farm. We also shifted from sowing the rice to planting seedlings. Initially, these new approaches made our rice yields go down, but so did the costs. And although we reduced the size of land for rice production to only 2.5 hectares, we were still able to produce 90 sacks of rice. The big advantage was that, by keeping the scale of the rice production manageable while focusing on other crops, we were able to diversify the resources used and the sources of income on the farm.

Do not disturb unless strictly necessary

Another important point was to disturb the soil and the farm in general as little as possible, and only if really needed, or if time and effort could be devoted to improving the disturbed area. The first and foremost activity was the design of the whole farm according to permaculture principles, while considering the capacity of Cabiokid to provide the money needed for it. The budget was limited and we did not want to overstretch our expenses, especially as we wanted Cabiokid to be a replicable example for our neighbours and other farmers.

The design consisted of a simple drawing indicating the areas that needed to be set up. We had to make a few key choices. For example, digging the main and secondary ponds was considered to be a priority. The cost for the rent of machines was carefully calculated, and we opted for doing this when we concluded that farmers in the area were also capable of hiring such heavy equipment. The water made available as a result of having these ponds would allow for new possibilities for vegetable production on the farm, while the soil resulting from the digging would elevate other areas and thus prevent them from flooding. We left the other parcels undisturbed, waiting for the moment when we could free our labour and energy to focus on them.

Focus on the existing crops

The most important crop on our farm, as in the farm of all our neighbours, was and still is rice. As such, we made sure never to

disturb the rice production cycle. Digging took place during the dry season (when the irrigation system was dry and no crops could be planted). The major earthworks were finished within a month, and by the start of the rainy season the farm was all set for planting rice on the remaining area. The rice production area was reduced from 4 to approximately 2.5 hectares, so we also paid great attention to the productivity of this area. By adopting rice intensification (SRI) planting techniques, we gradually recovered our total production. We still believe that total yields can be higher, but we have decided to work on that gradually.

Plan for immediate, short and long term changes

Starting with a farm plan and area design, we were able to estimate and plan for any potential losses or changes in terms of production. We planned to plant new crops and generate increased income gradually, alongside other changes that would take place. For immediate sources of income, we grew some vegetables, beans and fish, all of which were possible with the amount of water available and the new ponds. With a short-term perspective, we included fast growing trees, bamboo, fruits and vegetables, thinking of the necessary farm structures and the animal components. For the long-term, we thought of a sustainable lowland agro-forestry situation, with a healthy balance between food crops and the natural resources, all serving as potential inputs for livelihood opportunities. All these activities were planned in accordance to the capacities of Cabiokid. Still, these plans are not static, so any possible change in the design and work plan are discussed when necessary. Adjustments are made according to the developments taking place in and around the site.

Another important aspect in our plans was that we had to invest in our own human and material resources, since these were both limited. So just like with the food crops, we also considered the future of the farm. While we were spending money for the construction works and the (natural) resources needed to build them, we purposefully looked for those species which could be useful in the future. Cabiokid now boasts several bamboo stands, palm trees which can be used for roofing and firewood, and native hard wood species that will soon serve for building and construction materials. While the main focus of Cabiokid remains on the food crops, these other species provide valuable resources without demanding extra time or labour.

Looking further into the future, we are interested in more than the constant production of one or a few crops. We have expressed interest in becoming a support centre for a government seedling production programme aiming to reforest denuded areas. Following a site evaluation and a memorandum of agreement with the national government, the farm recently acquired three Philippine brown deer, and will start breeding them. The positive reactions received from scientists and authorities encouraged us even more, and we are planning to breed other endemic animals in the near future as well. From the start, Cabiokid made a well considered choice to prioritise endemic plant and animal resources and make these its long-term goal. This was one of the reasons why we established the farm in such a way that income and production would start almost immediately.

Cabiokid today...

Positive results were visible much sooner that we ever expected. At present, after only five years, we are reaping many unexpected benefits. The orchard area is now producing abundant forage for goats and the native deer, which are completely self-reliant in food. The tree belt area which was planted with passion-fruit vines along with several pioneer tree species has already given lot of fruits. The pioneer trees are more than one foot thick, and many of them are taller than 12 metres (which is even more surprising if we think that these trees come from seeds which we collected ourselves from selected mother trees in different areas). The prolific growth of cooking banana varieties under the trees prevents fires, and have been providing a good starch crop throughout the summer time. In all, such abundance of food has allowed Cabiokid to increase its animal stock.

Walking under a dense canopy in less than 4 years is a rewarding experience. Nowadays, Cabiokid supplies more than double its fuel needs. We already started constructing benches and sheds with the wood of pioneer species; trees which grew from seeds that we picked ourselves. By putting new life in the exhausted farm lands we reap more than we ever dreamt of. There is so much food available at the farm that it is impossible to compare our total yields with those of the neighbouring farms, most of which seem to die completely for 4 months or more during the dry season. It is now Cabiokid's task to regulate the entrance to the farm, as the abundance of food attracts interest from people and animals alike.

... a possibility for others to replicate

Many neighbours come to look at the houses and structures we built with local and renewable species. We share all such technologies and the needed plants and seeds with interested individuals. By promoting the use of local resources, Cabiokid also links up with local craftsmen to make and construct furniture and small housing units. Interest in Cabiokid increased even more when we started to introduce wildlife in the farm. The local people became more interested and took a second look at common hunting activities.

We believe that in essence, this system could be replicated by farmers in Nueva Ecija. While the principles of permaculture are easy for most farmers to comprehend, it is putting them into practice which often proves to be a stumbling block. Farmers may experience difficulties linked to the knowledge needed to manage a polyculture system, where different crops, plants and animals will need different levels of care and maintenance. The long-term solutions offered by a farming system such as the one developed in Cabiokid are frequently put aside because of immediate needs and pressing financial concerns. In many cases, farmers are not proprietors, but share the land with siblings and are only given control for a number of years. Having to vacate the land after a few years gives them little incentive to develop it from a long-term perspective. There is, at the same time, a persistent lack of financial and technical support from the government towards organic and sustainable agriculture.

Nevertheless, Cabiokid is primarily the result of a change of heart and attitude towards agriculture. In contrast to conventional farming, we started by collecting diverse seeds of native trees and plants wherever we could find them, and thus did not spend money on seedlings or other plant species. We made sure to keep a careful eye on the ecosystems where these plant resources were growing in order to ensure that the plants would not become invasive in their new home. We recycled all possible containers as seed boxes or potting containers. This, together with a careful planning, has been the key to success, already also seen in many other farms in the island of Luzon. ■

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Meeting agricultural change in the Lao PDR

Rick Dubbeldam

For centuries, farmers in the Lao People's Democratic Republic have grown rice to meet their subsistence needs. As the country's most important crop, rice is grown under irrigated or rainfed conditions in the low-lying plain areas, and also in slash-and-burn systems in the mountainous areas of the country.

In recent decades, the lower lying hills have drawn a considerable number of new settlers from the mountainous areas of the country, mainly because of the availability of infrastructure and services (electricity, better education, transportation). This trend began during the early 1970s, when war-displaced mountain communities sought refuge and protection in these relatively peaceful areas. Migrants brought with them their age-old traditional agricultural practice of slash-and-burn. Productivity in this system is very dependent on soil fertility being restored, which in turn depends on the areas being left fallow for a number of years after cultivation has taken place. Slash-and-burn systems make optimal use of the natural resources, but this can only be sustained when there is sufficient land. Because of increased population pressure (natural population growth and new migrants) and greater need for agricultural produce, fallow periods have shortened, which means that rice production levels have decreased. This is the start of a vicious circle where farmers have to increase their slash-and-burn plot sizes to maintain production levels which results in increasingly shorter fallow periods.

Since the 1990s, the situation in this region and in the country as a whole has changed even more. Villagers' access to the outside world is improving, and consumer habits are changing, as are agricultural lifestyles. As a result, villagers expect higher incomes from agriculture, and increasingly demand products which were previously not part of the subsistence agriculture pattern. Additionally, barriers to foreign products are decreasing and the national government is encouraging the production of crops such as rubber, maize and soya beans, meant to meet the increasing demand from China, Thailand and Vietnam.

Assisting farmers and promoting change

Within this changing social and economic environment, the Upland Agriculture Development Centre (UADC) has been trying to improve the living conditions of the population while adjusting itself to the new working environment. UADC is a local government institute aiming to assist farmers and promote changes in local agriculture. It operates in four districts of the Vientiane province, in the central region of the country. This area can be characterised geographically by having either broad valleys surrounded by steep mountains or rolling hilly areas connecting these larger valleys.

UADC started as a World Bank project whose emphasis was on irrigation as a means to reduce slash-and-burn agriculture. Since 1998, the Lao government has run the centre without external funding, following the same main objective: to assist local communities in finding more sustainable agriculture alternatives. Its aim is to increase agricultural output in financial terms, without affecting the natural environment. The promotion of small-scale fruit growing is nowadays a major focus. Another alternative has been the promotion of vegetable production to meet the growing domestic demand. In this regard, UADC has supported the improvement of market facilities, thus encouraging a market oriented production of vegetables.

Photo: Author

Farmers practising planting techniques. Soil fertility is improved by digging large holes for planting and enriching the soil with compost and neem leaves to repel termites.

Throughout its institutional history, emphasising self-reliance and open access to knowledge has been the main methodology, but UADC's strategies have also changed. Whereas in the past only one or two farmers per village would be invited to trainings organised at their offices, nowadays trainings take place in the field, which allows all villagers to participate, be they educated or non-educated, male or female, rich or poor. But more importantly, the way extension is viewed and conducted by the UADC staff has been redirected. In the past, the centre relied heavily on top-down methods, which resulted in little knowledge and information being exchanged. This was partly because few new agricultural techniques were available, and partly because this information rarely reached the extension workers themselves. In cooperation with local district extension offices, the UADC has changed from an organisation which mainly provided crop production inputs to farmers, to an organisation which truly assists the rural population in improving their livelihoods. An important change has been opening up and learning from farmers, as well as promoting exchanges of information between farmers. Whereas the role of villagers was previously limited to listening to governmental messages, now the extension staff is keen on listening to, and -more importantly- discussing villagers' problems. Greater importance is now given to acknowledging and understanding local innovation processes, and consequently building on the information gathered.

UADC's "transformation" is a result of different factors. Limited financial means led to a "slowly-slowly" approach towards livelihood improvement, recognising that results can only be achieved after a consultation process with villagers and by

encouraging farmers' innovation. Its staff became gradually receptive to participatory approaches, and now gladly advocates them. Thus, even if the organisation itself did not opt for a participatory approach, the circumstances have certainly made UADC unique.

