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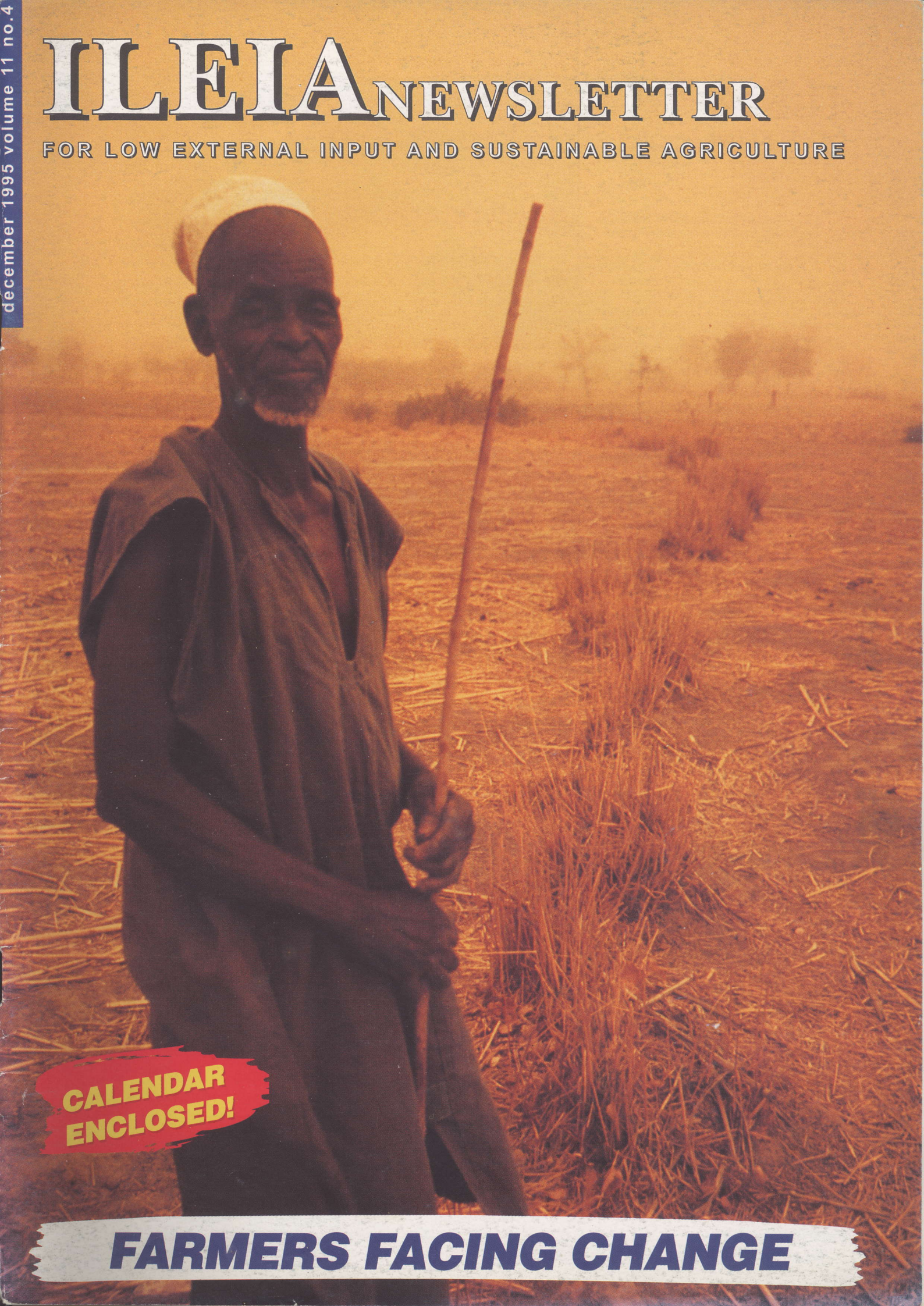
ILEIA NEWSLETTER

FOR LOW EXTERNAL INPUT AND SUSTAINABLE AGRICULTURE



CALENDAR ENCLOSED!

FARMERS FACING CHANGE

ILEIA
NEWSLETTER
december 1995
volume 11 no.4

The ILEIA Newsletter is a publication of the Information Centre for Low-External-Input and Sustainable Agriculture (ILEIA), Kastanjelaan 5, PO Box 64, NL-3830 AB Leusden, Netherlands. Tel. +31-33-4943086; Telex 79380 ETC NL; Fax +31-33-4940791; e-mail ileia@ileia.nl

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CONTRIBUTIONS Articles, short communications and news items should be written in easy-to-read English. Articles should be less than 1200 words long, and should include at least 2 illustrations. Authors of published articles will be paid DFL 165 per printed page. A guideline for preparing articles can be obtained from ILEIA.

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ILEIA (Information Centre for Low-External-Input and Sustainable Agriculture) was established in 1982 by the ETC Foundation and is funded mainly by the Netherlands Ministry of Development Cooperation. Project funds are assured till early 1999.

ILEIA's long-term objective is to contribute to a situation in which Low-External-Input and Sustainable Agriculture (LEISA) is:

- widely adopted as a valid approach to agricultural development, complementary to high-external-input agriculture,
- recognised as a means to balance locally available resources and local knowledge with modern technologies requiring inputs from elsewhere,
- valued as a useful perspective in planning and implementing agricultural research, education and extension,
- developing and consolidating its stock of knowledge and scientific basis.

LEISA is agriculture which makes optimal use of locally available natural and human resources (such as climate, landscape, soil, water, vegetation, local crops and animals, local skills and indigenous knowledge) and is economically feasible, ecologically sound, culturally adapted and socially just. The use of external inputs such as mineral fertilisers, pesticides and machinery is not excluded but is seen as complementary to the use of local resources and has to meet the above-mentioned criteria of sustainability.

ILEIA seeks to reach these objectives by operating a documentation centre; publishing a quarterly newsletter, bibliographies, resource guides etc; holding workshops; and supporting regional networks in the Third World.

CARTOON by Gato

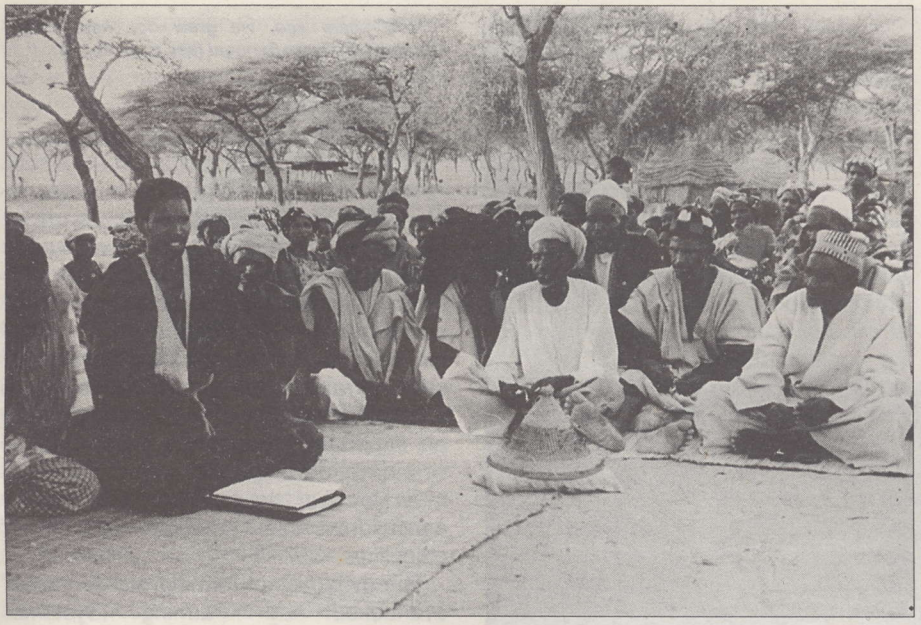
COVER PHOTO: Wim Hiemstra

DEAR READERS

In this issue of the ILEIA Newsletter we present a first outline of the "ILEIA Learning Process", the new phase of the ILEIA project. The goal of this new phase is to assess the feasibility of ecologically sound agriculture in three contrasting agroecozones. To do this, space is created for "Learning Partnerships", coalitions of farmers, development workers, researchers, ILEIA and external specialists. These learning partnerships are presently being established in Ghana (dryland savannahs), Peru (mountain valleys) and the Philippines (humid lowlands). This issue is the first in a series of three to focus on these agroecozones. Its main theme is "coping with change in dryland savannahs". The articles present examples of the changing demographic, economic, political and ecological conditions farmers in dryland savannahs have to cope with and the influence these processes of change have on the technologies and strategies they prefer. For assessing the feasibility of ecologically sound agriculture coping with change will be one of the main points of attention.

The new goal and approach of ILEIA, the process of change ILEIA is coping with, will also influence the content of the Newsletter. The experiences of the learning partnerships will be presented. In the heart of this issue, you will find a new subscription form. If you are interested to continue receiving the ILEIA Newsletter in 1996, please fill it out and return it to Marika van de Brom.

The Editors



Paysans sans Frontieres

Farmers cross the borders

Life of the nomadic Peuhl in the village of Guelackh in Senegal has changed dramatically. "The people that follow their cattle" in many cases had to settle down. Most of their cattle died. Doudou Sow realised he had to look across the border to find solutions. In Belgium, farmer Remi Schiffeleers witnessed the alarming pollution of his environment and the downfall of more and more of his fellow farmers. He too realised the changes could not be faced alone. Together they learned to cope with the dynamics of farming.

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Coping with risk and uncertainty

Drought, dust and disaster. For many people these are the words to describe dryland farming. For the farming community of Chivi, Zimbabwe, dryland farming means variability, flexibility and diversity. They have their own strategy to cope with risk and uncertainty. If researchers and policy makers are to support them, they need to take the local strategy serious. There can be no standard recommendations or technology packages for dryland communal areas.

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Building partnerships

David Millar of the ACDeP network in Ghana describes their experience in building partnerships between NGOs and researchers. The NGOs are now invited to the research institutions and researchers venture into the farmers' fields. The choice of the research area, the methods and tools brought all parties back to the classroom, ready to start a common learning adventure

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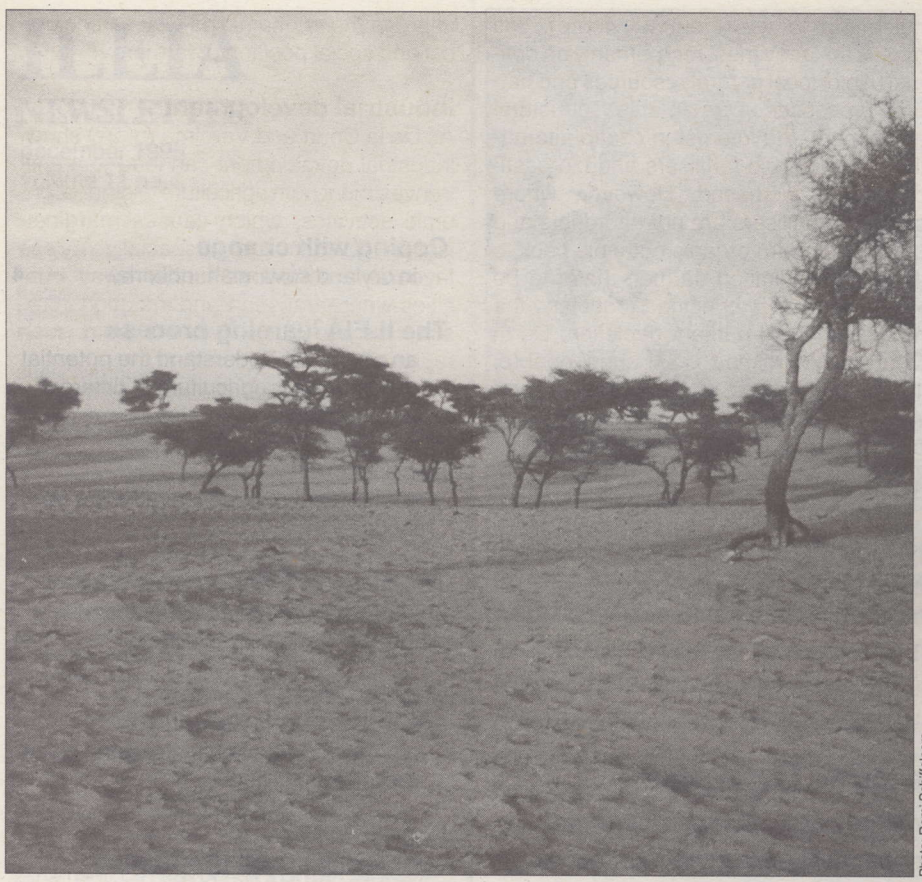

Photo: Remi Schiffeleers.

"Thirty years ago, we grew rice here" says Doudou Sow from Senegal (see page 8).

Coping with change in dryland savannah

"In the past, it was quite unusual to sell anything. Goods where bartered: your millet was exchanged for your neighbour's cowpeas, sorghum or even livestock. Money had very little meaning to most of us.... There were fewer people and the land was free. Land was inherited, was loaned to neighbours, but was too sacred to be bought or sold. Today, the ground is no longer respected: it has become just a saleable product, like any other.... Because there are so many people, our fields have shrunk. Those which once belonged to one person are now used by five. As population grows, soil productivity and yields decrease. To compensate for this, trees are being savaged to clear ground for agriculture...." says El Haj Chaibou Bagouma, a farmer from Takieta, Niger (Cross and Baker, 1992, p 144-145).

Although the conditions for agriculture in dryland savannahs (see box) have some common characteristics: drought prone, low natural soil fertility, vulnerable, variable, uncertain and risky, there are also many differences. Not only in agroecological conditions and population densities but also in history, culture, knowledge, social organisation, market orientation, market opportunities, infrastructure, non-farm income opportunities, development support and policies affecting agriculture. However, diversity also results from differences in processes of change and adaptation.

Dynamics of farming overlooked

It is clear from the words of El Haj Chaibou Bagouma, that farmers in dryland savannahs all over the world face many processes of change. These strongly influence the direction agriculture is taking. From an historical point of view, changes are overwhelming in number and speed. To survive, farmers have to adapt their ways of farming continuously. The capacity of farmers to adapt to changing conditions, with or without support from development workers, researchers, policy makers and others, can be seen as the key to sustainable agriculture.

Change and adaptation involve economic, ecological as well as social aspects. Many farmers in dryland savannahs are in trouble due to ecological degradation and, as a result thereof, low production and income levels. This situation also puts social relations under stress. Until recently, improvement of the ecological situation rarely was an important objective of development. It was not recognised as an important precondition for long-term economic development and social welfare. However, the need for sustainable agriculture creates a need to set broader objectives.

The dynamics of farming are generally overlooked by Farming Systems Research, but also by advocates of alternative agriculture (Meertens et al. 1995). Therefore, efforts to support farmers are often not very effective, lead to economic development of better-off farmers, while threatening the interests of small farmers and ecological sustainability. We urgently need to better understand the processes of change and adaptation as well as the implications they have for sustainable agriculture , from the perspective of individual farmers and the nation. Likewise there is a need to improve the capacity of farmers, development workers, researchers and policy makers together, to adapt to changing conditions and needs.

Ecological degradation

Many articles in this issue mention the serious ecological degradation and desertification of the dryland savannahs, two of the important processes of change in this climatic zone. However, ecological degradation is a symptom. Causes mentioned are climatic change, population growth, labour migration, marginalisation of farmers, decreasing use of natural elements like hedges, competition between dryland farming and irrigated farming, shift to market oriented monocultures, continuous use of agrochemicals, dumping of cheap agricultural products from Western countries on Southern markets, competition between investment in agriculture and in industry, and growing cities. As various processes take place at the same time ecological degradation is a very complex phenomenon.

However, ecological degradation is not an issue everywhere. Harris (p. 16) reports that around Kano, one of the main cities in Northern Nigeria, due to intensification of agriculture, ecological degradation has been reduced to a minimum.

Population growth

Population growth is an important driving force behind change. Production has to increase through using more land, if still

available, or otherwise through intensification. Boserup (1965) concluded that farmers in pre-commercialised systems will only intensify their way of farming if there is a real need, for example, when land is short and the number of people depending on agriculture is growing. This makes sense as labour productivity of intensive agriculture is normally lower than that of extensive agriculture. For the same reason farmers will turn to more extensive farming if more land becomes available. Development workers who propose farming methods that are too labour intensive will not get much response from farmers if labour is not available. In a study in Northern Nigeria, Harris (p. 16) found proof of this principle. It appeared that only with high population density the so much advocated strategy for intensification, integration of livestock and crop production, becomes possible. Several studies (Tiffen at al, 1994; Netting, 1989; Mortimore 1993; Meertens at al, 1995) show that where population pressure increases, intensification tends to become an autonomous process and ecological rehabilitation takes place. In the cases studied by the authors, situated in Kenya, Nigeria and Tanzania, farmers use only very limited amounts of external inputs such as chemical fertilisers and pesticides. But, considering the processes of ecological degradation in many parts of the dryland savannahs it is doubtful whether the necessary preconditions for intensification, based on optimal use of local resources and low levels of external inputs, are available everywhere.

Policy influence

To enhance economic development most governments propagate the introduction of green revolution technology. But green revolution techniques that are successful in densely populated regions with relatively favourable production conditions are unlikely to be adopted by farmers in regions where land is still abundant and market access is poor (Meertens et al, 1995). However, fast growing populations, expanding cities and changing cultural values are favouring commercialisation and production for the market. Also in many parts of the dryland savannahs, economic conditions for green revolution agriculture seem to become more favourable than ever, except that prices of external inputs have increased significantly and that, due to ecological degradation, their effectiveness and hence economic profitability is diminishing.

Pressed by their economic situation and the World Bank, many developing countries have adjusted their economic policies. Subsidies on agricultural inputs have decreased leading to higher prices of chemical inputs. For farmers who can still afford these inputs this may be an incentive to look for ways to use them more efficiently and hence with less negative impact on ecology. For farmers who cannot afford to use them (anymore), this means that they must rely primarily on optimal use of local natural resources and natural processes. Due to this structural adjustment the interest in cheap alternatives such as bio-fertilisers and bio-pesticides has increased. However, where chemical fertilisers are not affordable and options to return organic nutrients back to the land are limited, farmers have to be very restrictive in bringing products to the market to avoid nutrient depletion. De la Court and Verolme (p. 27) and Gopal (p. 12) present cases of farming in dryland savannahs where productivity has become very low due to nutrient depletion. This is happening on a large-scale in the dryland savannahs.