The results of this transformation are clearer when looking at the changes taking place in local agriculture. Extension workers promoting one alternative to slash-and-burn agriculture, fruit tree growing, faced many difficulties when trying to gain the farmers' interest. Previously, farmers were appointed and then expected to participate. This resulted in them not being motivated to manage the recently planted orchards, as only when the trees started bearing fruit did farmers see the need for maintenance. Nowadays, UADC staff visit farmers who started growing fruit on their own, without any external assistance, and learn from the farmer's successes and failures. With this approach, UADC has become known for its openness and willingness to support motivated farmers. Implementing trainings at fellow-farmers' orchards has lead to a substantial increase in the interest in growing fruit trees as an alternative to slash-and-burn agriculture, as well as in a substantial improvement in the expertise of extension staff and farmers alike on how to recognise and spread innovations. Other positive results include the identification of high potential areas for fruit production, the development of various low-cost methods of irrigation, exploring the use of various green manures and encouraging the use of red ants as a plant protection method against pests. Another significant result of the changed attitude of UADC has been that farmers have started to visit the centre in search of advice, instead of waiting for the information to be brought to them.

Increasing challenges

Farmers in the other villages where UADC works already see the benefits of using sustainable agriculture techniques. On the one hand, it is cheaper (by using local products there is little or no need for fertilizers or pesticides) and easier, as production is based on their own abilities and agricultural know-how. On the other hand, they see that they are producing vegetables and crops which they can consume themselves, and that they can sell. At the same time, slash-and-burn agricultural practices are evolving into more sustainable agricultural systems.

Changes at the village level

The village of Ponsavang is 4 km away from UADC's main offices. UADC decided to work here as the general situation was clearly worse than in other villages in the area. Various participatory methods were used and the villagers drew up their own plans, defining what they expected to be done. These plans partly reflected their interest in improving their general living conditions (an access road, a school, electricity, drinking water), and partly focused on the possibilities of increasing the villagers' income. However, these possibilities were limited, as yields, in general, were decreasing. This forced villagers either to find work in other villages or in non-agricultural activities, or to encroach on forest areas located far away (>20km) from their village.

UADC then started up a programme aimed at supporting villagers to improve their general living situation, and at the same time initiated a programme assisting villagers to improve the use of their land. These programmes concentrated on growing fruit trees as a long term strategy, and on growing vegetables for the short term. Both programmes focused intensely on a low-external input agriculture. All villagers were invited to participate in training courses on the preparation of compost, on the burning of rice husks, on the production of various natural pesticides, and on the production of effective micro-organism extracts. Villagers were visited weekly by a UADC extension agent, and follow-up meetings were also organised.

The results were remarkable. While during the previous growing season (2001-2002) just one household had a vegetable garden, by the end of the 2002-2003 cropping season, all 39 households in Ponsavang were growing vegetables on a considerable scale. Villagers started selling their produce at various markets, while previously they were always forced to buy vegetables. New UADC programmes then introduced off-season vegetable growing, and in the following year farmers expanded their vegetable gardens even more. As a consequence, the vegetable programme was extended to four other villages and participation is now, in general, a key feature of UADC's work.

The challenges ahead, however, are many, resulting from the general context in which rural communities are found in the Lao PDR: continuous migration, limited sources of income, lower trade barriers and economic competition. In such a context, the need for adjusting and encouraging innovation as the main organisational instrument becomes more apparent. An open organisational structure, where staff lower in the traditional hierarchy contribute to the overall direction of the work, is crucial. This means that the institutes which assist rural development need to change as well. Mainstream policies seem to result in little overall change, or in a model that mainly assists the wealthier farmers. The preferred approach should rather be one in which the institutes are able to recognise and encourage innovation at a local level, trying to meet the needs of all. The UADC has now faced up to this and is able to adjust its work so as to meet the new and constantly changing challenges. It is thus in a much better position to support the transition of farmers towards a sustainable agriculture. ■

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Photo: Author

Farmers and UADC extension staff listen to a farmer explaining how the irrigation system he designed works.

Regenerative agricultural entrepreneurship and education along the Petite Côte, Senegal

Nathan C. McClintock

On a map, Senegal's Petite Côte ("Little Coast") stretches southeast from Dakar, forming a smooth arc from the underside of the Cap-Vert peninsula to the dense islands in the mouth of the Sine-Saloum river delta. This several hundred kilometre smooth stretch of white sandy beach has attracted beachgoers and tourists since colonial days.

The increase in tourism over the past decades has been, as always, a double-edged sword, providing economic opportunity for some of the local population, while draining rural villages of a much-needed workforce. This outmigration of mostly young men from farm to city is commonplace not only in developing nations such as Senegal, but also in farming communities in developed countries, including the United States. One of the central goals of sustainable agriculture is to revitalise rural

Photo: Author

The coconut nursery at the Association Panafricaine Jardins d'Afrique, promoting the integration of trees and agriculture as the basis for sustainability.

areas, to protect rural livelihoods not only through environmentally sound techniques, but also by providing real economic opportunity for rural populations. Two men in Mbour, the economic centre of the Petite Côte, are playing a central part in promoting this model of agricultural sustainability through their entrepreneurship and educational activities.

In the early 1980s, when they were university students in Dakar, Gora Ndiaye and El-Hadji Hane began gardening in the vacant areas that are home to the majority of Senegal's urban agriculture. Troubled by the excessive use of pesticides in the city's gardens, they formed the *Association des Agriculteurs Naturalistes du Senegal,* known as AGRINAT, in 1986, an organisation promoting organic agriculture and pesticide awareness. El-Hadji remembers "The turning point came one day when we found that all the fish and frogs in the spring were dead. Someone had mixed pesticide in the watering can, watered their plot, then dipped the can into the spring. If it could kill everything in the spring, imagine what it could do to the producers and the consumers!"

Farming and promoting community development

El-Hadji went on to study tropical agroecology in Montpellier, France. Well-prepared to work for the government or an NGO, he decided instead to become a farmer, and purchased four hectares of land for a good price in Ndiemene, 25 km south of Mbour in 1993. "My family was furious. You don't go to school and then go back to the farm. But I farmed and sent my father money just as if I was working in an office."

His goal in starting the farm was threefold - to make money himself as a farmer, to educate local farmers about sustainable farming practices to revitalise the soil, and to advocate community development through initiating an organic market. Additionally, agritourism by Europeans eager to learn about community development, sustainable agriculture, and Senegalese culture is a central function in his multi-faceted approach to developing his farm.

El-Hadji also chose this arid region because the problems affecting Senegalese agriculture were more "visible" here than in the lush south — soil degradation, outmigration, and infrequent and variable rainfall. The land he bought was typical of the land of the Petite Côte - exhausted soils, eroded by wind and rain and continuous cultivation. He improved the land with generous applications of organic matter (manure, compost, leaf litter and prunings from the nitrogen-fixing *Leucaena* trees he uses as windbreaks). Additionally he emphasised the traditional practice of intercropping legumes such as cowpea (*Vigna unguiculata*) and pigeon pea (*Cajanus cajan,* known as *poix d'Angole* in Senegal) into millet and peanut rotations. In his market garden area, he intensified these same practices; he also increased vegetable crop diversity and used biopesticides such as neem to control pests. Working with local farmers and women's groups, El-Hadji has addressed these issues by promoting regenerative agricultural techniques such as cover cropping with pigeon pea and integrating *Leucaena* to provide animal fodder, fix nitrogen, and slow down erosion in their millet fields and vegetable gardens.

El-Hadji invites people to his farm to show them on a field-scale how to manage the sandy soil in a manner that reduces erosion. By ploughing along contours, intercropping with legumes, and planting nitrogen-fixing agroforestry species, he has improved soil productivity. "The problem here is not that the soils are poor, but that they are sandy and demand a certain method of farming." Erosion is a considerable problem here, leading to lower productivity, one factor in causing some farmers to abandon farming for urban jobs. El-Hadji hopes that by helping farmers improve soil management, they will have the option to stay on their farms. After three years of experimenting and providing trainings at the farm, many of the participating farmers began implementing what they had learned in their own fields. "Everyone is a producer here!" says El-Hadji. The rainy season lasts from July to September, during which time millet is intercropped with cowpea. Rice is also common.

When the rainy season stops, however, labour shortages plague agricultural production along the Petit Côte, as in so many rural areas in Senegal. The men leave the fields to go and fish or work in the cities. "In some cases, there is no one left to work in the village but women and old men." Helping these women improve horticultural production and marketing has been one of El-Hadji's primary goals.

The gardening season begins in October and November, at which time the local women's group that El-Hadji works with begins farming the half hectare market garden located on his farm. Currently there are 15 women from Ndiémene who have plots in the garden. The garden is not only for the production of vegetables for sales in Mbour and Dakar, but also a forum for training farmers about organic production. At least a hundred farmers, mostly women, from four other nearby villages are active on the farm.

Their primary products are onions, cabbage, peppers, lettuce, and eggplant. Tomato production, however, has been limited due to a seed-borne disease widespread throughout Senegal. For pest control, they use a home-brewed bio-pesticide made from neem seeds, but El-Hadji says that he is trying to get people to understand that having healthy soil is the most important way to manage pest and disease.

The women's group sells their produce in Mbour and Dakar, where the high quality of their organic onions is becoming famous. "Our onions, you can keep them for a year. The others, they rot. Everyone now knows that organic onions last longer. We just want to interest people in what we're doing. Everyone says that the quality is high. The cabbage, you can smell the flavour."

Most importantly perhaps, El-Hadji has helped the local population take responsibility for stewardship of their land. "They realise that thirty years ago this was all forest with lots of wild animals. Now people are starting to understand that the environment is being degraded, that they must take charge of it. If someone else does it for them, it won't last. 'We must do this ourselves' is what they say now."

The activities of the farmers' groups, as well as El-Hadji's prominent role in the International Federation of Organic Agriculture Movements (he served 7 years on the IFOAM World Board), have attracted visitors from around the world. Every year, El-Hadji hosts several European interns on his farm. "Now my father is happy. The farm is always full of *toubabs* (white people) from Europe. He's happy that my name is well-known. He decided in the end that I'd made a good choice."