To increase production, farming in more favourable environments often receives extra support from governments. However, as Gopal shows, subsidising the development of irrigated agriculture in India marginalises rainfed agriculture. This is further aggravated by the fact that the production of traditional food crops cannot compete with the production of cheap rice. The governmental food distribution programme selling rice to the poor at a subsidised price makes it even worse. Reallocation of subsidy flows in such a way that small farmers rainfed farming is enhanced prevents the increase of rural poverty and hence the need to subsidise food for the poor. Gopal and Lobo (p. 14) show the potential of this strategy. Watershed management on degraded land in the dryland savannahs of India can improve the economic as well as ecological and social position of farmers.

Dryland Savannahs

FAO (1993) classifies dryland savannahs as seasonally dry tropics and subtropics . The following description is given: The tropics and subtropics where the dry season lasts between 90 and 285 days and the rainfall is not concentrated in winter belong to this type of climate. This zone extends over about 2,475 million ha and is the prevailing climate in large areas of South and Southeast Asia, northern Australia, the major part of Africa, and South and Central America, between the deserts and the tropical rain forests. Given the wide range in the length of the dry period, the natural vegetation in this climatic zone varies widely, but is generally dominated by what is commonly called savannah, a term that embraces all the mixed tree and grass types of vegetation found in the subtropics and tropics. The climate-dependent agricultural potential of this zone is largely determined by the length and the intensity of the dry season. In general the grazing potential is high, provided animal diseases can be kept under control. A wide range of agricultural crops can be grown, from millet, sorghum and cassava in the drier parts to maize and cotton in the wetter areas. The forestry potential is largely constrained by the length of the dry season, but adapted species yield reasonably well.

Industrial development

As De la Court and Verolme (p. 27) show, industrial development can lead to a shift in investment from agriculture to other economic activities, which causes marginalisation of agriculture, especially in less favourable conditions further away from cities where transport and irrigation infrastructure are poor. Farmers from such regions become increasingly involved in migration labour and in the end settle permanently in cities.

Where wages in non-farm activities are higher than in agriculture, farmers find it difficult to hire labourers. Also farmers increasingly combine farming with non-farming income raising activities. In these situations they prefer time-saving and low-risk techniques (Caceres p. 20). Low (1993) found that farmers in Swaziland preferred to use chemical instead of organic fertilisers to have more time to participate in economic activities outside agriculture.

However, where economic growth stagnates and off-farm income opportunities are scarce, farmers prefer maximisation of income from their own labour with low capital costs instead of maximisation of labour productivity with relatively high capital costs. Scoones (p.10) studied coping strategies of small farmers in Zimbabwe who, to large extent, still depend on the use of local resources. To cope with drought, government support and off-farm income opportunities become increasingly important for these farmers.

Change in values

Traditional land use has been strongly determined by cultural values and institutions which make farmers respect the land and nature in general. Incorporation into the international consumer culture has resulted in a loss of traditional values and respect for the needs of the land. As El Haj Chaibou Bagouma states, "the monetary economy has reduced our land to common merchandise". However, not all people accept this alienation from their culture and values. In particular, groups of indigenous people and ecological farmers try to develop alternatives to the international consumer culture and modern farming. The movement Paysans Sans Frontieres (p. 8) is an example of farmers who support each other and who exchange experiences on ecologically sound agriculture. For them autonomy, solidarity and communication are the guiding principles for sustainable land use.

From cyclic to linear flows

The above processes all contribute to a drastic change in resource flows threatening the ecological base of societies. In traditional land use, resource flows were to a high extent cyclical. But the increasing

orientation on market production, monoculture, loss of vegetation, soil erosion, urbanisation and poor waste management all are contributing to the transformation of these cyclical flows into linear flows of biomass, sediments and water: from farm land to cities and finally to the sea. If we are to avoid the threats to coastal ecosystems as well as to agricultural productivity, and to the long-term sustainability of urban livelihood in the tropics, there is an urgent need to close these flows at various levels in different sectors of society. These actions comprise changes in agricultural practices, such as low-tillage, agroforestry, alley cropping, mulch farming, closing the rural-urban carbon flow..... (Strong and Arrhenius, 1993).

What are the margins?

Farmers do not deal separately with the above and other processes but have to cope with the entire complexity of change which is different for each situation and time. Depending on their resources, preferences, opportunities and motivation, farmers develop different strategies to react to change. The articles give the impression that most of the above processes of change favour the adoption of practices which cause ecological degradation. Poverty and profit orientation favour adaptations directed to short-term economic benefit, mostly at the cost of the environment. Population growth often leads to ecological degradation but can also lead to intensification of low-external-input agriculture and reduction of ecological degradation. However, this seems to happen only in case of necessity, where no other, economically more rewarding, options are available. Structural adjustment can favour the adoption of ecological techniques such as biofertilisers and biopesticides, but the motivation to choose for these techniques is purely economic. If prices of agrochemicals become favourable again, farmers will turn back to their use.

Where farmers really get into an ecologically precarious situation and together become aware of it, they may conclude that something has to be done. Doudou Sow (p. 8) and De la Court and Verolme (p. 27) report on such shifts of motivation and readiness to develop new ways of farming which are ecologically sound. However, poverty, uncertainty, cultural alienation, lack of information about alternatives and conflicts can lame their actions. External support in that case can be very important to start, facilitate and support a process of community based self-help development as described by Lobo and Gopal. Their experiences show that where land is in a degraded state watershed management and development of ecologically sound agriculture can be economically and socially very rewarding.

From this it can be concluded that the shift in motivation in favour of ecologically sound agriculture is crucial. Religion can play an important role in motivating people for ecologically sound land use. In Zimbabwe leaders of Christian churches and traditionalist jointly started the War of the trees, to re-green the land (see p 29). Religions but also other institutions and personalities with ethical authority have a great responsibility to motivate people to choose for ecologically sound behaviour.

However, agriculture in the dryland savannahs is increasingly an integrated part of the regional, national and international economy and motivation and expectations are strongly influenced by the international consumer culture. This makes it not easy for farmers to shift to ecologically sound agriculture. Co-ordinated action and reorientation of economy will be needed at local, regional, national and international level. But how realistic is this? Considering the above processes of change, what margins are there for development of sustainable agriculture and how can it be enhanced in dryland savannahs?

ILEIA coping with change

These questions will be central to the activities of ILEIA in the coming project phase. On page six the ILEIA learning process is presented. Together with learning partners and other groups and individuals with relevant experiences and skills, ILEIA will try to assess the feasibility of ecologically sound agriculture in three contrasting environments, in Northern Ghana (dryland savannahs), Peru (mountain valleys) and the Philippines (humid lowlands). For ILEIA this means a considerable change in activities and focus. The results of these activities together with the experiences of many other groups and the usual information on relevant new publications and network activities will be published in the ILEIA Newsletter. By sharing your experiences and information you can join the ILEIA learning process! ■

Photo: Bertus Haverkort

Where land is abundant and labour is scarce, intensification is not an option.

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The ILEIA learning process

In the next three years, ILEIA's major goal will be to assess the potential and constraints of ecologically sound agriculture. We will focus on three agroecological zones in Peru, Ghana and the Philippines with different agroecological potential and socio-economic environments. In each country, pilot sites are being selected to represent each agro-ecozone. For this purpose, we will develop "learning partnerships" with farmer organisations, NGOs, universities, research and extension organisations.

During the last six months ILEIA has begun the process of shaping these "learning partnerships". The action plans are still in preparation. Therefore, in this issue we only look at the initial steps which have been implemented in northern Ghana. Several articles describe how this process has begun. The article by Kooistra (p. 22) explains the selection of countries and pilot sites. The very process through which ILEIA fosters the learning partnerships is one of the first explorations of the "learning process". David Millar (p. 24) reports, from a historic perspective, on the formation of the learning partnership in Ghana.

ILEIA has always regarded information as a key input for the development of ecologically sound systems. Our research during the next three years should also help to understand how community organisations can better link with NGOs, researchers, extension workers and universities to ensure an exchange of relevant information. We will be looking at knowledge and information exchange networks in communities and among organisations supporting them. We will learn to draw the patterns of information and knowledge exchange among networks of organisations to enable them to improve their linkages locally, nationally and internationally. The learning partnership members will gain the skill of assessing knowledge and information systems.

While most agroecological research studies base their assessment on statistical surveys and simulation models, few attempt to base their assessment on the knowledge of farmers. Understanding farmers' categories of natural resources will be an entry point for dialogue with rural communities: How is their information stored and built upon? Are there local categories of natural resources? How do farmers monitor the changes in their farming system? How can outside sources of information be made available for them to enrich their own?

Linking knowledge systems

The learning partnerships comprise many different kinds of organisations and many different knowledge systems. The challenge will be to find mechanisms to link these systems that are different across languages and interpretations. Each partner organisation will need to determine the type of information it needs to record, maintain, modify and share. We will aim for a shared information base which allows for the exchange of information among the different groups. Each partner will store information that they find relevant in a place and form that fit their needs. Communities will be encouraged to prepare a box with the maps, written documentation, audio recordings, and illustrations which they choose, to visualise and monitor the changes in their natural resource use. NGOs will be able to develop and enhance their databases and computer networks. We will investigate how to link them to the community information requirements, and to the information resources available elsewhere.

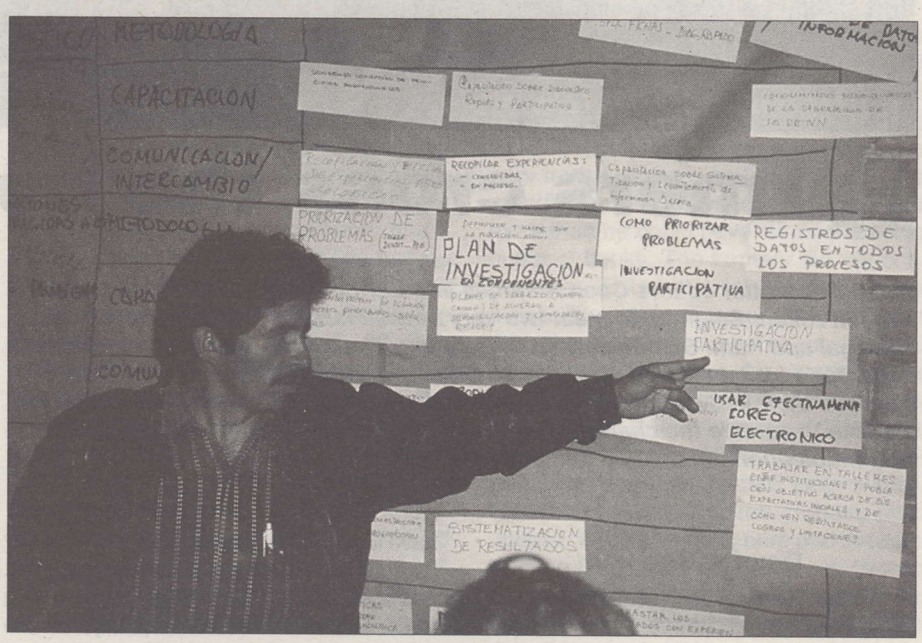

Photo: Ricardo Ramirez

Universities and research

Our assessment effort also requires, among others, a study of the contexts that favour or inhibit ecologically sound farming. In addition to supporting NGO-led coalitions in action-research, we will engage local universities and other research institutions in desk and field studies on demographic changes, agricultural land use, evolution of the farming systems, climatic and environmental history, labour and markets, agricultural policies and socio-economic issues. These studies will enable the learning partnerships to understand the linkages between the local constraints and opportunities and the regional and national context. The article by Gyasi (p. 23) from the University of Ghana, Legon gives an overview of land use in the northern region of Ghana.

For ILEIA, the learning process means a considerable change in activities. We will, however, maintain our commitment to information exchange. Indeed, our learning process enlarges the commitment as it enables partners to input, access and shape local and global information sources on ecologically sound agriculture. In addition to our quarterly newsletter, we will also make information available through electronic media. At field level, we will encourage our partners to develop communication strategies using traditional and modern media to enhance information exchange.

Not a blueprint

Through the ILEIA Newsletter we invite readers to follow the learning process as it evolves. In this issue we share the steps we are currently taking. In the next issues we will describe how these steps have evolved in Peru and the Philippines. We encourage you to send articles describing your learning experiences and to react to the ones reported here. ■

Photo: Paysans sans Frontieres.

Farmers cross the borders

ILEIA Newsletter editors Coen Reijntjes and Carine Alders travelled to a goat farm in Alken, Belgium, to meet two very special farmers: Doudou Sow from Senegal and Remi Schiffeleers from Belgium. The two friends have known each other for a long time and visited each other's farm and village to learn and improve their knowledge. They believe exchanging information is essential to be able to survive the changes they face. For them autonomy, solidarity and communication are the key to a better future.

Doudou Sow and Remi Schiffeleers

Doudou Sow explains: "I belong to the ethnic group called Peuhl. In Africa everyone knows the Peuhl. They are the men who follow their cattle anywhere throughout Africa. We are nomads. Even if our environment has degraded, it doesn't prevent us from being with our cattle. Before the dry periods of the 70ies, we had cattle all throughout the village. Each family had more than 40 cows. Not for the meat, but for the milk. We gave the milk to the farmers and they gave their products to us. We could not stay in the same place for very long. We need space. When we live close together, it will be not good for our cattle.

The area where we live in small groups of four or five families is called Guelackh. Guelackh in our language means a place surrounded by water. In the north of Senegal we have 200 mm of water. We have it only during two months. I cannot say that only because of that we have a desert. It is also caused by human beings using trees. Since we have no electricity, we use wood for fuel. We are Muslim, at night our children need a fire to learn about the Koran. Only two months after the rain season everything is dry, dry. We cannot find grass and so we cut trees to give leaves and twigs to our cattle. Our houses are also made from trees. Before the dry spells of the 70-ies we let the cows go out in the forest to graze and kept the calves in the stables. In the evening we milk the cows, but the cows have nothing to eat and their milk is nothing else than what they eat. Therefore, the cows give no milk so we let the calves and the cows in the forest together.

In the valleys, they say that 30 years ago, they cultivated rice here.... Before the drought, we had cow milk. Women sold produce, they had to walk 8 km and then take a taxibus. At any time, night and day, women were selling the milk door to door. Our only means for getting money is our milk. But our cows died."

"My cousin was with an NGO called Maison Familiale Rurale. He went to the village during the weekends and thought "I have to do something in my village. We have to find a solution to be able to stay here." We could not do anything else but change, we had no choice. The cows died. My cousin used to go to the village every week to discuss the problems. We needed help, not with money but with ideas. When he went to Belgium to train himself in computers, he found Remi by chance. Remi invited him to visit his goat farm. When my cousin got home, he gathered the members of the village in a general assembly. At that time, I was in Dakar with my brother. I was a student at the university. My cousin still had his job, which he could not leave, but it was in my blood, I wanted to go back to my village. I was not married, so I went. Two years after that, my cousin joined us.

The first problem we had to solve was the problem of water. So we began to dig wells. Then we said we cannot feed ourselves if we only depend on cattle. If we want to dwell here, we have to produce our food. So we began farming. At the same time Remi and his friends visited our village to exchange ideas. Together we discussed that goats can survive in this condition. They can be fed on trees and do better than cows. But if we let our goats roam free in the forest, they contribute to desertification. We had to struggle against that

Doudou Sow (middle), his brother and cousin decided to go back to their village

and decided to build a stable. It was a big problem, because this was not our custom. So we began with a demonstration farm. We said to Remi that we wanted a goat and Remi sent us a little billy-goat of twelve days old. The name of the goat is "Alken", which is also the name of Remi's village. We made a crossing with our own goats."

Our life depends on trees

"We had to change our customs. Now, we have to go to the forest to look for Acacia fruits, and to gather grasses. We also started to grow trees. With the rope pump that we built ourselves, even children can now water tree seedlings. Our life depends on the trees. For houses, for lights, for cooking... we cannot live without trees. If we cut two, we have to plant more than two. However, it is difficult to plant trees in our area because of all the animals that eat the seedlings. We therefore started to build dead fences with branches. Our goal is to one day take down the dead fence because we have a live fence. For that purpose we plant acacia seedlings in double rows 20 cm apart. After a few years, animals cannot get through and you can use the leaves and the fruits for your animals.

Many things changed. Our parents didn't send their children to school. But one day, I have to die, my cousin also. We have to be replaced by other people, so we have to teach the children. We built a school, where we ourselves are the teachers. We teach not only theory, but also practice. If we were to ask parents to pay for pencils, they would take their children out of school, because they are not familiar with this type of schools. We therefore have to produce vegetables and teach the children how to do it at the same time. The vegetables are sold at the market.

The women started a training centre, where they learn to dye clothes and sew. In the gardens, women produce a diversity of vegetables for food. Now we have gathered all women in a milk producing co-operation. We have a shop in town and only two women are needed to sell the produce They no longer have to sell their milk from door to door. In order to keep the money in our village, we opened a shop to be able to buy goods we don't produce ourselves. We also opened a market so that we don't have to go to town to sell surplus produce."

A place of learning

Fifteen years ago, Remi Schiffeleers and his friends decided to start a co-operative goat farm to find an alternative for the degenerating form of agriculture that surrounded him. They called it "The living earth". Remi says: "Increasing mechanisation has forced many farmers to quit farming, pesticide use is extremely high and agriculture depends on large-scale inputs from the South. Overproduction is a serious problem. Last year, one farmer in my village had to dump 8 million kg apples on his fields.... Therefore, we decided to start a co-operative to see how we could do things differently. We felt our farm had to be economically viable (people would have to earn a living), it had to provide people with a rewarding job with equal rights and responsibility for all members and it had to have low capital input (we had no money to start with). Our farm further had to produce healthy food that people can afford to buy. Our farm had to be ecologically viable, not just without chemicals, but also building on local resources with low energy input. We also wanted our farm to be a place of learning, to exchange ideas with the community and with our colleague farmers in the South.