Planting palms for sustainability

Up the road, off a sandy street in a residential neighborhood of Mbour, El-Hadji's old partner Gora Ndiaye is surrounded by thousands of baby coconut palms in the nursery of his business, the *Association Panafricaine Jardins d'Afrique* (APJA). Tiny palm shoots sprout from coconuts half-buried in the sandy soil. Gora shares El-Hadji's vision of enhancing the sustainability of Senegalese agriculture and making agriculture profitable for the local population. His work revolves around promoting the integration of palm trees into both the natural and agricultural ecosystems of the Petite Côte. "Legumes fix nitrogen in the soil. By integrating trees and agriculture, we can create a microclimate that is favourable to the growth of legumes. The coconut palm helps to do this."

Gora Ndiaye embarked on his project with similar goals to El-Hadji - to make a living, and to educate and rehabilitate the environment at the same time. His research and experimentation is much more focused than El-Hadji's holistic system approach - while this nursery sells all sorts of trees and shrubs, Gora's primary focus is on palm trees. His research involves integrating legume cover crops to create a sort of agro-sylvicultural system, as well as using palms for dune stabilization. Both men's experience as agriculture students led them to incorporate agronomic research or experimentation into their endeavours. Rather than pursuing jobs with the government or aid agencies as technical researchers or bureaucrats, both men were drawn to working the land and making a living doing so, a living that compares to what they left when they left the city.

In 1994 Gora began the first phase of his project, working with farmers to integrate palms into their gardens. He quickly realised that he needed some technical assistance when many of their young Grand West African palms were ravaged by beetles and a fungus. Gora met a palm specialist from Benin who invited him to his country to learn more. Both in Benin and in Côte d'Ivoire, Gora learned new germination methods and identified resistant varieties of palm that he has since used in Senegal, improving his production a hundred-fold. His business has been selling coconut, oil, and date palms, as well as the related *ronier* or borassus palm (*Borassus aethiopum*) to customers since then. Selling for a hefty 5,000 CFA francs each, roughly ten US dollars, the young trees are a good source of revenue, particularly in this area popular with tourists, where there is a high demand from hotel and home owners. The investment is worth it, Gora maintains: "Coconut palms may take four years to fully develop, but they will produce for fifty years."

In addition to selling palms, the *Association Panafricaine Jardins d'Afrique* has been involved with dune stabilization along the Petite Côte. In 2001 they received a US$ 50 000 grant from the United Nations Development Programme to train the local population to grow palms as a means of stopping dune erosion. An hour to the south, in the village of Samba Dia, fences of palm fronds now indicate the extent to which these important trees are integrated into the farming systems and daily lives of farmers along the Petite Côte. The organisation recently purchased a 3.5 hectare plot here where they continue to experiment with palm varieties and integration with field crops. They have planted more than 300 coconut palms at this new experimental farm, watered by a 6.5 metre deep well. Additionally, they have constructed a classroom for training and a small lodge for guests.

While Gora Ndiaye and El-Hadji Hane have taken slightly different paths towards promoting the transition towards a more sustainable agriculture, education is central to both of their activities. Both are proud of their successes, but are also well aware of the obstacles that lay ahead, such as a lack of water or a lack of an organic marketing infrastructure. Nevertheless, their deep-seated belief in promoting a socially-equitable and environmentally sound agriculture keeps them both motivated. "We just want to interest people in what we're doing," El-Hadji says. "The first step is to show them that we must approach things in a holistic manner."

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Economic benefits of a transition to ecological agriculture

Sílvio Gomes de Almeida and Gabriel Bianconi Fernandes

The heavy rains caused by El Niño in 1995/1996 had a devastating effect on that season's production and harvest on the Licheski family farm in São Mateus do Sul, Paraná, Brazil. The losses made it impossible to restart production at the rate that they had managed to maintain until then. Had it not been for the income from the sale of *erva mate (Ilex paraguariensis*, the plant commonly used as herbal tea in this region) and their eight cows, the Licheskis would have gone bankrupt and been forced to give up farming.

José and Silvia Licheski both come from farming families. They were married in 1983 when they established a system similar to that of their parents, who had managed conventional farms relying on mechanisation and use of agrochemicals, with the aim of intensive production for local markets. The Licheskis specialised in the intensive cultivation of potatoes, maize and beans as companion crops, as well as the native *erva mate* plant. They also raised eight cows, and had a small vegetable garden for their own consumption. The economic and technical reasoning behind the system was aimed at increasing their income through larger scale production by using agrochemicals as well as increasing the cultivated area. For example, they began growing potatoes in 1987 on two hectares, and by 1990-1991 they had fifteen hectares. With this scale of production, the family's income was dependent on the market conditions for only a few products, with the prices always changing. "We would make a profit from one harvest, break even with another, and then lose out on the next" said Mr. Licheski. Under such circumstances, it was impossible to save, and the income generated one year was spent on the next production cycle.

Photo: AS-PTA

José Licheski selecting maize ears from a local variety.

The change began in 1995-1996. The family, now with three children, decided to work only on the areas they could manage and afford to cultivate themselves, gradually abandoning the use of agrochemicals and motor-mechanised techniques, and making the transition towards a system based on agroecological principles. The knowledge inherited by José Licheski from his family about seed production, use of green manures and cultivating potatoes organically for domestic consumption contributed greatly to this process.

From specialisation to diversification

Looking at the system in 2001, only five years after the process was begun, many changes and benefits could already be seen. The family home, the chicken coop, the vegetable garden, the shed and the majority of the crops are found in the main 2.7 hectare plot. In this area, the family cultivates more than 60 plant species, including vegetables, fruits and medicinal plants. The chickens and other small animals are fed food scraps and leftovers from the home and vegetable garden. Poultry are also treated with medicinal plants. The annual crops of potato, maize, beans, wheat, rice and cassava are always rotated in space and time, using green manures and biofertilizers as well as a mix of manure, ashes, rock and lime phosphate. As he has no cattle or pigs, José Licheski either buys manure from neighbours or trades it for other products. In another 2.5 hectares plot, the *erva mate* is grown in a natural agroforestry system, where more than 35 useful species are found, including local wild fruits, medicinal plants and firewood. The family selectively prunes the natural regeneration of the forested system, to favour the production of the *erva mate* and medicinal plants, but encouraging the preservation of the area.

Labour on the farm is provided by the family and also through the local community system of exchange, where relatives and neighbours agree to assist, provide services or work on each others' land as needed. They now use a horse, with a plough, harrow, cultivator and planter, a maize thresher and a *matraca,* an articulated manual planter. All weeding is done by hand.

Economics of diversification

The large number of different species grown on the farm, as well as contributing to fertility of the system itself, is important in that the family does not rely on only one or two income sources but has a variety of crops and products to sell. Four main groups of products contribute as much as 68 percent of the family's income –potatoes, vegetables from the garden, cassava and products from the agroforestry area- while other activities are also important for generating cash income and other non-cash benefits, such as food for the family or products such as composts and wastes that can be used as animal feed. This contrasts with the economy of many other farms in the region who only rely on beans/maize or potato plantations. The different uses and value of each product also stabilises the economy of the system. The sale of seeds in particular has become a significant source of income for farmers. Seeds are sold or exchanged on the local market, where demand is high because farmers do not usually produce their own. The local markets where products are sold are also an important factor in the

Table 1

	Licheski family farm (a)	Conventional animal traction (b)	% a / b	Conventional mechanised (c)	% a / c
Beans	2,770	1,488	+86	1,020	+171
Maize	6,000	3,720	+61	4,200	+43
Potato	10,000	14,750	-47	15,300	-53
Rice	4,917	2,975	+65	1,896	+159
Cassava	24,020	15,000	+60	20,700	+16

N.B. Figures for (b) and (c) are averages reported by Department of Rural Economy of the state of Paraná, for the 2000-2001 yield.

family economy. Some maize is sold to middlemen, but all the other produce is sold directly to consumers. Many of these clients have been buying from the Licheski family for years, showing their confidence in the quality of the products. The clients include restaurants, co-operatives and families in the municipality. This local market and community, where the Licheski family live, is important as it is where the sale or exchange of products, including *erva mate*, eggs, seeds, vegetables and chickens takes place. This is different to many other farms who rely on selling their produce at low prices to wholesalers or middlemen. In addition, the Licheskis often receive higher prices for their organic products.

By having a range of products to sell, having many loyal clients, and generating the inputs needed to maintain the fertility of the agroecosystem by themselves through good management and recycling, the family is now much less dependent on external inputs, and is protected to some extent from market fluctuations. In all, this means that they have achieved some degree of self-sufficiency. The expenses of the system in cash are only 14.5 percent of the cash profit derived from the farm. Only 2.5 percent of this surplus is spent on domestic supplies (including food). This means that up to 80 percent of the income generated by the family is savings or profit, to be used as necessary for household maintenance, leisure, goods or small investments.

Low costs and high value added

The yields of the main crops in the agroecological system were higher when compared to figures obtained from the Department of Rural Economy of the state of Paraná, for conventional mechanised farming systems in Paraná. They ranged from an increase in yield of 16 percent for cassava to 171 percent increase in the yield of beans. The only exception was potatoes, which yielded less. According to Mr. Licheski, this was due to the planting material – there were no varieties available which were adapted to the organic system under local conditions. High physical yields together with very low unit costs made the agroecological system highly profitable. The costs of production were only about 5.5 percent of the gross product. This proves the system's capacity for efficient use of internal resources (labour, seeds, composts and soil fertility management), so keeping the costs of external goods and services to a minimum. This farm management strategy shows the value added to the external inputs through family labour, which works out at 1640 percent. For maize, for every one *Real* (R$) spent on the production process, the family makes R$ 38.12, compared to R$ 1.27 in the conventional animal traction system and only R$ 0.57 in the mechanised system (see Table 1). Even in the case of potatoes, with lower yields but also lower costs, the agroecological farming system proved to be more profitable, adding between 8 to 28 times more value to the product by area unit than in conventional mechanised systems and animal traction systems respectively. These technical and economic results show that the income of the family farm is equivalent to 92 percent of the value added. As a result, the Licheski family's financial situation has remained stable.

Economics of synergy

The sustainability of the agroecological system is based on what could be called the economics of synergy – the close integration of external and internal factors. The production system is based on recycling of internal resources. For example crop wastes are used in soil fertility management, and the production of bio-pesticides on farm results in much lower costs for chemical fertilisers and pesticides. Outside of the farm, good relations with the local community, neighbours and extended family means that labour costs are lower, and less is spent on buying and maintaining equipment. As a whole, the input costs of this system are therefore considerably lower than of a conventional mechanised system, and comparative profits are considerably higher.