A goat farm fitted our purpose: it needed hardly any capital investment and goats are found all over the world. For many people, goats are their last resort. We sometimes call them the cow of the poor man. In our desire to be autonomous, we slowly built our farm with local materials. Our goats are fed with 5 types of clovers and 5 types of grasses that we grow ourselves on 10 ha. They further eat by fodder beet, waste products of the local brewery and lin-oil producers and our neighbour's barley. We try to keep the cycle closed as much as possible. We try to improve our goat breed to fit these circumstances. The 100 goats are milked twice a day and the milk is used to make cheese. Eight times per week, we go to the market to sell our own cheese. We also have one pig to eat the farm's waste products and some cows. This farm is the basis for everything we do. If our farm is no longer profitable, we might as well stop all our activities."

Farmers are the actors

"The goat farm is also the basis for our exchange with farmers like Doudou. Throughout the years, we have built up contacts with many farmers in Senegal, Burkina Faso, Kenya and Morocco. When all these farmers came together in the village of Doudou, the "Mouvement Paysans sans Frontieres" was born. We all walked the last 8 kilometres. Gogo, a farmer from Kenya said to me: "Are you certain we are on the right track? Surely no people live here in this desert? And their goats give milk?!" From this experience Gogo learned more than he could have learned reading hundred books. The farmers did not only come to Guelackh to talk. Together they also built a stable. Everyone learned from this. Our movement is all about practice. Farmers are the actors, the carriers of our action. Acting and thinking are united in one person. In our idea, farmer-trainers should also be people from within the society, who know and respect local culture, but who are also exposed to ideas from outside. We are working here and they are working there, and we both learn. We do not say that this is the only way to do it. No, we say for us, at this moment, this is the right thing to do. We also see that other farmers, in a different place, have different results. That is nice, it is not a problem. In ten years time, everything may have changed and our practices may no longer work. We will find new ways by working together. We must not convince others, we must convince ourselves. That is the only way." ■

Doudou Sow, GJEG, BP 393, St. Louis, Senegal.
Remi Schiffeleers, Trakomula, Aardbruggenstraat 85, B-3570 Alken, Belgium.

Photo: Paysans sans Frontieres.

This picture expresses the philosophy of Paysans sans Frontieres: Any person, black or white, man or woman, keep some distance but walk together. Do not try to go faster than your neighbour, because that will destroy what you are building.

Coping with risk and uncertainty

Much of Africa's dryland farming areas have a stereotype of drought, dust and disaster. This stereotype is wrong. During three years the coping strategies of farmers in Chivi communal areas of southern Zimbabwe have been examined. This article presents the insights gained and explores policy implications.

Bright Mombeshora, Blasio Mavedzenge, Maxwell Mudhara, Chinaniso Chibudu, Sam Chikura and Ian Scoones

Photo: Ian Scoones

To effectively manage the field environment over time to both maximise water infiltration and retention, farmers in Chivi, Zimbabwe, need to act fast and make efficient use of both human and animal labour.

The people of Chivi communal area in southern Zimbabwe have been receiving food handouts almost every year since independence in 1980. The area suffers regular droughts, is dry, dusty and overcrowded. The stereotype of the communal area in Zimbabwe as with much of Africa's dryland farming areas is one of disaster, environmental collapse and misery. Research carried out by the Farming Systems Research Unit in Zimbabwe together with Institute of Development Studies (IDS) and the International Institute of Environment and Development (IIED) in England proved this stereotype wrong. In fact, the farmers in Chivi have a myriad of practices that help overcome the vagaries of the harsh environment and allow them to sustain their livelihoods and actively manage their environment (Scoones et al 1995).

Making a living

To make a living of farming in semi-arid environments, farmers have to respond to a huge range of spatial and temporal variability. Variability includes diverse landscapes, from hillsides to river banks, a range of soil types and different rainfall conditions, including drought. The ability to respond to variability varies between farmers. Those with access to external sources of income, like remittances, may be less reliant on agricultural production than others. Those who own or have preferential access to draft power or other inputs like labour or fertiliser are able to farm more flexibly. Farmers must respond to conditions as they emerge, they cannot plan with any certainty in advance. Their practices are therefore incredibly diverse (see box). Agricultural success under highly constrained conditions therefore means effectively managing the field environment over time to both maximise water infiltration and retention, and make good use of locally available resources, such as organic materials for fertility inputs. Improving the resilience and productivity of the agricultural resource base, bearing farmers' coping strategies in mind, has important implications for research and extension.

- There can be no standard recommendation or package for technology promotion in dryland communal areas. Instead, research and extension should assist with offering a range of choices that farmers can choose from, depending on their particular circumstances, encouraging a participatory approach.
- Research should emphasise the process of farmer responses rather than designing fixed options in standardised trials. Researcher managed on-station and on-farm-trials need to be combined with trials designed and run by farmers. Researchers therefore need to expand their focus and learn about complex adaptations made by farmers.
- Diversity is the key to responding to risk. Agricultural research needs to reflect farmers' own diverse conditions. Research needs to be adapted to different spatial settings (eg. both dry fields and wetland (dambo) agriculture), to different filed conditions (eg. a variety of soil types) and to different cropping patterns (eg. multiple and intercropping patterns), rather than focusing on standar-

dised, uniform trial plots so that the processes of local-level adaptation and technology development are understood and can be supported.

Coping with drought

Drought is part of the normal pattern of life in Zimbabwe. However, in 1991-92 the whole southern Africa suffered a major drought, a complete failure of crops and the running out of national food reserves. The situation was monitored and a pattern of sequential responses was seen. First minor adjustments such as diet changes or increased reliance on off-farm income sources took place, followed by the disposal of assets, notably poultry and goats and major shifts in practice such as out-migration. Understanding this pattern is vital if external support is to complement local coping strategies. Non-farm income generating activities are therefore critical to people's survival, both during drought and non-drought periods. With the reduction in real wages and retrenchments due to structural adjustments, the value of remittance incomes has dramatically decreased over the last few years. During the drought, an expansion in trading activities and the sudden explosion of gold panning were seen. It also prompted widespread diversification of non-farm livelihood activities, among men and women, as well as a shift in investment in agriculture. Following the death of many cattle and the inability of people to afford to purchase new animals, there is a severe scarcity of draught power. Farmers are unable to purchase inorganic fertilisers, except in very small quantities. The result has been a shift towards more intensive investment in small gardens and home field plots, using the limited draught power for cultivation and any available organic materials for fertilisation. This resulted in growing premium on prime arable sites, such as low lying wetlands, where crop yields are more certain.

Policies for resilience

Risk and uncertainty are all pervasive in dryland farming systems. Policies for resilience, for reducing vulnerability and for improving livelihoods must take risk and uncertainty serious. Yet, most policies assume predictable relationships and assumptions about standard responses and equilibrium patterns. There is no better way to improve the resilience of the system than to increase the productive base. Proofing the system against drought (and other risks) means strategic investments in key areas. In Zimbabwe this means, first, addressing land redistribution with more flexible and imaginative approaches than in the past. Second, investments in technologies that increase outputs while reducing risk is essential. Obvious investment is in water harvesting and irrigation, whether in the form of hand watering and residual moisture wetland (dambo) cultivation or small scale pump assisted irrigation schemes. Third, longer term investment means commitment to strategic research, driven by demands from farmers and developing technologies in partnership with them. Finally, diversification of income earning options is vital and policies to assist people with limited assets, especially women, to enter new businesses are crucial.

The erosion of people's assets base is undermining their possibilities to cope with risk. Therefore, policies to protect people's assets entitlements will help to ensure that productivity improvements are sustained and act to reduce vulnerability. For instance, in order to prevent excessive livestock mortalities during the 1991-92 drought, government and NGOs provided feed to selected breeding animals chosen by village groups.

Market liberalisation, particularly for grain trade, has opened up a wider range of opportunities for exchange with many new small-scale traders and transporters setting up businesses to replace the marketing functions once exclusively played by government parastatals. In periods when there is grain to sell and buy, this has positive effects. For instance, in Zimbabwe crop prices have risen in real terms over the last few years. The relative gains, in maize production in particular, has benefited many small-scale farmers with access to markets, encouraging a return to agriculture following the drought. However, in times of widespread drought and food shortage there remains a role for the state to offer guaranteed opportunities to purchase or sell.

Providing safety nets for the most vulnerable also requires attention. Zimbabwe's record in public support for food aid has been impressive. The government, together with aid donors and NGOs, has managed to feed the population, but the cost has been enormous and is growing. Therefore, an alternative must be sought. Recent experience shows that both national and regional early warning systems are effective in recognising food deficits at the aggregate level. They are based on district level surveys carried out by extension workers and aggregated in geographic information systems. However, such systems are inadequate as it does not imply that politicians will act in a timely manner. A more tied link between early warning and decision making is required (Buchanan-Smith and Davies, 1995). But, perhaps more importantly, there is need for a much more disaggregated view, which incorporates local views and is responsive to the complexities of people's livelihoods in dryland areas. Only with this in place, it will be possible to target support and design policies more effectively. ■

Forty-three years of experimentation and innovation

Mr. M. and his family were allocated a piece of land by the Chivi District Commissioner in 1952. Their farm is about 4 ha in size and is made up largely of good quality sandy soils with a few patches of heavy clay. They own a number of cattle. For the first couple of seasons, no fertility inputs were added, but after 1954 heaps of cattle manure were broadcasted and ploughed under. This system worked well for the next 30 years, based on a three year manuring rotation. During the 1970s, also crop residues were ploughed back into the soil during winter ploughing, following advice from extension workers. Manure was always applied when maize was planted, and in intervening years, finger millet, groundnuts were sown in rotation. The 1960s and 1970s were relatively wet decades and with continued manuring and maintenance of soil bund structures, the field was highly productive.

However, in 1983 the cattle herd reduced in size due to drought. As a consequence, manure was no longer broadcasted but put in furrows. This reduced the amount of manure needed. To increase the volume of manure produced, grass, stover, leaf and other vegetative manner was added to the cattle kraal. At this time, also, termitaria soil mixed with leaf litter began to be used, with a five year rotation between sites. From 1990, ash and household waste compost was added to the repertoire, especially in the home field area and garden managed by Mrs. B.

Unfortunately during the 1991-92 drought all the remaining cattle died. Without manure, it proved very difficult to fertilise the land. However, in 1992 the family received fertiliser handouts from the government, as part of a drought recovery package. It was applied to their maize. The compound fertiliser was applied at planting, along planting furrows. The top dressing was applied by spot application along the side of emergent plants when the soil was moist. However, the free fertilisers were short-lived and Mr. M. says he cannot afford them in the future. So by 1995, the level of termitaria and compost application to the maize areas had increased. This was combined with further investment in soil and water management techniques, such as improving the field contour bunds and digging infiltration pits. Although Mr. M. hopes to get some new cattle soon, and return to manure fertilisation, he also says that he will never be able to return to the old system of broadcast fertilisation with pure manure. However, with the innovations adopted, he hopes to maintain productivity of the land into the future.

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Forced fallows through government policies

Food security in the semi-arids

Narsamma is a poor woman in Mamidigi village, Zaheerabad taluk of Medak district. Medak is one of the most backward districts of Andhra Pradesh and forms a part of the semi-arid tropics in India. It depends largely on rainfed farming with pockets of groundwater based irrigated agriculture. Land use in Mamidigi village is changing. "Steep fall in jowar output" says a headline in The Hindu Newspaper of March 1992. This, according to the article, is due to a shift of the lands from jowar (finger millet) to groundnut, sunflower and cotton crops. But when this news item was read to Narsamma she said that the stated reason for the decline in jowar acreage is not the whole story. She estimates that in her village more than 150 acres of productive rain dependent land is left fallow. She feels that the land that has been left fallow is just as much as what has shifted to more remunerative crops.

KS Gopal and M Sashi Kumar

Andhra Pradesh (AP) is a rice producing and rice surplus state. Rice production uses the bulk of irrigation water available in the state. Along with virtually free water a whole package has been designed to promote rice cultivation. The bulk of fertilisers consumed in AP is used rice. Rice and wheat have received the bulk of money spent on agricultural research and extension bringing high yielding seeds enabling quantum leap in productivity. Farmers get assured crop loans at low rates of interest. Insurance companies prefer to cover rice crops as the risks in irrigated crops is low. The loan waiver scheme meant for farmers caught in a vicious debt trap has benefited mostly farmers with irrigation facilities as they are the favoured customers for the banks and as the scheme was tied to loans given by banks. This package and attendant incentives has made growing rice, but also of other irrigated crops such as sugarcane, a profitable option for farmers. A study on agricultural subsidies in India made by the World Bank points out that Rs. 139 million has been spent in 1989-90. The study shows that larger and wealthier farmers, who have access to irrigation, groundwater and credit and who use higher levels of fertiliser, receive the greatest proportions of subsidies (The Hindu, 11 May , 1992).

Rainfed farming no longer viable

Copious supply of water is not available in most parts of the state. 70% of the lands depend entirely on rainfall for agricultural production. Traditionally these lands are used for food crops like jowar (finger millet), bajra (millet) and ragi (sorghum). Rainfed agriculture in the semi-arids is characterised by uncertainty, small profit margins and low productivity. Due to the high subsidies, prices of irrigated crops such as rice stayed relatively low. Additionally the government offered rice at an even lower price of Rs 2.- per kg for poor people through the Public Distribution System (PDS). The availability of cheap rice led the poor in rainfed farming areas to shift from eating their traditional food crops to eating rice. Consequently prices of traditional food crops went down too. Farmers react to shrinking profit margins by leaving land fallow and getting increasingly involved in labour migration to regions where irrigated agriculture prospers. But employment opportunities are unsure and wages are low, keeping these people poor and dependent.

Presently the fallow lands are facing heavy soil erosion and are the breeding grounds for toxic weeds like parthenium. The fragility of semi-arid environments makes land vulnerable to degradation and once it has started, it is self-accelerating causing irreversible damage to the land. The net result is that the best lands with copious water have joined the irrigation bandwagon, the moderate are struggling to do so and poor lands have fallen to fallow (Ratna Reddy, 1991). The situation is getting more and more explosive due to increasing population, neglect of the resource base, soil erosion and widespread poverty. A process of silent desertification of arid lands is at work. In 1990 the extent of fallows in India was 41 million hectares. This is over 30% of the net sown area. The fallows in India exceed the total area of arable land and that under permanent crops of four countries - Pakistan, Bangladesh, Nepal and Japan. It exceeds the total area of land held by large landholders in the country. India's population will touch the 1000 million by the turn of the century. At that point of time the food producing crop land will shrink from 144 million ha to 120 million ha and the cultivable land per capita which was 0.48 ha in 1950 will decline to 0.15 ha. A big threat is looming the poor living in rainfed agricultural areas which sustains 40% of the human population, 60% of the cattle and contributes 44% of food. Narsamma is a witness to this process in her village.

Food distribution under strain

The PDS is under increasingly severe strain. The financial outlay needed for running the PDS scheme is rising rapidly due to the increases in procurement prices. In AP the subsidy on rice to 9 million card holders in '94-'95 is Rs 15,000 million. The subsidy has increased by ten times since the scheme started twelve years ago. Major changes are taking place in the cropping pattern in irrigated areas with the entry of agri-business (as a consequence of economic liberalisation) which sees a huge export market for agricultural commodities. In AP over the last three years 100,000 ha of rich rice growing lands has shifted to pisciculture for exports. Surplus in rice production turns into a deficit. This

leads to increasing prices of rice which puts PDS under even higher pressure. An alternative to PDS is urgently needed. But this should not be an alternative which keeps the poor people poor. It should create chances for poor people to gain their own livelihood and secure food security for the country.

In Ibrahimpur village of Nyalkal Mandal in Medak district of AP a programme has started involving small and marginal rainfed agriculturists to promote food security and arrest the degradation of their fallow lands. This programme was planned and implemented by the village women's association in collaboration with an NGO (Centre for Environment Concerns) and suggests a new paradigm to handle the complex problems facing agriculture in semi-arid areas in AP. Since the last two decades a single crop - sugarcane - is dominating the agriculture in Medak. All available groundwater is used in the cultivation of this water guzzling and extremely profitable crop. Farmers have shifted from shallow open wells to deep borewells. Now drinking water is scarce and is pumped to Ibrahimpur village from a distance of 40 km. A decade back the villagers had plenty of water from a shallow open well. The exploitation of groundwater to unsustainable levels in just a decade was a consequence of a sugar factory established by the government in the area in 1970. Commercial banks and development agencies offered liberal loans and subsidies for tapping groundwater to facilitate sugarcane cultivation. While sugarcane is cultivated on less than 5% of agricultural lands it takes away all the groundwater, organic manure, soil nutrients, bank loans, bullock energy and farm equipment. Successful farming has meant cultivation of sugarcane. In recent years there has been an alarming rise in fallows. The fallows in Nyalkal Mandal increased by 13 percent between 1985-86 and 1989-90, the area under-utilised when compared with net area sown has increased from 30% to 37% during this period and there was a 50% decline in area under kharif cereals. Traditionally lands were left fallow for a year for soil nutrition management but we find that fallowisation at present is due to desperation among poor farmers and is leading to the loss of productive capacities of lands. The question of increasing fallows assumes significance as the decline in land use over the last fifteen years is taking place at a time when the population increase in the region should have naturally led to more land hunger and utilisation.

Experts who participated in the discussions with the women's association advised improving productivity in rainfed farming through soil and moisture conservation works and a watershed project to improve their conditions. But the women felt that central to the degradation of land was the lack of involvement of the farmer on their land. The women felt that poor farmers must find livelihood on their lands to ensure its sustainable use and only human resources can halt the process of desertification setting in their village. The conclusion was to develop a programme that can pump-prime and enthuse marginalised people to develop neglected fallow lands in order to build food, fodder, nutrition and ecological security. As a consequence a scheme of fallow land development and food security evolved.