The success of the agroecological innovations leading to this largely self-reliant system, have in turn promoted changes of attitudes within the family and community. The increased technical and economic integration of productive activities has meant a change in how decisions are made on the farm – for example, now the family as a unit plans which crops to plant, and how to use the profits. In addition, the knowledge and skills of the female family members as well as the children are much more appreciated. At the community level, the Licheski family have been sharing their experiences and new knowledge, encouraging others to look after their natural resources, and take part in the local economy for everyone's benefit – by selling, buying or exchanging goods and services locally. José has participated in the Regional Forum for Rural Workers, attending courses and meetings, and contributing to policy proposals related to the transition to agroecology for family farms. Silvia served in the local Pastoral Health Unit, attending the communities and participating in various events. Her knowledge of health issues and medicinal plants has also been an asset to the family economy and well-being.

The future

The family plans to continue the process of transition to ecological farming, and to intensify production in the coming years, expanding the land area used productively. This will also mean they will have to deal with some of the challenges and difficulties they identified in a recent evaluation. This expansion will mean that more labour will be needed on the farm, and more equipment. They also plan to reintroduce pigs and cattle, and will look for potato varieties suitable for organic production in the region. All these expansion activities may need to be financed with a loan. The family has already proved the viability of this system under their conditions, and with their know-how and the information available to them, they are willing to incorporate innovations and adapt to changes to build on the success of their transition process. ■

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Photo: Author

Feeding the cows: their diet is a mixture of grass and clover, the basis for healthy animals.

Organic farming increases independency and creativity

Lieve Vercauteren

In the village of Lovendegem, in the province of East Flanders, Belgium, the Mouton family runs their organic dairy farm, *De Zwaluw*. "This farm passed from my grandfather to my father, and later from my father to me", explains Dirk Mouton. "My father farmed cattle intensively, and when I took over the farm in 1983, I made an effort to expand and modernise the farm. In 1994 this all changed abruptly when all our pigs had to be destroyed because of a case of classical swine fever within one kilometre of our farm. That horrific experience made me start reflecting seriously about the current direction of agriculture, which values larger and increasingly intensive farming enterprises. I became interested in alternatives and started collecting information about sustainable and organic agriculture. On the farm, we became more cautious with the use of external inputs, especially chemical fertilisers and pesticides. At the same time, we were hesitant to go any further than that. I could not stand the idea that I had to spend my future days removing weeds by hand. By applying less chemicals, we considered that our milk was already a much better product. However, apart from feeling positive about that, there were not really any other benefits from our new farming approach. We could not sell our farm produce for a better price. Therefore, in 1998, we made the logical decision and took the big step to producing in a completely organic way. On the one hand, this meant that our production methods were even more eco-friendly, while on the other hand we would be enjoying a higher price by selling our farm products with an organic label."

Conversion

The Moutons' farm looks much different now. Their cattle herd consists of a mix of dairy cow breeds that produce milk satisfactorily, with a high protein and fat content, under extensive management. A Brown Swiss cow, for instance, is capable of producing about 8000 litres of milk in a year, compared to 9500 litres under the previous system. It is also important that the natural features of these animals have certain advantages: their udders are not heavy and the animals have a long life span. Technically, the conversion to organic farming has resulted in a different way of working that not only requires a new way of thinking, but also different knowledge and information. An external advisor assisted them to develop a complete farm plan for the changeover, including planning the feed production scheme which was a central issue in this transition. They also planned how to develop an optimal feeding schedule for the cows. A big advantage was that the Mouton family owned enough land to produce most of the required feeds themselves. Apart from some organic feed concentrates that they buy (2 kg per day per animal), the animals are fed solely from plants grown on the farm.

Since the conversion, maize has disappeared from the cows' diet. The Mouton family now grows grains and a mixture of grass and clover instead. They do not experience any weed problems with this system, whereas by growing maize or beets organically (which would have been the main alternative), manual weeding would have taken up a lot of their time. Before ploughing the fields, cattle manure is applied and fodder grains are sown in April. This is rather late in the year, but it allows for a fast growth of the crop and which keeps weeds under control. A few days after sowing the grain crop, the grass/clover mixture is sown in the same field. After harvesting the grain crop, the grass/clover mixture is cut for silage production (grass which is cut when green to be stored for feeding the cows during winter) or directly grazed by the cows. "With

grass/clover mixtures I manage to achieve very good yields" claims Dirk Mouton. "In the rather dry summer of 2003, for instance, I had yields of 17 ton per hectare on this light sandy soil, with only 140 kg of nitrogen applied in the form of cattle manure. That is about double the production that conventional farmers achieve on the same soils, applying chemical fertilisers."

Healthy animals

Dirk Mouton discovered that it is better to cut the grass/clover combination for silage production after it has received a few days of continual sun. Sunlight allows the grass leaves to produce more sugars. The higher the sugar content in the grass/clover cut, the better the fermentation process, which will allow for the feeds to be stored for longer. The quality of the grass in the grass/clover mixture is very important, since this forms the bulk of dairy animals' diet. The cows are always fed a mix of different grass/clover cuts in order to increase the variation and quality of their diet. Early in the year, the grass/clover mixture yields fodder with relatively less protein and a lot of sugars. At the end of the cropping season, in autumn, this is exactly the other way round.

Apart from paying special attention to the quality of the feedstuff, the Mouton family makes sure that their cows are in good health by doing their best to prevent the animals getting infected with some common diseases. When kept inside, all cows and calves stay in open, well-ventilated stables where the animals can lie down on straw. This straw, the by-product of grain produced on the farm, is brought in fresh every day, and the stables are cleaned once every two weeks. Because the farm is not pursuing maximum production, the animals are seldom ill and easily come in heat without any special treatment. When an animal does become ill, they first attempt to solve the problem with homeopathic treatment, and only if that fails will they allow conventional medication.

Proceeds

The conversion of the Mouton farm to completely organic production was achieved in about one and a half years, the period officially set for the soil ecosystem to recover from earlier non-organic management. In June 2000, the first organic milk was delivered to the organic milk cooperative, the *Coöperatie Biomelk Vlaanderen* to whom they now sell about 80 percent of the milk for a much higher price than conventionally produced milk. Ria Mouton, Dirk's wife, assists with the twice-daily milking activities. She is also responsible for processing some of the milk into butter, butter milk, cheese, yoghurt and rice pudding. These products are sold in their new farm shop to about 150 loyal local customers, as well as to another 50 families from the area who participate in "food teams". The members of these food teams, which were started with the assistance of the Flemish development NGO *Vredeseilanden*, have organised themselves in such a way that different fairly-produced and organic food products are purchased every week directly from farmers. The products that the food teams obtain from local producers include vegetables, fruits, meat, bread and dairy products. Ria Mouton states: "Processing milk, selling the dairy products from our shop and participating in the food teams creates an important added value to our farm enterprise. Moreover, our customers and the wider community appreciate what we do, which has assisted us in making the changeover to organic farming".

"There is no need for us to grow any bigger" adds Dirk. "Our family of four can live comfortably from the proceeds of our farm and that is enough. Now, I would rather continue growing in ecological terms in order to contribute further to a healthy environment. All our fields are within a catchment area for drinking water. Each year, nitrate levels of the soils are checked, and on 50 percent of our fields it is always below 30 kilograms, far below the officially allowed figure of 90 kilograms. Based on that, we receive a financial reward from the government, but more than that, it gives me enormous satisfaction."

Part of the farm's profits are invested in ecologically-friendly farm equipment, including solar panels, machinery to clean waste water, and machinery for reusing warm water. "I became an ecological farmer" he says, "because I feel that the safeguarding the environment should no longer be rated as less important than economics. Cautious management of nature, the environment, and natural resources are essential. The milking equipment is cleaned three times, and I can re-use the first lot of water as drinking water for the animals, and the second and third lots for cleaning the stables."

Farming more independently

"It has always been my dream to farm more independently," Dirk Mouton explains, "no longer relying on commercial companies for my inputs or large factories for my output. Now that we produce all our feeds, and hardly require any commercial feedstuff, we maximise the profit we can get from selling milk with an organic label. This allows us to farm in an efficient and economically viable manner."

After the decision was made to change the farm management drastically, they have not lost heart even once, because they made a deliberate decision. Farmers these days are confronted time and again with rules and regulations that they need to obey without any choice, and that they find much harder to implement. Before and during the transition to becoming organic producers, they received a lot of support and helpful advice from other farmers who had already made a similar changeover. Now that they have their own experience to offer, the Moutons are also regularly involved in supporting other interested colleagues who are considering a conversion to organic farming. However, during study meetings, which are commonly organised by farmer organisations in Flanders, many conventional farmers have shown a strong dislike towards the Moutons and other organic producers. A criticism often heard is that organic farmers are only chasing subsidies and that they "are taking a huge step back", something that conventional farmers cannot understand. Furthermore, with all the attention paid to environmental concerns, such as soil and ground water pollution by agrochemicals, conventional farmers feel attacked and therefore distrust the organic farming sector. This disapproval hurts, of course, and the Moutons are now tired of explaining what their real motives are for producing in an ecologically-friendly manner. They have stopped going to general farmer study meetings. Instead, they invest their time and energy in meeting with concerned consumers at annual "open farm days", and in June of this year they will participate in the *boerentoeren* (farm tours), where a bus full of interested consumers will visit several farms to learn about the source of the food they eat. ■

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Managing agricultural transition in African drylands

Michael Mortimore

The African drylands are home to 268 million people, or 40 percent of the continent's population, and, excluding deserts, they comprise 43 percent of the continent's surface area. Frequent droughts, and other risks, threaten investors and producers. Poverty is widespread, and the numbers of poor people in the drylands are so large that they threaten to block the achievement of the Millennium Development Goals. Food insecurity and dependency on food aid occur frequently in some countries, because besides the risk of drought, agricultural productivity is low and the natural resources seem to be degraded (desertification). Development projects have often failed, and few governments have enough resources to support enlightened policies.

However, African drylands are not all the same – annual rainfall can be anywhere from above 1000 mm to below 250 mm. There are rivers and wetlands, many types of soil, differences in land use, and in roads connecting with markets. Large-scale policies have mostly not worked, mainly because they lack the flexibility that people need to survive and prosper in such regions. The often low and highly variable rainfall creates risky environments for households, but people have responded flexibly, adapting to their opportunities, and developing strong links with humid or urbanised regions. Economic activities are characterised by innovation and experimentation. People's knowledge is a valuable resource for managing risky environments, in contrast to the narrower understanding that introduced technologies are often based on, many of which have failed.