The programme

Ibrahimpur has 160 households with about 600 acres of land under agriculture. It had 340 acres of land which lay fallow for more than seven years. Based on the carrying capacity in the village in terms of bullock energy, farmyard manure, labour etc. the women decided to take up development of 60 acres of fallow lands each year. For this each acre would get a maximum loan of Rs 2000 which would be operated as a revolving fund. The grain produced would be sold in the village and the proceeds used to advance loans in the next year. The decisions were: ploughing of the fallow with tractor as the soils are hard, two tractor loads of farm yard manure applied to each acre, traditional high yielding jowar and inter-croppings, seeds to be selected and procured locally, tractor ploughing followed by bullock ploughing, application of half a bag of chemical fertiliser, weeding to be done on a co-operative basis by the women, loan to farmers based on the condition of the fallow, credit for ploughing, seed application, chemical fertiliser and weeding is a crop loan payable annually on harvest, credit for tractor ploughing and farm yard manure will be a term loan repayable in annual instalments over five years, payments to labour will be a certain share in the crop and loan repayment will be in grain.

The results

The village godown received a little over 200 kg in the first year from each farmer which was purchased at the prevailing market price of Rs. 2.75 per kg. In the first year the procurement was eleven tonnes of jowar and half a tonne of seed material. An interesting aspect is that additionally about 4.5 tonnes of food reached the villagers directly as wage for labour and for the services of bullocks. The next step was the sale of jowar to the village poor. The difficult food periods were identified as occurring between May and October. During these months wage work is not available and for the poor farmers it is the period of investments in rainfed agriculture. In view of this the jowar is sold from the village godown during these five to six months. The women identified the eligible poor and the quantities needed per family. Based on the quantity available the quota per household was worked out. In May the stocked jowar was sold at Rs 3 per kg to the poor in Ibrahimpur while the market prices was over Rs 4.50 and by June it went up to 5 Rs. The sale of jowar produced on these fallows was the turning point to the programme and people from the neighbouring villages and also the rich in Ibrahimpur wanted the scheme. The sale proceeds are used to give loan in the second year while a new set of fallows was taken up with loan from the NGO. To manage the food needs of the poor in Ibrahimpur the annual requirement was calculated at 33 tonnes. This estimate is for 110 families @ 50 kg per month of jowar for six months (May-June). Thus if two thirds of the fallows in the village is developed it will provide food security even after allowing for annual crop rotation between a cereal and a legume.

Medak district covers an extent of 9669 km^2 with a population of two million. About 80,000 tonnes of subsidised rice is sold annually in the district. The net sown area is 10,38,009 acres while the fallows is 5,93,085 acres. Thus by reorienting the PDS subsidy flow the existing fallows can easily build a viable, vibrant and nutritious food security for the district. It will increase employment opportunities, arrest migration, stem malnutrition and stimulate rich agricultural practices like rotation of crops, ploughing of green manures crops, soil and water conservation in farmers lands, facilitate bio-diversity, enhance the availability of pulses, legumes, oilseeds and fodder to the poor while building up soil. The efforts of the women of Ibrahimpur offer a new paradigm to the development of the semi-arid areas in Andhra Pradesh. ■

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Watershed development through peoples participation:

The Story of Pimpalgaon Wagha

Photo: Coen Reijntjes

Children no longer had to look after the goats and could go to school. Now eighty percent of the people of Pimpalgaon Wagha can read and write.

Watershed development is getting increased attention in the semi-arid regions of India. However, the approaches applied are often rather technology oriented and controlled by NGOs and the Government. The participatory approach as developed by Social Centre and experimented with in Pimpalgaon Wagha holds many important lessons.

Crispino Lobo

Pimpalgaon Wagha is a small village covering an area of 840 ha in the Ahmednagar district of the state of Maharashtra. It is located at the foot of barren and rocky hills in the rain shadow area of the Western Ghats. The village experiences two major seasons: summer (March-June) and winter (October-February). The temperature varies between 28°C and 12°C in winter to 39°C and 23°C in summer. With an average annual rainfall of 511 mm, most of which falls within a span of a few days, Pimpalgaon Wagha has been experiencing severe droughts for many years.

The landscape is marked by heavy soil erosion. The highly eroded stony soil is largely unfit for cultivation, but for the lack of alternatives, the people of Pimpalgaon Wagha continue to grow crops. The main crops grown in summer and monsoons are millet, pigeon pea, lentils, gram and kidney beans, while sunflower, safflower and sorghum are grown in winter. Where seasonal irrigation is still possible, vegetables, onions and groundnuts are grown.

Pimpalgaon Wagha has 879 inhabitants, 27% of the families belong to backward caste, they live at the border of the village. A socio-economic study conducted in early 1988 revealed a very grim picture. Because of recurrent drought and the resulting poor economic condition, the 879 inhabitants often experienced hunger and were prone to many diseases. Sixty percent of the people depended on agriculture for their subsistence and the 11 landless families had other occupations, like haircutting, cobblery, carpentry. Most people from the village had to go out as agricultural labourers, but this income was barely enough for subsistence and that too not on a regular basis. People either migrated to urban areas in search of jobs or took debts from moneylenders and landlords and to pay them back often worked as bonded labourers. The women were the worst affected. Drinking water was not available within the village and they had to walk for miles to get water and fuelwood. More often than not, this task was given to young girls, who had to leave school to help in household chores and were, as a result, deprived of education.

In 1988 Social Centre, a voluntary agency which has been working in the district for two decades, decided to work in the village because of its poor condition. When Social Centre approached the village, the people expressed a desire to start a dairy co-operative as they had seen one in a neighbouring village. Social Centre helped them in this endeavour and also helped them obtain loans to buy better cattle. Thus a relationship of trust was established.

Watershed management

In 1989 Social Centre decided to introduce watershed development in Pimpalgaon Wagha. Some villagers were taken on an exposure visit to Adgaon and Ralegan Siddhi, where experiments of participatory watershed development had been successful. The villagers were very impressed and enthused. They saw the benefits of watershed development and decided to try out the same in their village.

The conditions laid down for successful implementation of watershed development were quite rigid and demanded a change in the prevailing lifestyle of village community. But the now-motivated people readily accepted the conditions.

Watershed development involves the complete participation of the affected people, where they are responsible for the planning, implementation and monitoring of the project. This was a new experience for the people, because hitherto developmental projects were implemented by the Government and the opinions of the affected people was hardly solicited.

The people of Pimpalgaon Wagha formed a Village Watershed Committee (VWC) to oversee the activities involved developing their watershed. This body was nominated from among the villagers and was representative of all communities and geographical regions within the village. This was again a novel experience as the backward communities who had never really been part of the village affairs now had fair representation on this decision-making body. As the VWC had been unanimously nominated by the villagers, the better-off farmers lobby could not dominate it.

A ban was imposed on free grazing and free felling. The villagers decided to levy a fine on defaulters. The villagers also sold off their scrub cattle and replaced them by good quality hybrid cattle. Goats were sold off, as a result of which children who otherwise had to tend them could go to school. The villagers then decided to take up measures to conserve soil and water. Social Centre gave them support for technical surveys and other managerial assistance. A nursery was set up by a small farmer. Treatment measures like contour trenching, contour bunding, gully plugging,

construction of check dams and percolation tanks were taken up. The villagers contributed free labour on the basis of two man-days per month per family or two days wages in lieu of labour. Women also contributed free labour for tree plantation activities.

The villagers were trained to carry out tasks like surveying and levelling. The activities were monitored by a supervisor who was also from the village. The result was that the people began to feel responsible for the project and so worked hard to make it a success.

Post-watershed impacts

Social. The backward communities were previously isolated from the village. They were not consulted on any matters pertaining to the village. They were considered as social outcasts. The watershed movement brought about a change in this attitude of the people of Pimpalgaon Wagha. Social taboos have been lifted and these people are now allowed freely in the village. The backward communities have fair representation on the VWC and participate actively in the decision-making process. Once the financial condition improved, the people from these communities also began to get respect from the other villagers. Injustice by landlords and moneylenders also greatly reduced. People became less dependent on them as they became aware of government schemes and loans. The income earned from the work on watershed sites helped them pay off their loans. As more children could go to school, literacy in the village improved and today the literacy rate is about 80%. Biogas plants were set up in some households in the village and their fuelwood consumption declined. As drinking water had become available within the village, the women did not have to go far for water and so could contribute more positively to the development of the village. They set up a revolving credit and made loans available to the needy at the low interest rate of 2%.

Economic. The soil and water conservation measures increased the water levels in the village wells and water was available for about 11 months in the year. Before watershed development was introduced in Pimpalgaon Wagha, only 40 of the 75 wells had water and that too for just 8 months. As a result, the farmers could irrigate their fields and agricultural productivity increased by nearly 50%. Horticulture was introduced in the village on wastelands and private farmlands bringing more land (33 ha) under productive use. Eleven ha is under dryland horticulture, while the remaining 22 ha under mango, chickoo, orange and tangerine cultivation is irrigated. The dairy co-operative is running successfully and milk production has also gone up to 1200 litres per day. As more opportunities for employment have become available within the village, the migration to urban areas and other agricultural wage labours has stopped. In fact, some families who had earlier left the village have now returned.

Natural resources. Positive impacts on natural resources are also observed. The once rocky hillsides around Pimpalgaon Wagha are now covered with grasses and shrubs, as a result of the ban on free grazing and free felling. In spite of the drought situation, nearly 80% survival rate is seen in the 200,000 saplings planted by the people. Soil erosion had declined considerably and grasses are growing along the waterways. Streams which would flow only up to November now flow up to January even in a dry year. Drinking water is available even in the dry years. This year, for example, the monsoons did not arrive in Pimpalgaon Wagha till September, but the people had drinking water, and could also irrigate their horticulture plots.

Lessons learnt

The experiment of Pimpalgaon Wagha shows that it is possible for people to unite and work together to develop themselves, at the same time expressing their creative potential and wisdom. About the way how to enhance such a process many important lessons have been learned, for example:

- Watershed development is possible only when the creative potential of the people is awakened, mobilised and organised in such a way that they constitute themselves into a self-help group oriented towards rejuvenating and managing their "space of survival" to the long-term benefit of all.
- The role of an NGO is only one of catalyst and advocate. It's job is to mobilise the latent power of the people, to accompany them and to empower them by putting them in contact with existing development institutions and by also upgrading their skills in the various aspects of project management, maintenance of works and enhancing of the productive potential of created assets. The NGO should not substitute the people's own initiative and responsibility.
- The imposition of "outside" ideas of equity may well prove counter productive in terms of good will of people who do not perceive it as just and fair within their particular socio-eco-cultural situation, thus leading to group resentment.
- All work plans, implementation and decisions concerning the same should be made by the people and the NGO together, with weight being given to the former. Moreover the project should be implemented in such a manner that the beneficial traditional, cultural and institutional mechanisms are not only eroded by the introduction of exogenous management systems into the village but are in the process to be strengthened and made effective.
- Whenever possible, all relevant major GO and NGO development institutions should be involved in such a project. This might well provide the possibility to reorient such actors in a way that people's priorities and demands set the agenda rather than institutional and administrative compulsions.
- Selection of the village has to be done very carefully. Those villages in which people have a tradition of intra village conflict management and decision making based on consensus in matters that affect the village as a whole offer a promising basis for success.
- Participatory development is largely a question of people management and personal relationships. Therefore having the right kind of staff is crucial to the success of such projects. Only s/he will succeed who is perceived by the people as sincere, committed and having their best interest at heart.
- Furthermore, if one is to empower the people and evolve a people's programme, it is important that these same people also have access to project finance - how much and how it is spent. The people cannot be mere beneficiaries of largesse or mere wage labour with the NGO being contractor or master. Mechanisms should be evolved wherein people are not only enabled to make their own active contribution but also have a say in the disbursement of project funds. The project must be accountable to the people!

Today, Pimpalgaon Wagha acts as a role model for other village communities that wish to help themselves and better their conditions. The people of Pimpalgaon Wagha have even decided to adopt another village community in their vicinity and introduce it to watershed development, thus giving an impetus to a watershed movement. ■

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Agricultural intensification in West Africa

Nutrient dynamics in the Kano close-settled zone

Small-holder farming in semi-arid areas is being forced to change to compensate for the needs of more people living under conditions of increasingly variable rainfall. As more land is used for agriculture, rangeland areas are reduced, so limiting the availability of animal fodder. The length of fallow periods where soil fertility may be restored is also reduced. This has forced herders and farmers to interact, exchanging crop residues (fodder) for animal manure (soil fertility restoration). As competition for these resources intensifies, some livestock herders started farming land to provide crop residues as fodder and farmers started rearing their own livestock. The Kano close-settled zone is an example of intensive farming systems in the semi-arid area, which has evolved under local market conditions.

Frances Harris

The systems of the Kano close-settled zone (CSZ) in Nigeria (Bache and Harris, 1994, Harris, 1994 and Mortimore, 1993) and the Mossi plateau, Burkina Faso (Prudencio, 1993), and Machakos, Kenya (Tiffen, et al. 1994) show that farming can be intensified without damaging the environment, and in some cases improving it. The unique example of the Kano close-settled zone, where population densities of up to 500 per km^2 have been reached and farming intensity has been at 100% since 1964 (Mortimore, 1993) without resulting in obvious land degradation, has prompted the study of nutrient dynamics within this farming system to determine if nutrient inputs and outputs are in balance, and how farmers maintain soil fertility.

Detailed study

The farming system of the Kano CSZ is based on the cultivation of four main crops (millet, sorghum, groundnut and cowpea), on farmed parkland bearing economically valuable trees and on the production of livestock (mostly small ruminants, with some cattle and donkeys). The long-term rainfall (1906-1985) is 822 mm, distributed in a unimodal pattern between May and September, however in recent years the rainfall has been below average. Rainfall during the study was 565 mm in 1993 and 895 mm in 1994. The study was conducted in a village composed of a farming community in a rural setting, located approximately 40 km east of Kano, about 10 km from any tarred road. The detailed nature of the study meant that it was impossible to consider large numbers of farmers across the Kano CSZ. Therefore it focused on a case study of a few farmers, which has provided valuable detailed data. The study has monitored the activities of three farmers within the zone through two farming seasons, focusing on the use of livestock manure, inorganic fertilisers, compound waste, the Harmattan dust which bears nutrients, biological nitrogen fixation by leguminous crops and the nutrient content of the harvest of farmers' fields to determine a nutrient balance (nitrogen, phosphorus, potassium, calcium and magnesium in 1993, nitrogen and phosphorus only in 1994). The objective was to identify sources and destinations of soil nutrients, and how they are transferred through the farming so that soil fertility is maintained.

Nutrient dynamics

The results were calculated for each farmer's field and then combined to provide information on the nutrient balance for each farmer's landholding (Fig 1). The farmers' nutrient balances vary from field to field, depending on fertilisation practices and crop rotations. Farmers may rotate the application of manure or use of inorganic fertiliser across fields over several years. Planting a legume crop ensures a large nitrogen input to that field through fixation. Year to year variability depends on rainfall, and its effect on nutrient removal in yields, and the subsequent effect on fodder and manure supplies for the following year. It is the balance of nutrients over time that determines sustainability. The sustained use of farmland in the Kano CSZ without complaint of land degradation or declining yields is evidence that nutrient inputs and outputs must be balanced over the long term. This study has measured the main inputs of nitrogen and phosphorus but there may be minor sources that will make up the balance such as nitrogen in legume roots, nitrogen and phosphorus in human waste, nitrogen from leguminous trees.

Despite the small scale of this study the results provide a detailed understanding of nutrient dynamics within the farming system allowing us to make informed judgements about what may be happening in the system as a whole, and its potential for sustainability. Farmers practices recycle nutrients through the farming system as much as possible (Fig 2). Nutrients are gained through nitrogen fixation and the use of inorganic fertiliser (nitrogen and phosphorus) and through the Harmattan dust (cations and micronutrients), and lost when crops are sold. The key to the success of the farming system is crop-livestock integration, involving the recycling of nutrients within the system as much as possible. Crop residues, especially those

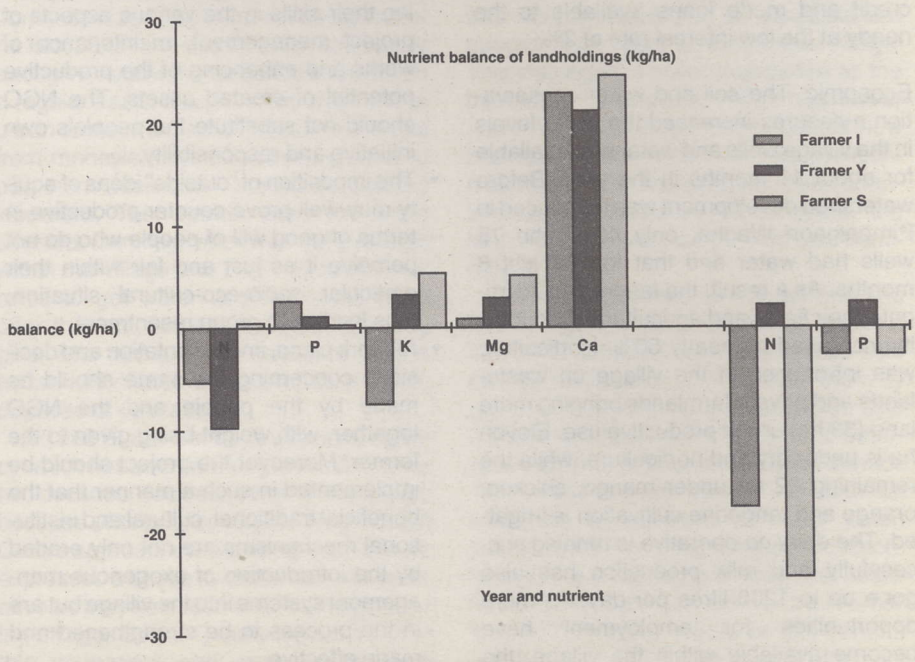

Figure 1: Nutrient balances of farmers' landholdings (kg/ha)

of legume crops, are used as animal fodder. Leguminous residues are transferred to the compound at harvest, where they are used to feed livestock which are tethered in the compound during the rainy season. Small ruminants convert the "free" nitrogen fixed by legumes into manure when legume crop residues are used as fodder. Their manure, together with compound waste, is returned to the fields during the following dry season. During the dry season livestock roam the field grazing cereal crop residues. Occasionally Fulani herds pass through the area, however estimates of the contribution of manure from grazing animals to the nutrient balance proved quite negligible. Farmers did not enter into contracts with herders to exchange crop residues for manure.

While millet and sorghum are grown as staples of the farmers' diet, groundnuts and cowpeas are grown to fix nitrogen and provide fodder. Storage difficulties prevent farmers from trying to store these legume crops for their own household consumption. The sale of these crops, and occasionally any excess cereal grain and any unused stalks and fodder earns cash with which farmers can purchase inorganic fertiliser. Farmers can also earn money in other ways, such as labouring, rope and mat making, or practising trades.

Population density and labour

In studying the Kano close-settled zone we have observed the point in the intensification process at which all land is under cultivation, all palatable crop residues are used for fodder and trees are conserved. As a result we have a better understanding of how the farming system works, and the rational of an indigenous farming system. Northern Nigeria has much higher population densities than its neighbouring francophone countries. Our results contrast with those of other workers. Researchers in francophone west Africa have calculated the amount of rangeland required to support the livestock necessary to provide sufficient manure to maintain annual production of cereal crops on 1 ha without reducing soil fertility (Schlecht et al, 1995, Turner, 1994). Calculations vary, but about 23-40 ha of rangeland is required to support 1 ha of cropland. This corresponds to a cropping intensity of 2.4 - 4.2%. The focus of discussion at a conference on the role of livestock in nutrient cycling in sub-Saharan Africa was the limit to agricultural production as dictated by manure and fodder supply (Powell et al, 1995). Research carried out in Niger, Burkina Faso, Mali and Senegal under similar rainfall regimes does not suggest that these areas could develop farming systems as intensive as that of the Kano CSZ. Yet results from the Kano CSZ and other areas show that farming can exceed this land-use intensity for many years. Areas of higher population density are characterised by higher livestock density (Bourn and Wint, 1994, Hendy, 1977), they also have more labour available to transport manure from compounds to fields, and so increase soil fertility. The research results differ because less densely populated areas are subject to labour scarcity, which limits agricultural intensification. In studies carried out in the francophone countries of west Africa with lesser population density and farming systems where average landholding size ranged from 3 - 10 ha, farmers did not find it worth their while to transfer fodder to the compound and tether livestock, then return the composted manure to fields. Livestock holdings were insufficient to provide enough manure to fertilise such large landholdings, even if sufficient fodder was available (Williams et al, 1995). Although some legumes are grown, the farmers have not yet realised the role that legumes can play in providing fodder for livestock, nitrogen through biological nitrogen fixation, and a saleable cash crop to enable purchases of inorganic fertiliser.

This discussion shows the importance of labour to agricultural intensification. The introduction of new technology will only succeed if the household is in a position to adopt such new practices, i.e. if there is sufficient labour. Development must coincide with the advent of conditions conducive to change. ■

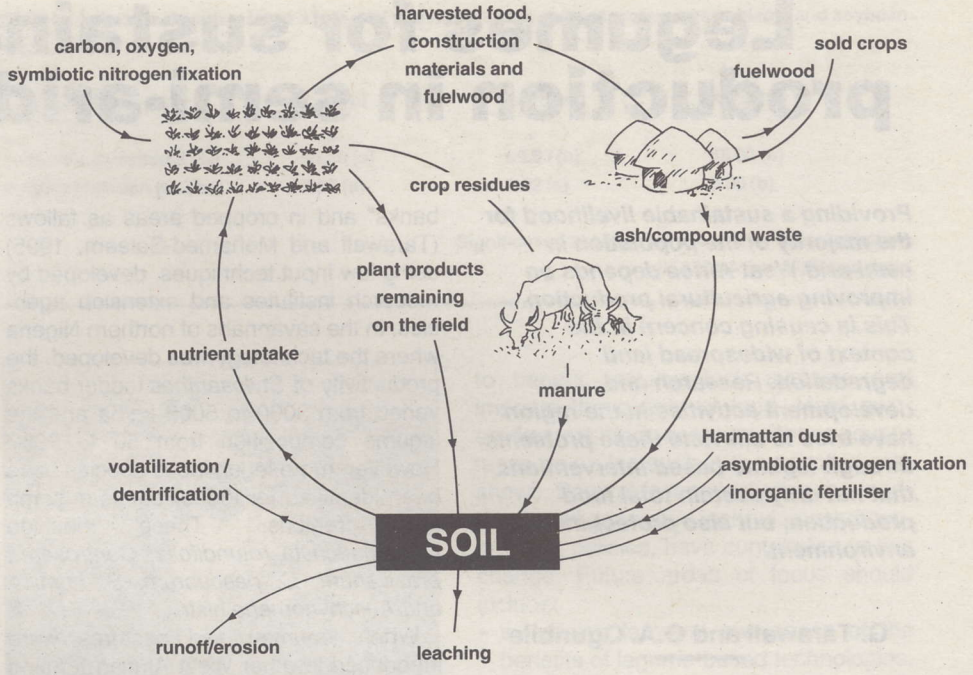

Figure 2: Nutrient cycling in the Kano close-settled zone

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This paper presents work carried out as part of the study "Nutrient budgets in relation to the sustainability of indigenous farming systems in northern Nigeria" funded by the Natural Resources Institute, UK and carried out at the Departments of Geography of the University of Cambridge, UK, and Bayero University, Kano, Nigeria.

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Legumes for sustainable food production in semi-arid savannahs

Providing a sustainable livelihood for the majority of the population in semi-arid West Africa depends on improving agricultural production. This is causing concern in the context of widespread land degradation. Research and development activities in the region have tried to alleviate these problems through legume-based interventions that not only sustain total food production, but also protect the environment.

G. Tarawali and O.A. Ogunbile

Over the centuries African farmers and agropastoralists in semi-arid areas have developed effective systems of land use such as nomadic grazing and shifting cultivation compatible with their environments. Problems have arisen in many countries when populations increase and the pressure on land becomes more severe as a result of intensified agricultural, residential and industrial activities.There is no longer enough land to allow soil replenishment through long fallow periods. More and larger herds are competing for forage over the same range. Farmers have responded by trying to cultivate new land, but expansion is taking place in marginal areas as most of the best soil is already in use. Given their limited resources, African farmers can not put sufficient nutrients into the marginal areas to replace losses through land degradation. Consequently, there is a steady decline in food production in sub-Saharan Africa which leads directly to human suffering.

Possible solutions

Previous studies on soil conservation and management aspects in the semi-arid zones of Nigeria and many other West African countries concentrated on mulching using straw (Kowal and Kassam, 1978). The acquisition of adequate quantities of straw mulch does not appear feasible. Therefore, current efforts should be geared towards the use of leguminous cover crops. Legumes give savannah farmers several advantages. They provide a more lasting protective cover for soil than dead mulch, they reduce the need for nitrate fertiliser and improve the quality of grazing land and they provide high protein forage to complement the low quality natural pasture.

Leguminous pastures have been successfully established by farmers and agropastoralists in rangelands as "fodder banks" and in cropped areas as fallows (Tarawali and Mohamed-Saleem, 1995) using low input techniques, developed by research institutes and extension agencies. In the savannahs of northern Nigeria where the technology was developed, the productivity of *Stylosanthes* fodder banks varied from 3000 to 5000 kg/ha and the legume composition from 50 to 70%. However, more leguminous species have been identified for fodder banks in semi-arid regions. These include *Chaemaecrista rotundifolia, Centrosema brasilianum, C. pascuorum, S. humilis*, and *Aeschynomene histrix*.

When legume-based pastures were introduced in other West African farming systems (Mali), *S. hamata* yielded 8000 kg/ha of which 80% was legume during the year of establishment with only 850 mm of rainfall. In the semi-arid region of Niger, *S. hamata*/millet dry matter yields in the second year ranged from 3000 to 6000 kg/ha of which the legume constituted 40-85%. In northern Cameroon, *Stylosanthes* grew to an average height of 1.41 m and produced 5500 kg/ha dry matter.

Better food production

Work with agropastoralists in northern Nigeria has shown that herds with access to *Stylosanthes* supplementation increased in size by 20% compared to cattle that were grazed on natural pasture (Boubacar Hussane, unpublished data). Conditions in Mali, Niger and Cameroon support higher herbage productivity and legume component. Performance should be even better and the new promising legume material with higher crude protein values should carry more animals for slaughter. Milk yields will also increase, providing more cash for women who control the dairy sector in traditional households in northern Nigeria.

Crops such as maize, sorghum, millet and soybean in areas preceded by leguminous pastures produced more grain than after natural vegetation and in some cases the yield was double. Maize appeared to be the most responsive crop. For cereals such as sorghum and millet with very low nitrogen demands, reasonable yields were achieved within *Stylosanthes* pastures without applying any nitrogenous fertiliser.

Better soils and less pests

The higher crop and livestock yields were due to the restorative and protective value of the forage legume. Some of the changes in soil properties included an increase in nitrogen content of the soil (Table 1). A range of other soil characteristics showed marked improvements including bulk density, organic carbon content, cation exchange capacity, and biological activities as measured by the number of microorganisms. Although not measured, earthworm casts were observed to be more numerous in the leguminous pastures than in the natural vegetation. The yield differences between crops planted within and outside *Aeschynomene histrix* pasture were a reflection of pest incidence (Table 2) in addition to an improvement in soil fertility. For instance, *A. histrix* decreased nematode symptoms and *Striga* infestation on subsequent maize. Although not quantified, the *Striga* population on maize planted within *Stylosanthes* pastures was much lower than on maize planted in the adjacent natural fallow.

Constraints and solutions

Despite the many advantages of a feed supplementation programme through legume integration, agropastoralists and farmers have identified constraints which militate against its rapid adoption. In Nigeria these include basic resources such as land, labour and capital. However, the benefits resulting from legume-based technologies and the associated research combined with favourable government policies have helped to alleviate some of these problems.

Table 1. Soil physical and chemical properties under *Stylosanthes* and natural fallow

Property	*Stylosanthes* fallow (3years)	Natural fallow (over 3 years)
N content (g/kg)	1.14	0.87
CEC (cmol/kg)	3.24	2.22
Organic carbon (g/kg)	4.31	2.70
Bulk density (g/cm3)	1.51	1.66
Total porosity (%)	43.10	37.40
Macroporosity (%)	42.10	36.40
Microrganisms (%)	34 x 107	12 x 107

Source: Tarawali and Ikwuegbu (1993)

Pastoralists' difficulty in acquiring land has been identified in the past as the most limiting factor. In northern Nigeria, the typical pastoralists rarely own land nor have fully recognised usufructuary rights. They depend on the goodwill and hospitality of village heads and local farmers who are most times very reluctant to grant them access to land and may withdraw such permission at any time. In more recent years, the visual demonstration of how legume-based pastures could be exploited for crops, livestock and soil conservation (Tarawali et al., 1987) was a breakthrough that encouraged arable farmers to co-operate more readily with pastoralists seeking land for legume establishment. Once the arable community had recognised crops such as *Stylosanthes* as soil conditioners during field days organised for them, fodder crops began to command the same care and respect as that given to food crops. Indeed, local farmers are now establishing leguminous fallows to improve soil fertility and for the wet season supplementation of their small ruminants (Ikwuegbu et al.,1995). The extension of the package to small ruminants is an entry point to boost the incomes and welfare of women, who are known to control this enterprise in northern Nigeria. The small ruminant package is also an area where the beneficiaries redirected research and development efforts since the intervention was originally targeted for the dry-season supplementation of agropastoral herds.

Labour

The agropastoralists depend on hired labour for farm operations such as ridging (Figure 1) and weeding, while family labour is used for planting and harvesting. Children and hired labour are used for herding in order to prevent damage to the crops of neighbouring farmers. Researchers and development workers who are currently refining the interventions are aware of such labour limitations and consequently have been introducing labour-saving husbandry practices in legume-based technologies. For instance, the undersowing method of establishing leguminous fallows/pastures in cropped areas is a much less labour-demanding approach as the legume will benefit from land preparation and the fertiliser originally meant for the crop. Also, ridging post-leguminous soils has been found to be easier because of the lower bulk density than after a natural fallow. Weeding crops once at the most critical stage (first 30 days) as opposed to twice (the conventional practice) has been recommended in forage legume-based cropping systems. This management style is not only labour-saving, but also boosts crop/livestock production and protects the soil better because of the availability of additional forage and live mulch. Finally, in managing leguminous pastures for higher productivity, beneficiaries are advised to control fast-growing grasses by grazing instead of applying expensive and labour-demanding herbicides or employing manual weed control.

Table 2. Nematode symptoms and number of plants with *Striga* after *Aeschynomene histrix* and soybean crops

Parameters	Control	Soybean	*A. histrix*
Nematode symptoms (%)	95.20 (a)	69.50 (b)	55.00 (b)
Striga infestation (No./ha)	2.25 (a)	1.92 (a)	0.90 (b)

Significance at a P= 5% indicated by different letters
IITA/ILCA (unpublished data)

Photo: Ann Waters-Bayer

On a field day, Fulani cattle-keepers inspect the fodderbank (small improved pasture) established by another Fulani.

Capital

Fencing leguminous pastures is essential to prevent trespassing and uncontrolled grazing. It is a major cost and can act as a key deterrent to the adoption of the technology in terms of capital outlay. In Nigeria, to meet these costs credit is provided by the National Livestock Projects Department (NLPD) in collaboration with the Nigerian Agricultural and Co-operative Bank (NACB). Researchers, development agencies and farmers have reinforced this government policy by trying to reduce the expenses of fencing. For instance, in response to farmers´ demands, live fence posts using local materials such as *Euphorbia, Ficus* or *Newbouldia* are gradually replacing expensive metal posts. This idea came from farmers who had been using these plants to construct fences in their backyards!

The future

Integration of legumes into the farming systems of smallholders has been shown to benefit crop/livestock systems and improve the quality of land. Herd owners/farmers have recognised these advantages as an increase in the adoption rate shows. Several factors including the modification of generated technology and government policies, have contributed to this change. Future areas of focus should include:

- increasing farmers' awareness of the benefits of legume-based technologies. In this regard, increased farmer participatory activities involving NGOs are essential.
- adequate training of extension staff must continue to be an integrated part of the forage-legume production system.
- national governments should be persuaded to continue to support (through policies and funding) the necessary research and development that will be required to maintain the expansion of sown pastures.

■

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Photo: Daniel Caceres

Handicrafts production is an excellent alternative to replace agricultural activities for it demands very little capital.

Not all improvements make sense

Farmers respond to changes in their environment. For some this means they stop farming. This case study presented in this article shows how the economic environment of Argentinean peasants influences their decisions on agricultural innovations. What seems appropriate from a technological and social point of view may make no sense from an economic point of view.

Daniel Caceres and Philip Woodhouse

Copacabana is a peasant community in NW Córdoba (central Argentina). Since the end of 16th century, population density has declined. The area is semi-arid, with an 450 mm annual rainfall, concentrated in the summer. The original vegetation of dry woodlands was cleared in the late 19th and early 20th century to produce timber and charcoal. By 1940, the forests had gone and the peasants of the region had to rely on an economic based mainly on small-scale livestock raising, crop production and later handicrafts making. Rural living standards are extremely poor. A marked emigration started in the 1950s toward cities and tourist resorts. This process has decreased over the past decades as a consequence of the stagnation of the national (and hence urban) economy.

About 60 families live in Copacabana. Surveys have identified two main peasant livelihoods: livestock-raising and handicrafts. Families raising livestock typically own more productive assets, such as land, and usually including a small flock of goats and a few cows. Their productive activities are oriented mainly to self-provisioning, and only partially depend on market exchange. Families engaged in handicrafts own few productive assets. They weave baskets using the leaves of a native palm and rely heavily on market sales to generate income, which, for the most part is barely sufficient to purchase food and other basic needs. Commonly such households depend for their survival on wage income, most usually secured by the migration of some household members to local towns. Although small maize plots and vegetable gardens are quite common in all households, they are more frequent among those raising livestock. Since 1988 a multidisciplinary team from the Department of Rural Development of the National University of Córdoba has been engaged in participatory research with people in Copacabana, in order to identify ways of improving productivity and living standards. The work has included "diagnostic" socio-economic surveys, detailed case studies of individual households and experimentation with new technology to improve agricultural productivity. The objectives of the experiments were identified in meetings between the researchers and Copacabana residents, experiments were conducted on peasants' farms, and were evaluated by local people as well as by the research team.

Bird pests in maize

Maize is the most important crop cultivated by peasant families in Copacabana. It supplies them with basic food for themselves, as well as with grain to feed poultry and other animals. The crop is sown in late December and harvested about June after the first frosts. Over the last two decades increasing crop losses (30-60 %) have been caused by birds (*Myopsita monachus monachus*), which feed on maize from late February and start causing major losses in March, when the availability of wild fruits, the birds' alternative food, sharply decreases. Peasants' efforts to reduce such losses, which involve spending the whole day on the maize plots to scare the birds away during the critical period are very time-consuming and do not significantly diminish crop losses. During the meetings organised in the community, the "bird problem" was identified as the most strongly felt problem of the region. As a first step, it was proposed to revive a strategy which many peasants remembered had been used some 40 years earlier, when a government campaign successfully reduced the bird population by paying cash for each dead bird. However, there was no state funding and cash payments to those who killed birds was to be raised by the local community. In addition, the cash payments were to be supplemented by packages of seed of a new drought-resistant variety of maize, provided by the research team.

The researchers believed the strategy had a number of positive features. It was based on local knowledge, it would allow testing of a promising maize seed and it would allow peasant families to get some cash, to name but a few. However, the system did not work. Although many birds were killed, money paid and seeds distributed, no decline in the pest was observed. An analysis showed that this method could only be successful if undertaken on a large

scale. If not, birds killed were simply replaced by others migrating from neighbouring areas. When they realised this was no solution, the community and the researchers agreed they had to "escape" from the bird pest. The researchers proposed to build a grain drying system that would allow earlier harvests and hence shorten the crop exposure to the pest. To test this idea an experimental solar drier was built, in which air heated by the sun would be vented through the stored maize cobs. The members of the community introduced modifications to the researchers' original design, adapting it to the resources locally available. The decision to test the solar drier was made and an experimental prototype built on a farm. The solar drier offered many advantages. For example, it could be built using local materials, the cost of materials was low, and construction demanded relatively little time. It could be adapted and replicated by peasants according to their own needs and it offered the potential for drying products other than maize (e.g. fruits, vegetables, palm leaves, etc.) The prototype solar drier proved technically successful: maize was stored and dried satisfactorily, despite being harvested about two months earlier than normal. However, the drier was not adopted by Copacabana's peasant farmers, and the "bird problem" remains unsolved.