Transition in the drylands

Transition can be a lengthy process, and means that the production system, as well as related natural resources and livelihoods, will be organised and managed differently. It is the result of many factors – including long term changes such as in rainfall and economic growth, and the application of peoples' own internal resources of knowledge, skills, capital and labour. External interventions only form a part of this transition process, sometimes a small one. Because so many external interventions have failed, and because development assistance and governmental resources are stagnating or declining, it is essential to understand transition better in terms of how it affects resource users, and what practices they can manage in order to achieve more sustainable livelihoods. Farming is usually practised as one part of a family's livelihood along with other activities. However, for the reasons stated, "business as usual" is now not sustainable in the drylands. The aim of managing transition, therefore, is securing a sustainable livelihood under the conditions of uncertainty that characterise drylands.

Can dryland peoples, against the odds, accomplish the transition from being at risk of further degradation, to more sustainable livelihoods?

Dryland peoples have been contending with changes, often beyond their control, for as long as they can remember, and they must manage and adapt as best they can. The slow pace of their adaptation may not be noticed by outsiders. Data on such change and variability over long periods -40 years or more- are now available in Africa. Taken with peoples' memories and indigenous knowledge, such long-term data can help identify policies (for the government) and practices (for the resource user) that can work in drylands. In the discussion that follows, examples are taken from recent fieldwork in the Kano-Maradi region of northern Nigeria and eastern Niger.

Managing environmental variability

In the Sahel region, average rainfall declined between the 1960s and the 1990s by as much as one-third. This meant that droughts were more frequent, crop failures caused food shortages, and animal mortality increased. The challenge was for people to increase their adaptive skills beyond what was needed before, to cope with added risk. Short-cycle early maturing crops and varieties took over from traditional longer-cycle varieties, and the use of wetland sites for dry-season cultivation was increased. Livestock numbers, too, increased on average, thanks to using grazing resources more flexibly, and shifting from cattle to small animals - a change associated with the ownership of small animals by women and sometimes children. In these and other ways, technological adaptations succeeded, on average, in maintaining the production of staple food crops per person at the levels of basic needs, despite the increase in the population.

Decision making under conditions of risk is not straightforward. The rains may begin at any time between April and July, and end without warning, which makes it difficult to assess best planting times and use of labour. In Kano, where there are two harvest seasons (early millet and the late crops, sorghum, cowpea and groundnut), if the rains finish early, labour inputs are relaxed for late weeding and the second harvest. In northern Maradi, where the risk of failure is greater, efforts are made to plant the largest area possible, but in drought years, large areas may later be abandoned without weeding or harvesting. In the worst years, technological adaptations in farming are not enough to compensate for lost crops, and decisions have to be made to migrate in search of alternative incomes (see Demographics below). In the past, three years' stored grain was considered to be a sound insurance; now, however, it is more common for the whole harvest to be consumed before the next one becomes available.

Managing productivity

So long as farming families prefer to grow their staple food (in this region, pearl millet and sorghum), every family tries to

The Kano Close-Settled Zone at harvest time.

Photo: Author

produce enough for their needs. When rainfall is satisfactory, farmers in the Kano Close-Settled Zone can grow their minimum requirements despite the tiny farm sizes. This is because they practise quite heavy manuring with organic residues, inter-cropping millet or sorghum with nitrogen-fixing crops such as cowpea or groundnut, and weeding several times during the short growing season, then feeding the cuttings to livestock. Fields are also ridged to preserve soil moisture. Where land is abundant and labour is scarce (in northern Maradi until recently), fallowing is used instead. If fallows become impossible because land itself becomes scarce, productivity falls, until intensive practices are introduced to reverse the trend.

It is not surprising, therefore, that staple crop yields tend to be higher in Kano than in northern Maradi (where they may often be less than 0.25 t/ha). This is not only due to lower rainfall (600-700 mm on average compared with less than 400 mm). Every farmer agrees that, given more manure, crop yields would be raised. Increasing productivity depends on having access to affordable inputs. One way of doing this is by keeping animals -either one's own or those belonging to nomadic herders- on the fields after the harvest (when they graze the crop residues). A farmer's own animals must be kept impounded during the growing season, while fodder is cut and carried to them at some expense in labour. Another strategy is to add value per hectare by switching to higher value crops on some of the land, or by planting and protecting trees.

Demographics

Until the 1990s, the rural populations of the Kano-Maradi region were doubling themselves in about 30 years. This means that each successive generation of every farming family has less land available to cultivate. There are two livelihood options: first, for adult sons to move elsewhere in search of land or other occupations, and second, to subdivide the holding into ever smaller portions and try to raise their productivity by more intensive methods, or crop diversification. In the Kano Close-Settled Zone, less than half a hectare of cultivable land is available per person living on the land, and people have been leaving for many decades. Because of lower rainfall and productivity of the land, farmers in northern Maradi feel threatened by a shortage of new land although each family has on average more than 18 ha. On the other hand, increasing numbers mean more family labour is available for working the land. Lower population growth may be expected in future, as the costs of having and raising children increase. There is evidence from Nigeria that this is already happening.

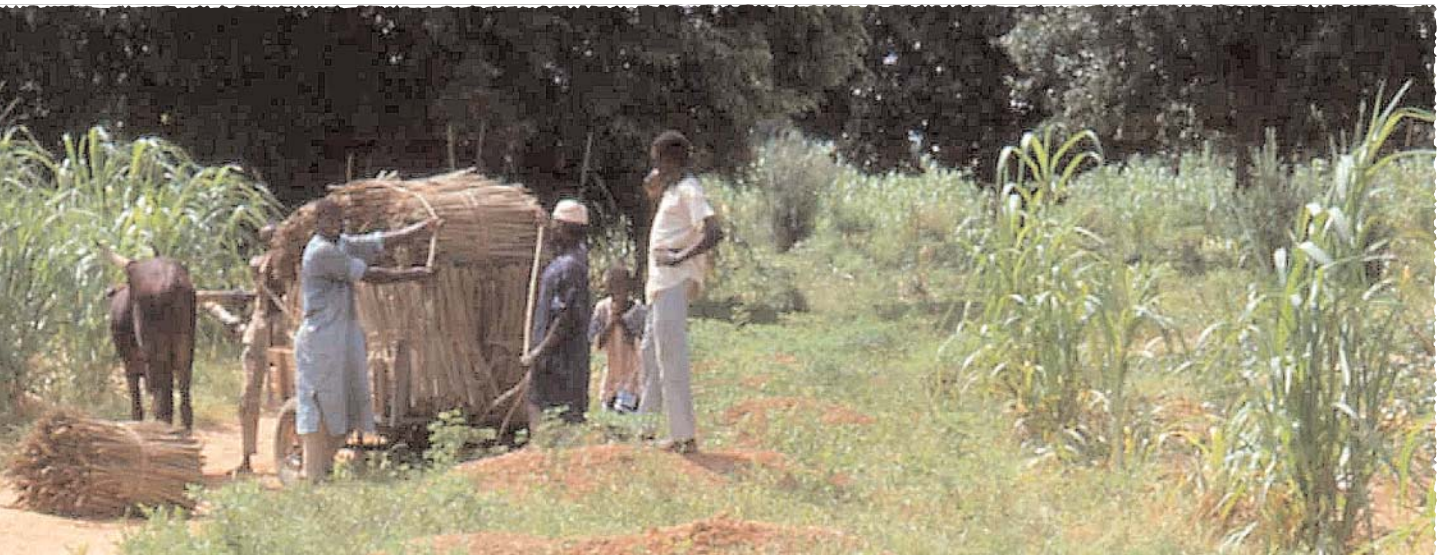
A critical part of the demographic changes in West Africa is urbanisation. The scale of urban growth has increased dramatically since 1960. For example, Niamey, which had less than 100 000 inhabitants in the 1960s, now has over a million; and 40 percent of Nigeria's population of over 100 million are now reported to live in cities. In some areas, rural to urban migration has removed part of the labour force; but in the drylands, rapid increase has easily supplied urban migrants while not significantly reducing the land to labour ratio.

Increased conservation

This discussion shows that scarcity of land and inputs causes changes in people's management strategies. In the past, heavy grazing, cutting for fuel, as well as more land used for cultivation, meant a decrease in rangeland, woodland and trees (especially in open access areas), but now more conservationist attitudes towards biodiversity are being reasserted. Every farmer who was interviewed in Kano and Maradi agreed on the priority of conserving trees. Where clear felling used to be regarded as evidence of "good" farming in northern Maradi, protection now has social approval. The practice of *défrichement amélioré* is now common, protecting trees of economic value that regenerate naturally. This change has occurred within one generation, and has been promoted by development projects. In Kano, where projects had very little influence, trees have been protected for generations. The amount of timber growing on farms is often greater than that in adjacent woodland, measured in m^3/ha. Even when tempted to sell wood to make up for crop failures, Kano farmers maintained the density of the trees on the farm. The village herbalists in particular value biodiversity, as they say "every tree provides a medicine", and are active in conserving individual species. Two of the villages which collaborated in this study (Magami in Niger and Dagaceri in Nigeria) identified tree nurseries as their priority for community action for conserving biodiversity, and invested their own resources in realising this opportunity. Even weeds are harvested in Kano villages for feeding to animals and -with crop residues- are exchanged in the markets.

Income diversification and marketing

Specialisation is highly risky in a semi-arid environment, and farmers have traditionally sought security in diversifying their enterprises. In the Kano-Maradi region, small-scale farmers entered global agricultural markets for the first time through colonial boards that were set up to promote groundnut and cotton production for export. Few producers were willing to take large risks, and so diversification was achieved by extending the area under cultivation. This option has almost gone (as explained above), and these global markets have all but disappeared with a drop in commodity prices and increased crop disease. Farmers have now diversified and are selling food commodities to local markets, and producing other crops, such as sesame in Kano and tiger nuts in southern Maradi. In both regions, livestock are shipped in increasing numbers to coastal cities. The markets for staple foods have grown. A study of Kano urban markets carried out in 2000 showed that the grain and livestock markets were supplying this city (with about 1.5 million consumers, compared



with 0.25 million in 1962). They had a key position in the national food commodity markets that even extended to Maradi.

Off the farm, improved roads and cross-border movements permitted under the Economic Community of West African States regulations, allow short-term migrants access to urban employment, hired labour markets, and more trading opportunities than before. Diversifying income sources thus depends on markets, whether for agricultural commodities, land, labour, or knowledge, and on mobility of labour and capital. In the Kano-Maradi region, nowhere is too remote to have some significant market linkages. It is important to support dryland people in realising income diversification strategies, and to facilitate their full participation in the regional market economy. Thus far, this has been achieved almost entirely without state support, and the contribution they have made to national economic growth has been systematically ignored by policy makers. Earnings from diversification are critical for the successful transition to more sustainable agricultural systems as they may be invested in farming, livestock, or natural resource conservation.

Facilitating transition

The point to stress is that all resource users are not in the same position. In the past, interventions (such as fuel-efficient stoves) have often been promoted irrespective of the variation in individual or household circumstances, where the innovation may not be needed by some or cannot be adopted by others because of constraints imposed by poverty, labour supply, gender or other considerations.

An approach to development that is gaining acceptance is that it should be "demand-led". In the present context, this excludes promotional interventions based on new technologies prioritised by outsiders, in favour of placing the service provision sector at the disposal of local people who are facilitated to develop their own priorities. A framework such as that presented here, which puts people into context rather than the two simple categories, "adopter" and "non-adopter", and recognises individual differences rather than relying on "averages", can assist development field staff to organise the services they offer, in order to respond better to what people need. This will enhance the timeliness and relevance of the service provided to support agricultural transition in the longer term.

The available evidence suggests a sustained effort to increase the output of food in line with increasing consumption needs. This shows the ability of small scale African farmers in these regions to manage the transition to sustainable livelihoods under difficult circumstances, given certain conditions such as access to markets and integration of livestock. There is still anecdotal evidence of rural poverty and food insecurity in the Kano Close-Settled Zone, but these long term transitions suggest significant successes in ecosystem management, contributing to more sustainable livelihoods, and providing important learning experiences in the search for viable pathways to development. ■

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This article draws on work undertaken for the IUCN (World Conservation Union) Commission on Ecosystem Management's Drylands case study of the ecosystem approach.

The hard way to success

Josphat K. Wachira

In Nyandarua District, in the Central Province of Kenya, the main food crops are maize, beans, peas and potatoes, and dairy farming is practised by most farmers. After independence in the 1960s, the Kenyan government gave farms previously owned by colonial settlers to local people, through the Kenyan government settlement scheme.

The people of Subuku, an area of the district's Ndaragwa division, were settled through this process. Since they did not have machinery, they only cultivated small pieces of land rather than large fields, and yields were often unsatisfactory. Government policies did attempt to favour farming in these areas: a milk factory was built in nearby Nyahururu, for example, but this assistance was insufficient to support the area's needs as a whole.

After farming for several years, farmers began using fertilizers and pesticides in their farming, as the land was not providing enough food for consumption and sale, while the cost of living was increasing. At first, production rose. But after some time, it was noticed that these agrochemicals started affecting the soils, yields dropped and were of poorer quality. The agrochemicals also appeared to be a health hazard. High blood pressure, among other health problems, was increasingly experienced, and within ten years became common, especially in elderly people.

Livestock were also affected: milk production dropped so much that the milk factory closed down in the mid 1980s. The previously satisfactory road network was neglected and, resulting impassable during the rainy season, often the area became isolated. With the rising costs of farm inputs and reduced yields, many families could not pay school fees, or buy animal feeds. The government was not in a position to help the people.

In 1999, the Kenya Institute of Organic Farming, the Conflict, Development and Peace network, and other organizations, came to the area. They encouraged farmers to start kitchen gardens, growing fruit and vegetables for domestic consumption, to help with the families' health problems. They looked carefully at local conditions, and designed appropriate short trainings on organic mixed farming, the uses of manure and compost, as well as on crop production. They worked on this for about two years. They were focusing on domestic consumption, with a view to possibly selling excess produce in the future. The NGOs also gave grants in the form of small live animals to, among other reasons, help farmers produce more organic manure for the fields. Introducing farmers to zero grazing showed that manure could be collected efficiently: previously this had been a major difficulty. All of these techniques were eye-openers. The farmers saw organic farming could increase their yields and give them more hope for the future.

Initial progress was very encouraging. The farmers decided to start organic farming on a larger scale. Many farmers found, however, that the land preparation method that they had been instructed to use ("double-digging") was very hard work. With double-digging, the soil is dug deep, and then dug once again to

be aerated and mixed with added manure. The markets did not make it any easier: consumers, not understanding the importance of organic products, preferred buying cheaper, conventionally grown products. Most farmers, discouraged, dropped organic farming. Within four years, every farmer had gone back to using agrochemicals, although many still used manure.

Members of the Syker self-help group taking their produce to the Juja organic market.

Photo: Marlies Marbus

In 2004, one of the NGOs came back to revive organic farming. Realising that the farmers had gone back to using inorganic fertilizers and pesticides, they re-evaluated their long term plan. This time they encouraged the farmers to try again and grow crops for sale, in order to generate some income. This time the NGO set the condition that the farmers should form a community based group, as the NGO believed this to be necessary for marketing purposes. Farmers would agree among themselves who would grow what, so that the market may have a constant supply. Therefore, the Subuku Organic Farmers Association made up of 24 organic farmers groups from four Divisions in Nyandarua District, came into being in June 2005. After trainings on processing and packaging, and the promise of ready markets in Europe and some of the major towns of Kenya, organic farming picked up again in Nyandarua. Once the system of double-digging was abandoned, it was not difficult to convince the farmers to try again. Organic fertilizers were now available in most shops, and some of the local NGOs had begun holding farmers open days on organic farming. The re-birth of organic farming in Nyandarua has brought rising yields, with some produce now being sold in local supermarkets, which now believe that consumers are ready for it. Money has started to come back to the area.

Other support

The Kenya Organic Agriculture Network is a marketing group for organic products in Kenya. They trained the Subuku Organic Farmers Association on marketing their products first to local people and then to the nearest towns, and are coordinating meetings between Subuku Organic Farmers Association and other organic producers in Kenya, with the organic markets in Kenya and abroad. The media has publicised the importance of organic products to the point that now consumers demand to know if food products are chemical-free. To solve this issue, the Kenya Organic Agriculture Network, supported by the Tree Is Life project, invites consumers to visit farms to see for themselves, where they can be taught by farmers about organic food. Many people now realise the importance of organic products to their health. However, international certification remains expensive, only large scale producers can afford to export their foodstuffs to Europe with certified organic status. The farmers are still looking for a way to certify their products.

The marketing of organic products has born fruit. Many buyers and consumers are local people and a market has been set up at Juja, on the Nairobi Thika road. It was officially opened by the winner of the 2004 Nobel Peace Prize, Wangari Maathai, in February 2006. The Green Belt Movement which Prof. Wangari Maathai leads campaigns for the domestic use of organic produce. Now, the Subuku Organic Farmers Association will supply organic vegetables to this market, including spinach, kale, broccoli, amaranthus, peas, onions, lettuce, leeks, squash, cabbage, fennel, and cauliflower. Fruits will include passion fruit, oranges, and lemon among others. Herbs such as coriander, rosemary, sage, thyme, parsley, dill, mint, marjoram, and balm will be available, and root crops such as red radish, white radish, beetroot, and rutabaga will be on the stalls.

Lessons learnt

This experience shows that any transition to a more sustainable system of production, especially if commercial, is never straightforward. Through trainings and forming organisations, most farmers now prefer to use manure, having seen that increases in yields have contributed to improving their livelihoods. Many aspects need to be considered, but with belief and perseverance, the farmers and consumers of this region are now seeing and eating the benefits.

Important factors in achieving these successes include:

- training - on organic production techniques and marketing;
- market and marketing advice - essential for knowing which crops to grow, how and where to sell them;
- the provision of inputs (including small animals);
- forming an organisation - this amplified the benefits of better marketing, better planning and, not least, of working collectively to share knowledge and experiences; and
- awareness raising among farmers and consumers about the benefits and importance of organic production and products.

Farmers groups were able to access the Arid Lands Information Network (*http://www.alin.or*.ke) and use their Open Knowledge Network. In particular, they receive the Baobab journal (in which community development workers across the drylands of Africa exchange their experiences). Access to such information sources remains very important in continuing to develop organic production, marketing, and in promotion of health benefits. ■

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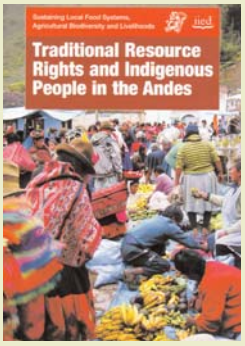
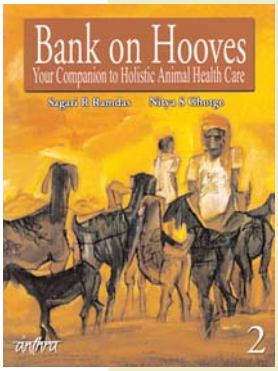
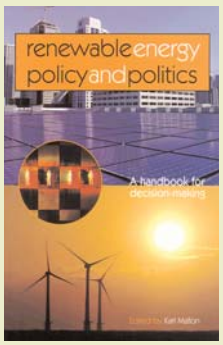


Traditional resource rights and indigenous people in the Andes
2006. 12 p. ISBN 1843695715.
IIED project: Sustaining local food systems, agricultural biodiversity and livelihoods.
IIED, 3 Endsleigh Street, London WC1H 0DD, U.K. E-mail: info@iied.org ; http://www.iied.org
This paper describes the development of a model to protect traditional knowledge systems, based on the conservation and sustainable use of the ecosystems in which indigenous peoples' knowledge and innovations thrive. This IIED project, together with ANDES, the Quechua–Aymara Association for Nature Conservation and Sustainable Development, builds on the Andean concept of "working landscapes" and integrates indigenous people's own concepts of rights over their knowledge and resources.

Bank on hooves: your companion to holistic animal health care by S. R. Ramdas and N.S. Ghotge, 2005. Vol.1. 256 p., Vol. 2. 361 p. ISBN 8190298909. Anthra, A21, Sainikpuri, Secunderabad 500 094, India. E-mail: anthra@vsnl.com ; http://www.anthra.org
Anthra is an alternative resource, training, research and advocacy centre for biodiversity based livestock production. Anthra has been involved in training community animal health workers in different parts of India. This book captures the experiences gained over more than a decade of these training programmes. The book takes the reader from participatory approaches to developing livestock programmes, to the essentials of livestock management, describing the complexity of its relationship with people's livelihoods and natural resources, in volume 1. In volume 2 the reader is presented with alternate approaches to animal disease management and health care. This book is an easy to understand reference to different aspects of animal healthcare and production. It assists in sharing knowledge and information on livestock care with others in the community. Very useful for all those interested in livestock development work.