Goat mortality

Another important productive problem which peasants raised during discussions with the researchers team was the high mortality of goats, and particularly kids, during the winter. This was due to the comparative higher impact of parasites on animal health as a consequence of food shortage at this time of year. To tackle the problem the research team suggested the use of conventional veterinary products. Although the technology is relatively simple to understand and had been used successfully by commercial farmers in the region, the researchers were unsure of its efficacy in this context. A number of potential difficulties were identified: i) peasants need cash to purchase the products in the market: ii) the products generate external dependence, for new supplies must be bought periodically: iii) peasants in Copacabana had no previous experience of using veterinary products: iv) the technology, while not complex, requires strict adherence to prescribed dosage instructions. As in this case of the solar drier, the pilot experience proved positive, but, in contrast to the solar drier, the veterinary products were massively demanded by peasants and high adoption (purchase) rates were observed.

What's appropriate?

Comparison of the introduction of the solar drier with that of veterinary products offers insight into the "appropriateness" of technology. Both experiences involve the same social actors (peasants and researchers), occurred at the same time, sharing the same methodology, and even the same farm for testing the technology. Both technical proposals proved capable of solving a specific technological problem, but in both cases technological adoption did not match researchers' expectations. The technology considered appropriate for peasant production (solar drier) was not adopted by peasants, while that considered less appropriate (veterinary products) was adopted. This dissonance in farmers' behaviour and researchers' expectations requires a broader understanding of maize production in the context of the whole productive system and the socio-economic dynamic of the region. If the productive systems in Copacabana are analysed from a historical perspective, it is apparent that a process of "de-agriculturization" is underway. Typically agricultural activities are being substituted by both handicrafts production and semi-proletarization. Maize production is also subject to this overall trend. Only 38% of the ploughable land is actually cultivated, and in the last four years the proportion of peasants sowing maize fell sharply form 66% to 39%. Three main issues underlie the "de-agriculturization in Copacabana:

- Increasing labour shortage. As a direct consequence of temporary or permanent emigration, the availability of workers to perform the diverse productive activities has declined.
- Availability of alternative productive activities. Handicrafts production is an excellent alternative to replace agricultural activities for it demands very little capital, it allows peasants to produce on a larger or smaller scale, it allows a rapid return on their investment, it does not rely on weather conditions, the final output is not a perishable product and it can incorporate marginal labour force (children and the elderly).
- Economic disadvantages. This point is the key to understanding the decline in maize farming in Copacabana. It can be illustrated by a comparison of labour required to meet subsistence requirements by growing maize or by weaving and selling baskets. In order to feed the 35 poultry needed to satisfy their own consumption of eggs and poultry meat during the year, a peasant family uses about 2 kg maize per day (730 kg per year). A plot of about 0.75 ha is needed to obtain this through farming. However, if the family were to use the 500 hours needed to farm this plot for weaving baskets, they would earn enough money to buy more than twice as much maize. By using the solar drier instead of bird scaring, crop loss due to bird damage could be reduced from 30% to 10% and farmers would save 250 hours. However, even 250 hours used in weaving would allow them to buy 20% more maize than they could harvest from their plot using the solar drier. Consequently, even for their subsistence requirements, peasants will find it cheaper to by maize in the market than cultivate it on their farms.

De-agriculturization

The factors mentioned above are at the roots of the "de-agriculturization" process, and together are re-orienting peasants' productive strategies. Since this process is recent, peasants may be not yet be aware of the depth of the changes in which they are involved. They may not yet have found the best combination between agricultural and non-agricultural activities. This confusing situation may be the key understanding, for example, why the "bird problem" was almost unanimously raised by the community, but, when a potential solution was identified (the solar drier), no peasants were interested in it. Although bird damage is an important limitation in farming, there is a further, more essential, problem: the opportunity cost of farming itself.

But why did peasants decide to invest in veterinary products for goats, while avoiding investments to protect their maize crop? To understand this choice it is necessary to involve in the analysis a further element: the risk. Although it is not possible to avoid completely the risk involved in any productive activity, peasants are considered more risk-averse than capitalist farmers. That is, they aim to secure the minimum income necessary for their reproduction, together with the highest possible stability of the system. If the main agricultural activities are analysed form this standpoint, it seems clear that arable crops carry more risk than livestock in areas dependent on rainfall. Further, in the last several years maize cultivation has become especially risky due not only to weather uncertainty (they have grown maize for decades under the same climatic conditions), but also to increased bird attacks. This, taken together with the very low maize price during the last decade and the progressive development of a productive alternative (handicrafts) explains the farmers' decision on a proposed agricultural innovation.

The main lesson we learnt from this case study is that it is very important to consider the historical (social and productive) trends when analysing technological innovation. New technologies may look appropriate, but if you disregard the historical processes from which technological problems immerse, you may develop inappropriate solutions. ■

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Finding partners in learning

As you could read on page seven, in the coming years, ILEIA will try to learn more about the potential of ecologically sound ways of farming in different agroecologic and socio-economic environments. We further hope to learn more about appropriate institutional environments to support local development of ecologically sound farming systems. Our strategy is to support and stimulate research in three agroecological zones with contrasting potential (dryland savannas, high mountain valleys and lowland flood plains). This first step in this programme was taken end 1994 and led to the selection of three countries, numerous collaborating institutions, and six representative sites.

Maja Kooistra

First we compared the list of countries that receive technical and financial support from the Netherlands government (ILEIA's donor) and the regions where ILEIA already had many contacts with (informal) networks on sustainable agriculture. This resulted in a pre-selection of seven countries: Bolivia, Peru, Ghana, Benin, Kenya, the Philippines and India (the states of Andra Pradesh, Kerala, Gujarat and Uttar Pradesh).

The next step was to make an agroecological characterisation of these countries, a comprehensive description of agroecological zones on the basis of physical, biotic, social and economic parameters. For this we made use of existing data. For the final selection, key areas had to be representative for their agroecological zone in order to be able to extrapolate the results. Therefore, apart from climatic conditions, selected key areas also need to be representative for the main geological units, landscape units (land regions), soil types, hydrological catchment areas (drainage systems) and vegetation types.

As the seven identified countries cover several agroecological zones, a pre-selection and prioritisation of these zones was made based on the criteria mentioned above. The selected countries in Latin America, Peru and Bolivia, have the mountain areas of the Andes in common. Mountain areas are importantly distinct in agricultural potential and not too far from major cities (Lima, La Paz). Therefore we decided agroecological zones in mountain areas should be part of the research. Looking at the different zones in Benin, Ghana and Kenya, we found they had drought-prone, semi-arid zones in common. The semi-arid zones in Africa were considered to have limited agricultural potential with many traditional agricultural practices. In India and in the Philippines, a (sub)humid zone can be found with both irrigated and rainfed agriculture to represent a high potential area.

Representative sites

Possible key areas within the countries were then ranked for "representativeness" for their zone, based on a literature review and on existing knowledge for the main physic and biotic parameters mentioned above. As result of this, the following selection was made:

- semi-arid areas: Ghana, Benin. In the case of Kenya, agroecological variability is very wide and this will limit the possibility for extrapolating results.
- (sub)humid areas: India (Andhra or Uttar Pradesh) is more uniform than the Philippines, where parameters within the climate, the geology, landforms and soils can vary widely over short distances.
- mountain areas: preference for Peru, as in Bolivia specific salinity and alkalinity problems occur.

It was further decided that when all criteria are met and a choice has to be made between countries, for practical reasons we would try to limit our working languages.

We then scheduled three missions: one to northern Ghana and Benin, another one to the Andes region in Peru and Bolivia and a third mission to lowlands in the selected Indian states and the Philippines. If the findings of the mission to Ghana and Benin would turn out not to be satisfactory, a mission to Kenya would follow. In each of the countries a consultant with a thorough knowledge of agriculture in that region and insights into the NGO and GO setting prepared a report on potential partners.

Our next task was to define the criteria to be used during the site selection visits. Agroecological, socio-economic and organisational capacity were the main categories. An additional but important criterion was to focus on farmers with limited resources. A specific effort was made to select sites with where NGOs, farmers' organisations and supporting research institutes already worked together. Further aspects looked at were participation of women farmers, documentation of farmers knowledge, institutional and staff stability, access to communication channels (networks, publications), scientific support capacity, experience with systematisation and on farm research and accessibility of the sites.

Visiting the sites

The purpose of the missions was to identify key sites within each major agroecologic zone and to formalise relationships with NGOs and research institutes that are explicitly prepared to work with us on the agricultural problems in the selected region. During the missions criteria were weighed and the following conclusions were drawn:

- In the mountain areas in the Andes two subzones can be distinguished: the altiplano or the mountain valleys. As the altiplano is a very specific landscape unique to the world and already quite a number of projects are being executed in this area, mountain valleys would be our focus. They occur in all Andes regions as well as in the Himalayas.
- A preference for selecting two sites in each country emerged, which means a possibility of recognizing commonalities and site specific factors within the same environmental boundaries, national policy and economic rules. The comparison can be further enhance exchange between the sites, capacity building of farmers and extrapolation of the results.
- In spite of our efforts we did not receive a report of potential partners in Benin before our departure to West Africa. Other efforts to contact consultants in Benin were not successful and the mission to Benin was cancelled. We agreed that if no adequate sites were identified in Ghana, a new mission would be planned to visit Benin. In Ghana, however, two sites were identified, which left Benin out of the selection.
- Although finding sites in India was a high priority, local consultants in India could identify only a very limited number of NGOs working with low external input agriculture in (sub)humid lowland areas. ILEIA sources and further contacts did not reveal a wider choice for potential partners. Moreover, the identified potential partners hardly fulfilled most of the selection criteria. Therefore the mission focused on the Philippines where extensive networks of NGOs with good contacts with farmers' organisations and scientific backup organisations exist. Since we had found earlier that agroecological zones in the Philippines are variable over short distances, we took special care to look for potential sites with a large uniformity in physical and biotic parameters, representative for other (sub)humid lowland areas in Asia. In the Philippines two potential sites were identified as well.

In the end, these sites were selected:

- Andes mountain valleys, Peru: Cajamarca and Huancayo
- Dryland Savannas, Ghana: Langbensi and Sandema
- Lowland, (partly) irrigated areas, Philippines: Jaen and Muñoz

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Photo: Maja Koolstra

Farming in Northern Ghana

The dryland savannah zone of the Northern region of Ghana occupies 40% of the country. It is comprising sub-humid to semi-arid guinea and sudan savannah. Although there are many constraints to farming, there are considerable opportunities too. Farmers succeeded to intensify land use significantly. To continue this increase in food production for the exploding population is an enormous challenge.

Edwin A. Gyasi

The soils, with exception of the limited alluvial ones, do not appear particularly productive. They are dominated by the difficult to cultivate shallow, easily waterlogged groundwater laterites overlying ironpan formations and by savannah ochrosols. This last type of soil, like the groundwater laterites, are humus-deficient due to the low organic matter from the sparse vegetation. Other farming limitations include soil erosion, bush fire, poor transportation and storage facilities. Complicated communal land tenure disfavours women, encourages farm fragmentation and constrains the use of land as collateral security for bank loans in a capital-short, poverty-stricken region. But, perhaps, the most serious farming constraint lies in the dry moisture-deficient climate. It is characterised by low and erratic rainfall less than 1000 to 1250 mm. The prolonged November-April dry season includes a period with exceptionally strong and dry winds, the *harmattan*. A further problem is accelerated desertification, most especially in the overcrowded once floristically rich Upper-East Region.

However, there are also considerable farming opportunities in the form of extensive grassland for livestock and arable farming. Rich indigenous agroecological knowledge underpins the diversified farming systems involving the hoe, burning, organic fertiliser and other low-external-input technology.

The farming systems

Under a relatively low population density until the beginning of this century, the main system of farming was shifting cultivation, which involves the intermixing of the drought resistant principal crops, millet (*Panicum miliaceum*) and guinea corn (*Sorghum guineense*), with yam (*Dioscorea*), pulses, vegetables and other crops to minimise soil erosion, maintain ecological stability, optimise utilisation of the different soil nutrients, and enhance food security and a balanced diet. This migratory farming system is now modified into the more sedentary bush fallow and compound farming systems in response to the growing pressure on the land.

The bush fallow system typically involves intercropping among natural economic trees in the form of agroforestry in out-fields operated on a rotational basis 1-6 km from the compound house. It comprises lowland bush fallow farms, upland bush fallow, and *faddama*, floodland and irrigated farming. This last category involves swamp rice cultivation in naturally flooded areas, artificial irrigation farming, and vegetable farming in naturally moist valleys and other depressions, especially in the *harmattan* season. Many dams and major irrigation projects were introduced from the 1950s to sustain year-round production.

Compound farming is an in-field relatively permanent mixed cropping system centred on the compound house. Soil fertility is regenerated by techniques traditionally involving mainly household refuse and manure from the livestock kept by virtually every household. The land immediately surrounding the compound is the most intensively cropped. It usually comprises an inner "kitchen garden" subzone with vegetables, and a sub-zone with the staples millet, guinea corn and maize, and melon and cowpea. The first major zone is succeeded by a second, much larger rarely manured area of short fallows dedicated mainly to millet, guinea corn and groundnuts. This zone and the surrounding outer unused common land serve as grazing grounds. Beyond lie the out-field bush fallow farms with the staples including yam. Specialised livestock raising centred on ruminants, especially cattle herded by children and Fulani herdsmen is fairly extensive.

Mixed farming widespread

Advanced mixed farming involving bullock ploughs, contour farming, grass bunding, stone terracing and other soil conservation measures, which were introduced from the 1930s, is widely adopted. A 1991 survey showed manuring to be the most popular soil fertility regeneration technique, followed by chemical fertilisation and bush fallowing. Others were green manuring, mulching and modern agroforestry. Anti-erosion practices, most especially contour farming, grass planting and terracing had become fairly widespread.

Rain season cultivation was the most popular form of drought-risk adaptation. Others were irrigation, cultivation of drought resistant crops and the increasingly popular valley bottom cultivation, all of which, together with farm land extension, chemical fertilisation and other high-external inputs have come to constitute major strategies for coping with the prevailing conditions (IFAD 1990).

Conclusion

Farming in the northern region of Ghana shows considerable adaptation to the spatially and temporally variable agroecologial conditions. But the serious challenge remains to promote appropriate affordable technologies to sustain production for the exploding population in this underdeveloped near semi-arid environment. ■

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Building partnerships

Northern Ghana is one of the three regions where a process of shared learning takes place through the establishment of learning partnerships between farmers, NGOs, researchers and ILEIA. As David Millar explains in this article, NGOs have already been sharing experiences since the early 1970s. The partnership between the NGOs and ILEIA dates back to 1988 and proved to be liberating and empowering for the NGOs.

David Millar

The Association of Church Development Projects (ACDeP) started in the early 1970s. The relationship between researchers in Ghana and this NGO body of over twenty projects had been simply one of organised technology transfer. Each project accessed whatever research technology was available and delivered it using the Transfer-Of-Technology modes. The power structure from researchers to projects and from projects to communities was strictly top-down. In 1988, as a member of ACDeP, I was invited to a workshop organised by ETC/ ILEIA where Participatory Technology Development was discussed. On my return, I did a presentation to the Association which allowed ACDeP to make an independent choice for a similar workshop in Ghana facilitated by ILEIA. On ACDeP's request therefore a workshop was organised in the north of Ghana where eighteen projects based on agriculture were invited. Two facilitators from ILEIA came and contracted the services of two local consultants (I was one of them, having participated in the earlier workshop). The four resource persons spent a couple of days working out the seminar strategies and possible outcome in detail (as structured and professionally as possible). The first day of the workshop saw very dramatic changes. After the usual protocols and the introductions to the workshop, the group of participants said that if they understood the intention of the workshop correctly, *they* were to be the local basis for "the new thinkings" so they would run the workshop. For the first time in my life I saw external expatriate consultants relinquish their power base, without a struggle, to the local "un-knowledgeables". There was no loss of face or hurting of egos, but a practical realisation of a potential with a desire to act. The role of the consultants changed to that of participants and the week-long product, "The ACDeP Approach to PTD", has since been seen by ACDeP as ACDeP's own and the flexibility of the consultants is still embedded in the minds of the members. With this product, the Association challenged itself to work on operationalising the outcome in another workshop. Although all fourteen participants of the workshop pledged to be present at this workshop, only five members made it. This group planned their action strategies over one week. Interestingly, one project that was not present in the first nor in the second workshop, picked up the reports and started on its own with PTD actions. Another project dropped out. In following ACDeP meetings the projects shared their experiences with other members and the role of ILEIA became one of networking, provision of literature, given opportunity for publishing and, to a limited extent, visits and sharing.

Farmers influence technologies

The result of these two workshops was a tremendous change in the field strategies of the projects. We still picked up the technologies form the research stations based on Transfer of Technology, but we processed these technologies with the communities based on our model of PTD which enabled the farmers to influence or further process the technology. Albeit marginal, a power relinquishing process had started, largely contributed to by the first consultants relinquishing their hold on power.

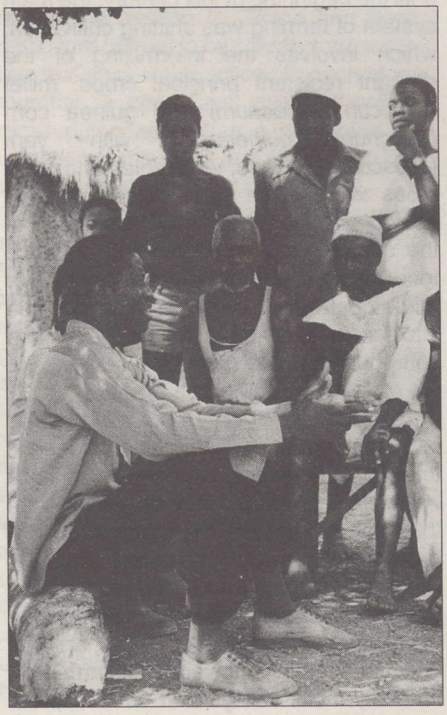

Photo: Wim Hiemstra.