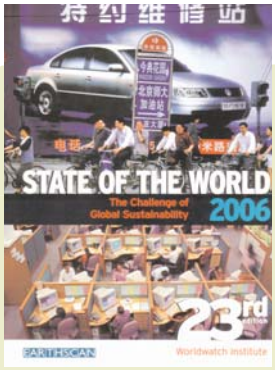
Renewable energy policy and politics: a handbook for decision-making by Karl Mallon (ed.), 2006. 268 p. ISBN 184407126X. Earthscan, 8-12 Camden High Street, London NW1 0JH, U.K. E-mail: earthinfo@earthscan.co.uk ; http://www.earthscan.co.uk
At a time when renewable energy attracts varying degrees of political support and mixed success in policy implementation, clear information on why and how to promote renewable energy markets is much needed. This book addresses that need. It examines the politics of renewable energy, including the key players required to drive energy reform and those likely to resist change. The interplay between government, industry and society is discussed and explained with a balanced hand, offering insight into political campaigning on energy. International case studies are included, containing the experience of world leaders in this field, complemented by step-by-step breakdown of the elements required to achieve legislation. The book is meant for policy makers, energy consultants, NGOs and other professionals working in the fields of energy policy, climate change and environmental policy.



Land reform and its impact on livelihoods: evidence from eight land reform groups in the Northern Cape province of South Africa by A. Bradstock, 2005. 32 p. ISBN 190402905. FARM Africa Policy and Research Series no 4.
FARM Africa, 9-10 Southhampton Place, London WC1A 2EA, U.K. E-mail: farmafrica@farmafrica.org.uk ; http://www.farmafrica.org.uk
FARM Africa's Policy and Research series summarises project experiences and research findings from its grassroots programmes in eastern and southern Africa. Aimed at national and international policy makers, national government staff, research institutions, NGOs and the international donor community, the series makes specific policy recommendations to enhance the productivity of the smallholder agricultural sector in Africa. The programme in the Northern Cape province aims to improve the natural resource management and livelihoods of communities benefiting from South Africa's land reform programme. This paper, the fourth issue in the series, examines the assets, activities and income sources of a random sample of households chosen from eight land reform groups, looking at changes between 2001 and 2003.

Monsanto: Who benefits from GM crops? 2006. 67 p. ISBN 9009149139.
Friends of the Earth LINK issue 110,
Friends of the Earth International,
PO Box 19199, 1000 GD Amsterdam,
The Netherlands. E-mail: info@foei.org ; http://www.foei.org
This report analyses the way in which genetically modified (GM) crops were introduced into our environment between 1996 and 2005. It describes how the rapid dispersion of GM crops in a limited number of countries has largely been the result of the aggressive strategies of the biotech industry, particularly pushed by top GM crop leader Monsanto, rather than the consequence of the benefits derived from the use of this technology.
The report shows that Monsanto's pesticide reduction claims are unfounded, and that in fact GM soya has dramatically increased pesticide use. Claims that GM crops will contribute to poverty reduction have also thus far been unfounded, as have claims that consumers benefit from GM products. Ultimately it is GM companies that profit the most from the aggressive promotion of their GM products. This publication is based on reports from scientific-technical bodies, industry, government, and civil society. It is illustrated by fully-referenced national and regional case studies from every continent.

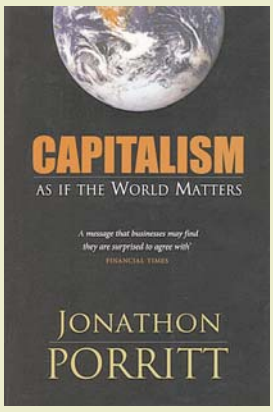
State of the world 2006: The challenge of global sustainability A Worldwatch Institute report on progress toward a sustainable society, 2006. 244 p. ISBN 1844072754.
Earthscan, 8-12 Camden High Street, London NW1 0JH, U.K. E-mail: earthinfo@earthscan.co.uk ; http://www.earthscan.co.uk
In this 23rd edition of State of the World, the authoritative and accessible annual guide to our progress towards a sustainable future, the studies pay particular attention to China and India, two of the world's most rapidly developing countries in terms of industry, population and significance to the global economy,



and associated impacts on the environment. With this report the Worldwatch Institute offers important information about the environmental and social challenges facing society and the progress the world has made in responding to them.

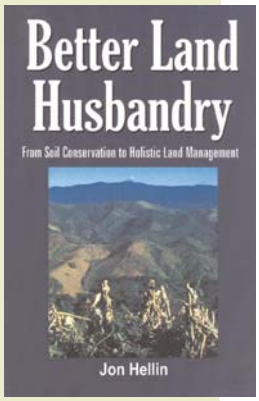
Small-scale mushroom cultivation: oyster, shiitake and wood ear mushrooms by P. Oei, 2005. 86 p. ISBN 9085730384. Agrodok-series no. 40. Agromisa, P.O. Box 41, 6700 AA Wageningen, The Netherlands. E-mail: agromisa@agromisa.org ; Downloadable from http://www.agromisa.org, also in French and Portugues.
Mushroom cultivation is well suited to the principles of sustainable farming due to several characteristics: it uses agricultural waste products, high production per surface area can be obtained, and after picking, the spent substrate is still a good soil conditioner. This new Agrodok contains detailed information on how to grow three mushroom species. These mushrooms are quite easy to grow on a small scale and they are full of proteins, B vitamins and minerals, and even have medicinal properties. Time between spawning and harvesting can be as short as three weeks.

Capitalism as if the world matters by Jonathon Porritt, 2005. 336 p. ISBN 1844071928. Earthscan, 8-12 Camden High Street, London NW1 0JH, U.K. E-mail: earthinfo@earthscan.co.uk ; http://www.earthscan.co.uk
Often NGOs have to campaign against commercial activities that cause environmental degradation around the world. Many of those working towards a more sustainable future for our planet see capitalism as a big part of the problem, and with good reason. In this observation of capitalism, Jonathon Porritt examines the most pressing question of the 21st century – can capitalism, as the only real economic system in town, be reworked to deliver a sustainable future? Porritt argues that indeed it can and it must as he lays out the framework for a new "sustainable capitalism" that cuts across the political divide and promises a prosperous future of wealth, equity and ecosystem integrity.



Cultivation of tomato: production, processing and marketing by S. Naika et al., 2005. 92 p. ISBN 9085730392. Agrodok-series no. 17. Agromisa, P.O. Box 41, 6700 AA Wageningen, The Netherlands. E-mail: agromisa@agromisa.org ; cta@cta.int Downloadable from http://www.agromisa.org, also in French and Portuguese.
This revised Agrodok focuses on good practices for growing a healthy tomato crop and obtaining a reasonably steady yield. It provides practical information on small-scale cultivation, harvesting, storing, processing and marketing of tomatoes. Seed selection and conservation, integrated pest management methods and record keeping are also covered. This information is meant for vegetable growers, whether beginners or more experienced farmers, extension workers and agricultural teachers.

Better Land Husbandry - From soil conservation to holistic land management by John Hellin, 2006. 288 p. ISBN 1-57808-244-7. J Oxford Brooks, Oxford University, U.K. http://www.scipub.net/environmental-science/land-husbandry-better-environment-sciences.html
This is the fourth volume in a series of international publications looking at various issues of land reconstruction and management; this volume tackles a new paradigm for the management of soil and water on agricultural lands, known as better land husbandry.
One of the founding principles of the better land husbandry approach is that the better the quality of the soil, the more organic matter it contains, the more open its texture, and the greater its capacity to absorb rainfall and restrict runoff.

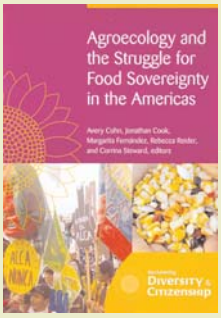


Better land husbandry strategies strive to address, simultaneously, farmers' concerns about productivity and, through a focus on soil quality, on minimizing runoff and avoiding erosion. The better land husbandry approach signals a move away from looking at erosion in terms of "what" is happening to questioning "why" it is happening. Examining the "why" component facilitates identification of the causes of erosion and provides the basis for designing appropriate strategies to combat soil degradation by treating its causes, not just its symptoms. It also shows where there are still gaps in our knowledge, particularly with respect to the beneficial roles played by the soil organisms.

Visit our website: www.leisa.info

Agroecology and the struggle for food sovereignty in the Americas by A. Cohn et al., 2006. 203 p. ISBN 1843696010. The International Institute for Environment and Development (IIED), 3 Endsleigh Street, London WC1H 0DD, U.K. E-mail: info@iied.org

The principles of food sovereignty include the right to food and the right to land for each nation and people. This workshop report, focusing on the Americas, offers empirically-based analysis, experiences, critical reflections and lessons that are directly relevant to the well-being of people and nature everywhere. This publication seeks to exchange ideas about new research, practice on the ground, and the social movements that are working to build more self-reliant, sustainable, and socially just food systems. The first section introduces the key themes of the workshop, the critical issues of global agriculture, trade and the environment. In the second section articles by participants explore specific connections among these larger issues with case studies. The report closes with tools for change to promote future work on the issues addressed at the workshop, including a list of resources for further action, and contact information for participants and their organisations.

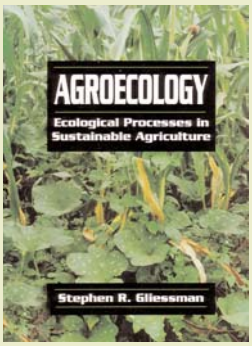


Steps in the conversion and development of organic farms by J. Isart and J.J. Llerena (eds.), 1997. 129 p. ISBN 84 921533 1 8. The European Network for Scientific Research Coordination in Organic Farming, Laboratory of Entomology and Environmental Analysis (LEAAM-Agroecology), Centre of Research and Development, Jordi Girona 18-26, 08034 Barcelona, Spain. E-mail: leaam@cid.csic.es

This proceedings from the European Network for Research in Organic Farming meeting in Barcelona, 1996, provides papers about farms in conversion in different countries in Europe. These papers cover economic questions of conversion, the study of weed communities found in organic crops, pest control technologies and soil fertility aspects. An important conclusion of this report is that organic farmers need good advice to help them overcome the many and varied difficulties they face during a conversion process.