This picture was taken in December 1989, when Wim Hiemstra of ILEIA first travelled to Ghana. ACDeP then developed their own approach to participatory technology development.

The attitude of the consultants coupled with their new role of back-up support, propelled us further into courtship with the only research institution in the area by opening our doors to them to do their field trials with our farmers monitored by our staff. A great achievement!

To consolidate the effort of its precursor, ILEIA has recently intensified actions with ACDeP once more. The original intention was to consolidate LEISA technologies so derived but beyond that look at their processes, methodologies and protocols. Now, as part of the learning process, this objective has changed into creating a space in which actors join in learning partnerships, integrating what they are learning with information from outside.

Looking ahead

It is yet premature to draw conclusions about this experience but preliminary observations can be made to the effect that a long term relationship is evolving between NGOs and researchers in northern Ghana. What has made it possible for such a marriage to get started? First of all, ACDeP realised the need for courting research and initial efforts were made so that when a partner was found in ILEIA, the ensuing response was only natural. Also, the power base of the NGO was extended providing the opportunity for them to enrol the researchers as if they were employers. NGOs braving up to the position that they can wheel and deal professionally with the researchers or even maybe they are the authorities when it comes to "hands on" activities. The choice to start with individual researchers rather than going to research as an institution proved important. The individual relationships had some reciprocity element and this was captured. Still, the outcomes would filter back into the institutions today or some other day. The process counted on the conviction that researchers are not one homogenous body and that there are some that are willing to share their power base or are prepared for "de-schooling". The choice of research area, methods and tools brought everyone back to the classroom. I sincerely hope that somewhere in this new effort, funds would be found for the researchers, using their own tools, to enrol NGOs and farmers directly in their processes as well. The actions that it would fund would be dictated by the researchers. This, for me, is what capacity building and power moderation is all about - trade-offs and compromises. ■

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Collaborating for sustainable agriculture

Photo: Bertus Haverkort

Bringing people together from various backgrounds to work on sustainable agriculture is a great challenge. Joe Taabazuing and Bern Guri acted as facilitators of a workshop in May 1995 to establish a working group for collaborative research in Northern Ghana. In this article they report on the process that was adopted to successfully establish this working group and the lessons learnt so far.

Joe Taabazuing and Bern Guri

It is apparent that the problems of sustainable agriculture are so complex that no one organisation or individual can address them alone. The combined skills and insights of a wide range of disciplines are required. Yet, for various reasons ranging from fear of loosing control or identity to pure competition, it is often difficult to get people from various organisations to collaborate towards sustainable agricultural development. It is therefore commendable that in Northern Ghana, 25 people from various disciplines coming from two research institutions, five NGOs, one university and ILEIA have been able to overcome all barriers to join hands in a collaborative effort towards the development of LEISA. This group is called the Northern Ghana LEISA Working Group. What is more remarkable is that the group recognises and respects farmers' own knowledge and skills as a basis for the collaborative research. The small scale farmer, is therefore central to this collaborative effort.

As the facilitators for the formation of the LEISA Working Group Northern Ghana (LEWOG), we recognised the need to allow the collaborating organisations determine the direction and nature of this whole effort. Consequently, we first made a reconnaissance visit to the area not just to study the political and socio-economic environment for the collaborative research, but also to consult and collect collaborators before planning the next step. These interpersonal contacts were kept informal and on a friendly note. This allowed people to open up and express all their fears, anxieties and interests for the collaboration. We also took advantage to press home the need for collaboration which stimulated their desire and commitment to the collaborative effort.

First workshop

In order for potential partners to get to know one another properly and also to create a platform to brainstorm together on the collaborative research, we organised a three day workshop end of May 1995. Even though ILEIA was not represented by a person, during a visit of ILEIA staff in March 1995 we had agreed that this workshop should be organised following their assessment of potential partners' involvement with LEISA. During the workshop, social evenings were organised to enable participants to develop a bond of friendship among themselves thus dispelling any suspicions or fears of each other.

The brainstorming and the reports from individual participants generated a lot of views and divergent interests. But we were able to reconcile these divergent interests and views and this paved the way for increased commitment and desire to collaborate. Focus was given to the NGOs operating at Langbensi and Sandema Agricultural Station that were to be the pilot sites for all. However, other interests that were not catered for by these two pilot sites were given attention by a third group that designed a programme for implementation.

The result of this workshop was a Programme of Action as well as the establishment of an institutional framework. Arrangements were made to deal with mechanisms for co-ordination, monitoring and evaluation; documentation and sharing of results; the necessary motivation to sustain the programme and roles and responsibilities for each partner were defined. At regional level, a Regional Coordinating Team was established by seven members, NGOs staff as well as researchers.

Second workshop

In the spirit of partnership, the collaborative research programme as designed by the group during the first workshop was discussed with ILEIA during a second workshop in August 1995. Even though the position of ILEIA brought out divergent views, a critical analysis of all opinions paved the way for compromises and meeting of minds by the end of this workshop. Partners were interested in the on-going process and this ensured them to continue and make compromises. It was the general consensus during the second workshop that more training was needed for the partners to have a better understanding of the agro-ecological zone they hope to work in as well as the dynamics and linkages of the indigenous farming system. It was therefore recommended to have visit the communities again, particularly the pilot sites at Langbensi and Sandema. Some Participatory Rural Appraisal tools were recommended for this exercise and a proposal was made for a third workshop to cater for this need. Before this training workshop, however, the collaborating partners decided to form "syndicate groups" to start practicising the PRA tools in different locations with technical support from other partners who already have more knowledge in applying them.

Lessons learnt

- Getting people from different disciplines and background to collaborate towards a common interest is a slow process that requires patience and tact.
- Building a strong interpersonal relationship among collaborating partners was found to be a useful starting point.
- Successful collaboration requires flexibility and compromises from partners.
- Views and interests of parteners must be respected and divergent interests reconciled as much as possible.

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Bern Guri and **Joe Taabazuing**, PO Box 68, Madina, Accra, Ghana.

Photo: Ruud Gort

Entry point for change

Environmental education

A small environmental organisation, Hind Swaraj Mandal (HSM), works together with over twenty schools in Saurashtra, Gujarat, India. The schools form a close network of Gandhian institutions. They provide formal and informal education to village youth. Skills needed for every-day village life, like cattle management or farming, are part of the curriculum. Together with HSM they participate in an environmental programme called "My Village, My Universe". This programme started a process of change towards sustainable agriculture.

Thijs de la Court and Hans Verolme

Cattle management used to be the dominant trade of the region until 20 years ago. The changing political and economic position of the region and integration in the national and international economic system, had put the focus on agriculture. The farmers of the region had been able to use these changes to their benefit. These days, a new phase is presenting itself. The region is industrialising rapidly. Farm labour is hard to find with labour prices competing with the local diamond-cutting and regional industries. Profits from agriculture move to expensive consumer goods or are re-invested in the stock market with large petrol and agro-chemical companies leading the way.

Organic agriculture

With 300 to 400 mm. of rain the main crops are monocultures of groundnut, cotton and pearl millet. The landscape is barren, water reserves absent or of low quality. The cattle population has diminished, with less than one cow per hectare of agricultural land. Trees have been cut, allowing wind and rain to erode the vast tracks of open land. Four months of production are followed by an 8 months fallow period in which temperatures of the soil easily exceed the 50°C. It is in this climate that one of the farmers showed us his fields and compost pit. Having made the change from chemical oriented agriculture to organic inputs two years ago the farmer now observes that production of groundnut and pearl millet did not go down. He had created three test plots. One with organic manure, the other with chemical fertilisers and a third with a mixture. There was no difference in production after two years of experimenting. His neighbours and fellow farmers follow his experiment with a sense of critical curiosity. He is a "strange farmer", stepping out of the main stream.

Little meaning for most farmers

Discussing with the farmers under one of the rare trees alongside a well we found

The landscape is barren, water reserves absent or of low quality. The cattle population has diminished, with less than one cow per hectare of agricultural land. Trees have been cut, allowing wind and rain to erode the vast tracks of open land.

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that most of them were extremely sceptical regarding this experiment. Their main worry concerned the economic gain and security of their farm. Would they be willing to risk anything? One of the farmers suggested that the price of organic manure will rise if more farmers would go the organic way. Organic agriculture has little meaning for most farmers. "Organic farmers" are from a more flexible layer of society. They are able to read and write with ease, have access to profitable markets, have an innovative and creative mind and are not bothered by too much debt. Most farmers don't fit this profile. Their low inputs are related to the trouble of finding resources to pay for them. Most of those farmers are heavily in debt. The use of fertilisers is therefore low, often zero. But the crops are export crops, grown without rotation. These farmers are trying to survive in a crisis. Their low inputs have little to do with organic agriculture. If they would be given the chance, they would immediately go for chemical fertilisers and pesticides in a big way. Only in that way they would be able to step out of their misery and build up some security and status.

My Village, My Universe

The school we visited had been part of HSM's network for several years. It participated in the programme "My Village, My Universe". In this programme students study the environmental, social, cultural and economical history of their village. They find out what went wrong, why the desert is taking over, why pesticides seem to be crucial in modern farming, why they have so little future in their own rural place. Results of "My Village, My Universe" have been presented in many different ways. Essays form the bulk of the product. Students, organised in local environmental groups, present their essays to the other students of the schools. A lively exchange of results, often through lectures about their essays, takes place during regional camps. The best of essays are being published in a simple booklet, shared by all the schools. Another set of methods is inspired by techniques related to Participatory Rural Appraisal. Making a map of the village of 20 years ago and now shows the physical changes which took place. Adding, for instance, a perspective on what the village will (or should) look like in 20 years from now adds a discussion on goals and targets of development. It is during those exercises that students involve their family and other members of the village community. Based upon this link it is possible to stimulate a discussion with the village community as a whole. These discussions move along the waves of history with farmers telling about agricultural practice in earlier times. While comparing the landscape, livestock, water and organic resources, farmers agreed that the current high input system could hardly be called "progress" any more. This awareness, which had taken root in the school and could now be openly discussed in a wider forum, is a starting point for the new "conversion plans" for sustainable agriculture.

Historical analysis

Without a good analytical framework little can be done. Meeting with the farmers we asked why the land lacked trees and whether the situation had been different before. Only after hesitant replies we were able to probe further. We found that the area had been rich in trees. Not in the form of forests. The hedgerows, mainly thorny bushes and euphorbia, provided safe places for trees to grow. Those thorny hedgerows had been one of the major sources of secondary products from agricultural land. They provided green fodder, organic pesticides, fuel wood, material for construction of small implements etc. They also provided shadow, protection against wind. And, because silt used to build up, they functioned as small checkdams. The length of these systems could only be measured in thousands or tenthousands of kilometres. Now they are gone. The economic value of the hedgerows went down with many products available on the market, fuelwood was available on the grasslands and through *Prosopis* plantations. A terrible drought, lasting for three years, provided the reason for destroying the remaining hedgerows.

The nutrient cycle is broken

Another historical element, which proved to be of great relevance concerned the pastoralist community. The amount of livestock for milk production had been stable during the past decades. A major shift had taken place in methods of irrigation. Instead of animals, now diesel provides the energy for irrigation. This change of focus has diminished the local livestock population to a certain extent. Perhaps more important, the relationship with pastoralists changed. This community of "Maldharis" used to interact closely with the farmers. Their cattle would come and browse the hedgerows and eat the after-harvest waste. Their input would be highly valued because they provided precious organic manure. Because the cattle would remain in the field during the night the transfer of organic matter from hedgerows, grassland and crop residues into manure and urine for the soil used to be high. Now, the cattle is not welcome anymore with a larger amount of farmers even burning their agricultural waste. There is little to get from the barren fields with products being different these days. The farmer produces fodder in a commercial way, selling it or using it for his own cattle. Those animals are kept in their stall or near the farm. Transfer of organic matter and urine to the field has diminished in a big way. Moreover, the grassland has degraded so much (often taken over by farmers for non-irrigated pearl millet) that cattle starve and the manure is of little relevance to the soil's fertility. The shift from a pastoral society to export and cash oriented agriculture broke the nutrient cycle, leaving the soil barren, devoid of organic inputs.

Change

The farmers acknowledged these developments, remembering many of the older ways of recycling basic inputs of their farming system. But they were extremely careful in proposing a change in their current practice. Many of them are in debt. All of them value their financial income highly. Change means taking a risk. Knowing that the traditional inputs are hardly available, the farmers would not choose for organic agriculture. We therefore proposed to start with building on their traditional ways of farming. No discussion about organic agriculture but strengthening of the local nutrient cycles. Building the hedgerows again would also benefit the groundnut harvest. Providing protection for the grazing land would benefit the shepherd without creating competition with the current mode of production. We would have to make an inventory of those resources which provide the basis for sustainable agriculture and study the process of making those resources available. We wouldn't start with a distant aim but with short-term gains at local level. Many other steps need to follow, such a development would not take place overnight. It would mean that farmers would join in a long-term goal and that a step-by-step conversion plan would be developed with the help of HSM and its partners.

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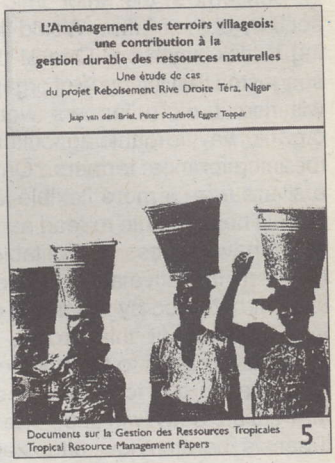
Vasuder Vora (general secretary) and Harjibhai Patel (agriculture) are responsable for the programme, **Thijs de la Court** worked for HSM for the past three years, **Hans Verolme** is his successor.

Crisis and opportunity: environment and development in Africa by F Falloux, L Talbot. 1993. 358 p. ISBN 1 85383 173 5. £ 15.95. Earthscan Publications, 120 Pentonville Road, London N1 9JN, UK.
Paints a picture of environmental degradation in Africa. In this publication it is shown, once more, that economic and social development, on the one hand, and environmental protection, on the other, are not mutually exclusive. The authors, authorities on environmental policy making, plead for a change from within African countries, rather than change as a result of involvement of external agents, in order to achieve widespread popular ownership of measures to be taken. Implementation should occur through National Environmental Action Plans. Such planning processes have been developed since 1987, largely by Africans. For these plans to take effect, a number of preconditions will have to be fulfilled, such as a sufficiently developed institutional framework, a well-developed information system, and competent staff in the field of environmental sciences. It is not easy to fulfil all these needs at short notice. (WB)

From woodlots to village land management in the Sahel by I Guèye, P Laban. 1992. International Institute for Environment and Development (IIED), 3 Endsleigh Street, London WC1H 0DD, UK.21 p. (IIED Dryland Networks Programme issues paper No. 35).
Describes how local people are involved in management of natural resources in the West African setting. The paper describes experiences collected in the framework of community forestry programmes. Over recent years, the initial, low-key, communal woodlots - with a forestry-oriented, technical approach - have evolved towards a much more ambitious and integrated Village Land Management concept. Principal benefits have been a much better forestry extension service, leading to increased women's interest and involvement. It remains to be seen to what point this approach will work out favourably towards halting environmental degradation, specifically with regard to the fuelwood shortage. Also problematic is insufficient commitment of people to a common cause and to urban-rural conflicts of interests. Land and tree tenure rights will have to be redefined in Sahelian countries in order to achieve better environmental protection. Further improvement of the VLM approach can be achieved through strengthening of successful village groups, transfer of formal responsibility for natural resource management to local-level authorities, and better knowledge of alternative technical interventions. (WB)

L'aménagement des terroirs villageois: une contribution a la gestion durable des ressources naturelles: une étude de cas du projet Reboisement Rive Droite Téra, Niger by J van den Briel, P Schuthof, E Topper. 1994. 94 p. US$ 12.00. Royal Tropical Institute (KIT), Mauritskade 63, 1092 AD Amsterdam, The Netherlands. (Documents sur la Gestion des Ressources Tropicales, No. 5).
Examines results of a land use management project in Niger. After an initial sectoral approach, focusing mainly on reforestation and on improved infrastructure, it was felt a more integrated and participatory methodology was needed. Central question was to what extent the land use management approach contributed to sustainable management of natural resources. It was found that the approach was promising for areas with predominant crop cultivation, but less so for pastoral areas. This is due to conflicting land use interests and improperly defined land use rights for pastoralists. Neither did the land use management approach provide a solution for intensification of agricultural production. The expanded project mandate led to increased management problems. (WB)



Stylosanthes as a forage and fallow crop by PN de Leeuw, MA Mohamed-Saleem, AM Nyamu (eds.). 1994. 340 p. ISBN 92 9053 279 3. International Livestock Centre for Africa (ILCA), PO Box 5689, Addis Ababa, Ethiopia.
Stylosanthes has, for quite some time now, received much interest as a ruminant feed. These proceedings examine this feed crop from a West African perspective. Stylosanthes was introduced in this region in the late 1950s. Apart from its nutritive value, the plant is also capable of nitrogen fixation, very useful for these soils on the verge of nutrient depletion. Much research, both on-farm and on-station, has gone into how to best incorporate Stylosanthes into crop-livestock farming systems. Still, producing forage for feeding livestock is little incorporated in farming practices in West Africa.