Agroecology: ecological processes in sustainable agriculture
by S.R. Gliessman, 1997. 357 p. ISBN 1 57504 043 3. CRC Press (formerly Ann Arbor Press), 2000 Corporate Blvd. Boca Raton, Florida 33431, U.S.A. E-mail: orders@crcpress.com

This basic textbook on agroecology is still very useful to promote a sustainable way of agriculture. It is divided into four sections. First it describes the concept of agroecosystems and why these are an answer to the failures of conventional agriculture. Then the plant and its response to



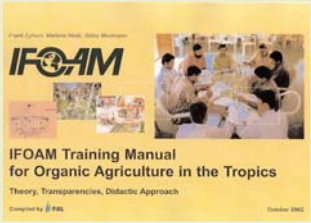
variations in environmental factors such as light, temperature, humidity and rain, wind, soil, water in the soil, fire, biotic factors and environmental interaction are dealt with. The third section looks at system-level interactions, on how groups of organisms (e.g. species, a diversity of crops) interact in the cropping environment. Finally the transition to sustainability is described and illustrated with case studies. Sustainable agriculture should develop into sustainable food systems.

Falta petroleo!: Perspectives on the emergence of a more ecological farming and food system in post-crisis Cuba by Julia Wright, 2005. 351 p. ISBN 908504197X. Thesis, Wageningen University, Hollandseweg 1, 6706 KN Wageningen, The Netherlands. E-mail: info.rds@wur.nl

This research analyses the nationwide change to a more self-reliant agricultural production and food sector in Cuba. After the cut-off of its foreign supplies of agricultural inputs and food imports, Cuba had no other option but to become more self-sufficient and turn to alternative agricultural systems. After a decade it appeared that Cuba had not only managed to feed all its population and increase its production, but was also operating its agriculture along more ecological lines. This research addresses the nature of this change from the perspectives of farmers and institutional actors. It looks at the type of agriculture emerging in Cuba and the interpretation of ecological agriculture, as well as at the institutional processes which drove through and emerged from these changes, and the mechanisms implemented to ensure food security.

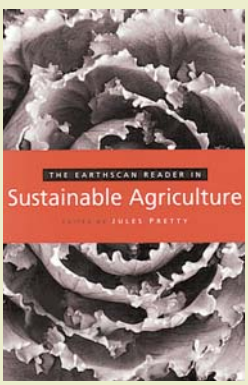
IFOAM training manual for organic agriculture in the tropics
by F. Eyhorn, M. Heeb and G. Weidmann, 2003. 195 pp. ISBN 3934055257. International Federation of Organic Agriculture Movements (IFOAM), Charles-de-Gaulle-Str. 5, 53113 Bonn, Germany. E-mail: headoffice@ifoam.org Website: http://www.fibl.org/english/publications/training-manual/content.php

This training manual can be used as a guide and source book to implement training programmes. It can also serve as a handbook for those who want to get more clear and complete idea on the basics of organic farming. The focus is on small-scale farming in tropical countries. The manual provides sections on soil fertility, plant nutrition, pest management, animal husbandry and farm economy. The chapter on Farm Economy deals with conversion to organic farming.



The Earthscan reader in sustainable agriculture by Jules Pretty (ed.), 2005. 405 pp. ISBN 1844072363. Earthscan, 8-12 Camden High Street, London NW1 0JH, U.K. E-mail: earthinfo@earthscan.co.uk Website: http://www.earthscan.co.uk

This reader describes sustainable agriculture as an alternative form of agriculture: one founded on ecological principles and which is more harmonious for people, their societies and cultures. This volume brings together the most influential scholarship in the field, containing both theoretical developments and critical appraisals of evidence. It addresses what is not sustainable about current or past agricultural and food systems, as well as studying transitions towards agricultural and rural sustainability at farm, community, regional, national and international levels. It provides different perspectives for the development of sustainable agriculture in industrialised countries and in developing countries.



IFOAM
http://www.ifoam.org/
IFOAM Head Office, Charles-de-Gaulle-Str. 5, 53113 Bonn, Germany.
E-mail: headoffice@ ifoam.org
IFOAM aims at the worldwide adoption of ecologically, socially and economically sound agricultural systems that are based on the principles of organic agriculture. The Africa Organic Service Centre can be found on IFOAM's website: http://www.ifoam.org/about_ifoam/around_world/africa.html
Africa Organic Service Center, B.P. 45603 Fann, Dakar, Senegal.
E-mail: c.makunike@ifoam.org

EPOPA Development through organic trade
http://www.grolink.se/epopa/
EPOPA c/o AgroEco, P.O. Box 63, NL-6720 AB Bennekom, The Netherlands.
E-mail: epopa@agroeco.nl
Export Promotion of Organic Products from Africa (EPOPA) is a programme created by the Swedish International Development Agency (SIDA). The programme has currently projects in Uganda, Tanzania and Zambia. EPOPA aims to give African smallholder farmers a better livelihood through developing local and international organic markets.

IAALD International Association of Agricultural Information Specialists
http://www.iaald.org/
IAALD Secretary/Treasurer, P.O. Box 63, Lexington, KY 40588-0063, U.S.A.
E-mail: info@iaald.org
IAALD seeks to be the leading global community of practice for information specialists serving agriculture. IAALD connects agricultural information specialists worldwide, providing platforms and spaces for information dissemination, exchange and knowledge sharing.

ALIN Arid Land Information Network
http://www.alin.or.ke
ALIN, P.O. Box 10098, 00100 – Nairobi, Kenya. E-mail: Info@alin.or.ke
Arid Lands Information Network (ALIN)- Eastern Africa is a network of Community Development Workers (CDWs) who are involved in drylands development. ALIN supports CDWs by encouraging the exchange of ideas, information and their own experience on development work. To join the network, write to the above address.

FiBL-The Research Institute of Organic Agriculture
http://www.fibl.org/english/index.php
FiBL, Ackerstrasse / Postfach, CH-5070 Frick, Switzerland. E-mail: info.suisse@fibl.org
The Research Institute of Organic Agriculture, FiBL, is a leading competence centre for research and consultancy on organic agriculture in Europe. FiBL has projects in Eastern Europe, India, Latin America and Africa to promote the development of organic research services as well as advisory and certification services. You can order print publications from the FiBL shop. Most of the black-and-white publications are available for download free of charge. In addition, they offer a series of data sheets in colour which are available for download at a charge.

Practical Action
http://www.practicalaction.org
The Schumacher Centre for Technology & Development, Bourton on Dunsmore, Rugby CV23 9QZ, U.K. E-mail: infoserv@practicalaction.org.uk
Practical Action works with poor people to develop the skills and technology that will enable them to build a better future. Practical Action has made available a very large selection of Technical Briefs -factsheets with basic practical information- on its website, which are available to download at no cost. Alternatively, hard copies can be obtained by contacting the Practical Information Service at the e-mail address above. Practical Action also has a Technical Enquiry Service which supplies, free of charge, technical information and answers to specific questions, to a target group which includes grassroots development workers, CBOs, NGOs and other agencies using appropriate technologies to implement sustainable development.

Permaculture network
http://www.permaculture.org.uk/
BCM Permaculture Association, London, WC1N 3XX, U.K.
E-mail: office@permaculture.org.uk
Permaculture is about creating sustainable human habitats by following nature's patterns. The international permaculture network has members in many countries and links to groups all over the world. They are supporting the development of permaculture internationally through compiling a database and giving advice and support to groups that contact them.

IMARK
http://www.imarkgroup.org/
IMARK is facilitated by FAO, viale delle Terme di Caracalla, 00100 Rome, Italy. E-mail: IMARKenquiries@fao.org
The Information Management Resource Kit (IMARK) is a partnership-based e-learning initiative to train individuals and support institutions and networks worldwide in the effective management of agricultural information. IMARK consists of a suite of distance learning resources, tools and communities on information management. IMARK learning materials are being developed as a series of modules available online and on CD-ROM. The modules are being developed using the latest methods in e-learning, providing an interactive environment for self-paced learning.

RUAF Urban Agriculture
http://www.ruaf.org
ETC, P.O. Box 64, 3830 AB Leusden, The Netherlands.
E-mail: ruaf@etcnl.nl
Growing cities and populations are one of the big challenges of the future. The importance of urban agriculture in sustainable urban development is growing. The Resource Centre on Urban Agriculture and Food security (RUAF) was developed to fill the information gap found. The Urban Agriculture website is one of the ways RUAF intends to facilitate the flow of information and discussion on the actual and potential roles of intra-urban and peri-urban agriculture.

Forest Stewardship Council
http://www.fsc.org
The Forest Stewardship Council (FSC) is an international not-for-profit membership-based organization that brings people together to find solutions to the problems created by bad forestry practices and to reward good forest management. It promotes responsible management of the world's forests through consultative processes, setting international standards for responsible forest management. It accredits independent third party organizations who can certify forest managers and forest product producers to FSC standards, operating through its network of National Initiatives in more than 34 countries. FSC also undertakes marketing programs and information services that contributes to the mission of promoting responsible forestry worldwide.

Call for articles

Issue 22.4 December 2006:

Making the most of ecological processes

Trying to develop sustainable agriculture which builds on ecological processes is an ongoing challenge. Though some of the basic ecological principles are well known (for example, nutrient cycles or nitrogen fixation), we know very little about how these processes work in detail and about how the different ecological processes interact with each other. Most of the knowledge about ecological agriculture therefore builds on practical experiences and trial and error – or success. Examples where farmers are managing ecological processes include intercropping, plant density and arrangement, use of shade, and seed treatment. The system of rice intensification (SRI) is one example of an integrated ecological approach that has been very successful in increasing rice yields of small scale farmers while reducing the need for commercial inputs and saving on natural resources like water (see also earlier articles in LEISA Magazine, volumes 15.3, 15.4 and 18.3). First described in the early 1990s, this approach is now spreading all over the world, mostly through informal exchanges. Farmers try it out in different contexts and with different levels of input and management. But how are these experiences developed? How have farmers and communities reacted to this rather revolutionary approach? When has it been successful and when hasn't it? What adaptations have been made to the system? Could a similar approach be used for other crops?

Photo: Rik Thijssen

This issue of LEISA Magazine will look at the experiences of SRI so far, as well as at other examples of how the broadening of our thinking, by including ecological processes in the development of sustainable agriculture, can have positive and dramatic effects.

Deadline for submission of articles: 1 September 2006.

Next issue:

Building knowledge through farmer innovation and participation