The war of the trees
"This is Sikuruchaminuka, the national spirit of Zimbabwe. I came to build Zimbabwe working through the soil to control and prevent soil erosion, construct adequate contour ridges, restore spoiled land and eliminate formation of gullies so the land will be beautiful.
I came to ensure that the coming generation will have a pleasant life through planting trees and through restoring sacred places in which no animals should be killed including the ancestral animals of which some are sacred. It is taboo to talk bad about these animals.
People who live close to these places should be taught to respect the rules which include the coming of the country peacefully with unity and without conflicts." With these words, the video "The war of the trees" starts. An ancient tree in the Zimbabwean landscape is pictured. The video highlights the work of ZIRRCON, the Zimbabwean Institute of Religious Research and Ecological Conservation, based in Mavingo. Through ZIRRCON some 750,000 trees have been planted since 1989 when it began in districts like Chivi. In those places, where drought had not dried up available water for irrigation, the survival rate of trees in plantations was more than 70%. After the independence struggle it's now the war of the trees: the ecological liberation struggle of nature. ZIRRCON is working in concert with at traditionalist association and AAEC, the Association of African Earthkeeping Churches, a Christian association. Each maintaining their own identity. Tree planting in the context of traditional religion is a ceremony which starts with women brewing beer. One of the villagers, usually one of the elders or the chief throws beer on the ground, thus presenting it to the ancestors. The ancestors are asked permission to plant trees. At the same time, the ancestors are asked for help in the tree planting and provide for rain so that the trees have enough growth. Churches also have tree planting ceremonies, carried out during Eucharist celebration or the Lord's Supper. Two priests position themselves in such a way, that a "gate" is created. Villagers can pass through the gates, confessing their sins, including ecological sins like cutting down trees.
Theology of Africans is holistic to include man, but also animals and trees. The video shows a conference where with chiefs, spirit mediums and independent churches interacted. One of the conclusions was to discuss on the reintroduction of wild life in communal areas.

More information:
Mamayo Video Productions, Asselijnstraat 21bisA, 3521 TB Utrecht, Netherlands.

This issue has been explicitly addressed during this workshop. (WB)

Dynamics in farming systems: changes in time and space in Sukumaland, Tanzania
by HCC Meertens, LJ Ndege, HJ Enserink. 1995. 95 p. ISBN 90 6832 819 0. Dfl 29.00. Royal Tropical Institute (KIT), Mauritskade 63, 1092 AD Amsterdam, the Netherlands.
Describes changes in farming systems over the period 1875-1990 in Sukumaland (Lake Zone, Tanzania) and analyses factors that brought about these changes. The authors demonstrate African farming systems are not as traditional and conservative as has long been thought. The historical approach to Farming Systems Research overcomes one of its inherent shortcomings: its static nature. Labour productivity is seen as the key variable in Sukumaland: extensive land use systems were traditionally preferred because of inherently high labour productivity. In line with findings of Ester Boserup in her book 'The Conditions of Agricultural Growth', population growth is an important agent of change in farming systems, but far from the only one: ecology, economics, technology, and policy can also lead to major shifts. Many examples are provided for this: the political situation, migration, the introduction of ploughs for clayey soils, the eradication of tsetse fly. A major outcome has been the massive introduction of cotton. From this publication, it appears rapid population growth does not necessarily lead to environmental degradation, as has been shown for Machakos (Kenya) by Mary Tiffen and her collaborators. (WB)

Sustainable land use: SDC's strategies in semi-arid India by Swiss Development Co-operation. 1994? Swiss Development Co-operation (SDC), PO Box 392, New Delhi 110 001, India.
Describes involvement of The Swiss Development Co-operation (SDC) in sustainable land use projects in semi-arid areas in India. This brochure provides an outline of SDC's views on purpose and implementation of such development projects. It must be realised, in this context, that rainfed agriculture in India accounts for 40% of the total food production. More than this can only be achieved at high marginal costs and with much environmental risk. The project objectives are to be reached through: 1) participatory watershed development; 2) replicating watershed approaches; 3) natural resource management through women; 4) improving self-help capacity of rural households and communities; 5) human resource development; 6) research, networking and policy dialogue. In the framework of this small booklet, these approaches remain rather schematic. AT the end, succinct descriptions are given of SDC's current projects the Indian states of Karnataka, Gujarat and Rajasthan. (WB)

Farmers are engineers: indigenous soil and water conservation practices in a participatory watershed development programme by PD Prem Kumar ; B Humbert-Droz (ed.). 1994. 40 p. Swiss Development Cooperation (SDC), SDC Field Office, Aishwarya Appt., 38, Rest House Road, Bangalore 560 001, India; Participative and Integrated Development of Watershed Project (PIDOW Myrada), Prakruthi, Gnana Kendra, Kamalapur 585 313, Gulbarga, Karanataka, India.
Describes a number of traditional soil and water conservation structures in semi-arid Karnataka state, India. Farmers are, of course, not only engineers, but also managers. Management of conservation structures is important: only if the farmer is convinced of their appropriateness, will he invest time, money and energy in maintaining them. It is a laudable undertaking to first record whatever knowledge is available in the project area before venturing to propose any advice or intervention. Also, the underlying publication may help to spread such, often unrecorded, local knowledge. Whether this recording contributes to the project's goal of increased farmers' participation remains to be seen, however. (WB)

Sylvopastoralisme et developpement: de la gestion traditionnelle à l'aménagement. June 1995. Special issue of 'Parcours Demain: Bulletin d'Information sur les Systèmes Pastoraux du Nord de l'Afrique et du Sahel' (ISSN 1164-4052). 161 p. Centre International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM), 3191 route de Mende, BP 5056, 34033 Montpellier Cx 1, France.

This issue contains the proceedings of the 3rd international seminar of the Parcours network, held from 13-15 October 1994 in Tabarka, Tunisia. The issues covered during this conference were: traditional resource management, new trends in management of forest resources, and land use practices, in conjunction with pastoralism, in the Mediterranean ecozone. The central issue examined was how to incorporate traditional resource management practices in an increasingly stressed ecosystem. (WB)

Changing places? Women, resources management and migration in the Sahel.
R David (Ed). 1995. Economic & Social Research Council. 168 pp. Obtainable from SOS Sahel International, 1 Tolpuddle Street, London N1 0XT, UK.
What is the relationship between male out-migration and women's management of natural resources? Researchers posed this question in 25 villages in Senegal, Burkina Faso, Mali and Sudan. The research has been a lesson in diversity as variability in conditions, responses, perceptions and strategies was very high. Nevertheless some tentative general conclusions have been drawn. The study provides an important contribution to understanding the changing survival strategies of rural people in the drought prone Sahel and the implications these strategies have for women and the natural environment. The presentation of the findings is very readable. (CR)

Arid ways: cultural understanding of insecurity in Fulbe society, Central Mali.
M de Bruijn & H van Dijk. 1995. Ceres Series, no.1. Amsterdam, Thela Publishers.
ISBN 90-5538-013-X. 547 pp.
The initial aim of the research project was defined as the assessment of the consequences of ecological, economical, social and political changes on land use and ideological systems in Fulbe society in dryland Central Mali. The authors discovered that insecurity and uncertainty were the only 'certainties'. The dynamics of the ecological, social and political circumstances were leading to constant changes in how people use and manage natural as well as social resources. This was accompanied by a continuous reinterpretation of the cultural understandings they have of their own situation and related normative complexes. The authors have placed the practical realities and dilemmas in an historical context. The study poses very important methodological questions and is valuable reading for those who want to understand the dynamics of insecurity. (CR)

KEEP ROLLING

Dung beetles will be rolling up the themes again. When we publish a Newsletter on a certain theme, we hope that readers will digest it so that new ideas can emerge. In this section "Keep Rolling" you have a chance to present further information about themes highlighted in previous issues, thus giving still more food for thought and action.

Economics of the entire farming system

I read with interest the article "Economic Evaluation of LEISA" by Ruben and Heerink in ILEIA Newsletter Vol 11/No 2. The article attempts to compare, contrast and quantify costs and benefits of High External Input Agriculture (HEIA) with that of Organic Agriculture (OA) and Traditional Agriculture (TA). The article is thought provoking and interesting. However, I have several concerns with regard to the methodology of evaluation adopted.

Anura Widanapathirana

My first concern is that the production benefits and costs are evaluated considering only one crop, i.e. banana. But the reality is that there is a mixture of crops and several livestock types from which the farmers would benefit. It is immaterial whether any single crop or livestock type leads to a higher output, income or lower cost; what is more important is the total of profit and loss from the entire farming system. The orientation to concentrate on segments is a result of the emphasis of modern agriculture which essentially looks at 1-2 crops or livestock types whereas the traditional agriculture was concerned with the net gains and losses of the entire system.

Second, in comparing costs and benefits attributable to TA, it is important to characterise traditional agriculture. The commonly accepted definition of TA is agriculture using traditional practices (such as organic manuring), inputs (such as indigenous seeds) and processes (such as local leadership patterns, local customs and rituals, etc). Therefore, it may be realised that OA is, in fact, a part of TA. In addition to organic practices, several important social institutions are involved. If TA is defined as above, there should be a higher level of production, due to the use of socially accepted methods of crop production. Table 1 in the article indicates that the yields are lowest in the case of TA. The reason for this confusion has to be explained.

Third, the results of economic indicators may be different if a farming system approach is used in the evaluation. For instance, labour productivity (as measured by kg per manday for a specific crop) is high in HEIA compared to AO or TA. However, if labour productivity of the entire farming system is assessed, it is likely to be low in HEIA, because of the environmental and externality problems associated with the use of chemical inputs, tractor power, etc. Water quality is deteriorating pest, predators get lost, fish and aquatic die, honey bees disappear leading to low level of crop pollination. As a result, production of fish, aquatic system, bees, honey and others will be low. Moreover, pesticide poisoning of humans will be high leading to a variety of health impacts and inproductivity. It is a misnomer to say that there is high labour inputs for weeding in TA. It will in fact be less due to the use of a combination of methods and activities adopted in the case of TA.

Fourth, table 1 of the article gives data for only one single season. Aren't we interested in the cumulative effects of TA and OA over several seasons? One of the significant features of OA and TA is that crop yields will be sustained over a longer period of time. Manures and other organic materials will have a cumulative effect on soil fertility. The sustained level of yield from farm yard manure and the dropping yield trend curve for mineral fertilisers is graphically shown in the article by Nagendra Rao (ILEIA Newsletter Vol 9/No 4, 1993). Rao has used data for 14 continuous years. Still another related issue is the level of yield for organically manured vis-à-vis chemical fertilised plots. Perumal (ILEIA Newsletter Vol 9/No 2, 1993) shows a higher cost-benefit ratio for organically manured crops compared to that of Urea. Banmeke (same ILEIA Newsletter) describes an experiment of five years, showing that continuously adding mineral fertilisers to maize plots has resulted in a soil no longer fit for arable cropping anymore.

Fifth, with regard to the production function (figure 1) given in the article, let me point our that both curves are based on a single crop. The output from the entire system will be low due to externalities associated with high-tech agriculture. However, I am yet to see a production function developed for a farming system.

Sixth, the article says that at relatively high output and low external input prices, HEIA tends to offer better economic prospects. This is an incorrect statement. Such a technique will offer better financial prospects and NOT necessarily economic prospects. Economic prospects should consider externalities and assess costs and benefits to the society. If HEIA is evaluated in economic terms, then the economic returns to the society will likely be low.

Seventh, although OA and probably TA require more labour, there will be a range of benefits on the society at large. This itself make it the duty of the government to support this form of agriculture. Finally, by way of a suggestion, let me point out that another way of promoting OA/TA techniques is to offer incentives. In our country, HEIA receives at least 20 different types of incentives, ranging from direct financial subsidies to better access to knowledge in the form of leaflets and propaganda work, mass media, printed media and attractive sign boards. Organic manures are provided with just 2 incentives only! If profits to the society are considered, it will be less advantageous to spend a country's resources on chemical fertilisers. Promotion campaigns to educate consumers on the virtues of organically grown food will create more demand and push the price up. However, these arguments should be assessed and quantified through further research. As economics is concerned with the entire society, let us put our thoughts to assess and quantify changes in the entire farming system. I would be very happy to hear from ILEIA members on this.

Anura S. Widanapathirana (socio-economist), 59, Galle Road, Colombo 4, Sri Lanka

Here's good news to farmers and environmentalists! Environmental contamination and high cost of production due to indiscriminate use and over dependence on petroleum-based chemical pesticides could now be alleviated through the discovery of a botanical pesticide by the Cotton Research and Development Institute (CRDI) based in Batac, Ilocos Norte. It's the physic nut, scientifically called Jatropha curcas. Locally it's called the tubang-bakod (or tawwa-tawwa) because it is commonly planted as a fence around residential and farm lots. Ordinarily, the seeds are used as purgative while the leaves and bark are used for treating fractured bones and pain in the abdomen.

A safe and effective pesticide

Milaflor L. Morales

With the results of the experiments conducted by Dr. Aida Decena-Solsoloy, an entomologist at CRDI, the insecticidal potential of the crude oil extracted from tubang-bakod can now be harnessed through formulation into an emulsifiable concentrate. According to Solsoloy, the crude oil extracts from the tubang-bakod cause abnormalities on treated bollworm and flowerweevil. Furthermore, she says that other agricultural pests like weevil for stored grains like corn, rice and mungbean can be controlled. on the other hand, golden snail, a major rice pest could also be controlled with tubang-bakod through dust formulation. Likewise, it is anticipated that with the proper formulation, it wards off household pests such as cockroaches, rats and houseflies.

"Indigenous plants that are just taken for granted may provide the answers to pest problems without resorting to petroleum-based chemical pesticides" says Dr. Solsoloy. She believes that mother nature could help man solve environmental problems if only he is keen and resourceful enough to discover them. "Pesticide from tubang-bakod is simple and easy to make. Even the farmers themselves can make it," she explains. "The formulated product is yellow and turns white when mixed with water. Its odour is similar but less intense than that of kerosene. It forms a uniform suspension with water. Thus, it is convenient for small farmers to use because it does not clog the nozzle of the knapsack sprayer. Likewise, they no longer worry for being contaminated.

As of this writing, its commercialisation is in the offing. A co-operative in Batangas is planning to embark on the mass production and commercialisation of the product. Likewise, the National Post-Harvest Institute for Research and Extension (NAPHIRE) is co-ordinating on the possibility of trying it on several stored grain insect pests.

The development and recognition of tubang-bakod as a source of safe and effective pesticide in the form of an emulsifiable concentrate (EC) is a breakthrough in pest control. With this breakthrough, it only proves that nature is an abundant source pesticidal resources for the use against agricultural pests. A botanical pesticide like tubang-bakod is not only effective, it is also low-cost, biodegradable and not harmful to beneficial insects!

Milaflor L. Morales, Cotton Research and Development Institute, Batac, 2906 Ilocos Norte, Philippines.

How to make a biopesticide from *Jatropha*

1. Gather mature fruits of physic nut then air dry
2. Dehull the seeds
3. Grind them to fineness
4. Soak the powder in petroleum ether in 2-3 days
5. Decant the supernatant in a wide-mouthed container
6. Evaporate. The remaining fluid is the crude oil.

Mix 1400 ml of the formulated *Jatropha* with 16 litres of water (or one tank load of a knapsack sprayer). For one hectare of cotton 7 tank loads (112 litre) are needed. We can only give specific recommendation for cotton for the meantime, as Dr. Teodoro S. Solsoloy is currently working on grain products with the National Post Harvest Institute for Research and Extension in the Philippines.

Dr. Aida Solsoloy, is still working on the determination of the recommended rate for using powder dust on rice. The dust formulation or wettable powder was tried on molluscs, specifically on golden snail - the major rice pest problem in the Philippines and was found to be effective. The powder is broadcast in the field.

1. Gather mature fruits of physic nut then air dry.
2. Grind the seeds (including the husk) to fineness.
3. Broadcast to rice field infested with golden snail.

For more information, please contact the researchers, Dr. Aida Decena-Solsoloy and Dr. Teodoro S. Solsoloy, both entomologists at the Crop Protection Department of the Cotton Research and Development Institute, Batac, Ilocos Norte, Philippines.

NEW IN PRINT

A trainer's guide for participatory learning and action by JN Pretty, I Guijt, I Scoones, J Thompson. 1995. International Institute for Environment and Development (IIED), 3 Endsleigh Street, London WC1H 0DD, UK. 267 p. ISBN 1 899 825 00 2. £ 14.95. (IIED participatory methodology series).
A long-awaited, comprehensive publication about training of trainers in the use of participatory methods. This manual is the result of many years of experience of IIED with Participatory Rural Appraisal (PRA). Much of this know-how has been condensed, in the second part of the book, in

over 100 games and exercises laid out in a visually very attractive manner. The first part of the book deals with general issues such as adult learning, group dynamics and team building. In addition, there are chapters on how to best perform as a trainer (not only a function of subject matter knowledge) and on participatory methods (semi-structured interviewing, diagramming, ranking). A very impressive work. (WB)

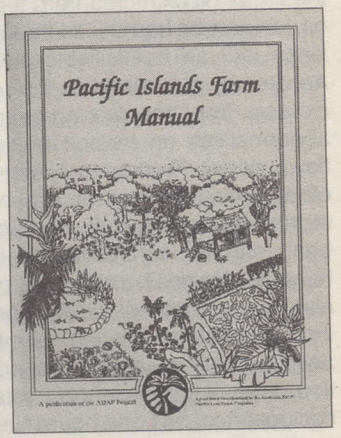
Traditional seed-saving practices in Northern Ghana and Central Malawi by M Wright, P Tyler. 1994. Natural Resources Institute (NRI), Central Avenue, Chatham, Kent ME4 4TB, UK. 55 p. (NRI Report ; R2102 (S)).
It has been estimated that for all food crops grown in developing countries some 80% are planted using home-saved seed, but little is known about traditional seed-saving techniques used by small-scale farmers. This report summarises the findings of surveys using rapid rural appraisal techniques, undertaken in two different agro-ecological areas of Africa, viz. northern Ghana (with a wide range of crops) and central Malawi (dominated by maize). This study, written in a clear style, touches on many aspects of seed-saving practices in different crops, such as seed selection, storage methods, viability assessment and choice between varieties. Furthermore, topics such as farmers' attitude towards risk, labour division between men and women, attitude towards improved varieties, local use of crops, commercial seed distribution and cropping patterns give a good insight in agriculture in general in these regions. Regarding seed-saving practices these surveys provided enough information to allow more general recommendations. (IHG)

Learning from Gal Oya
by N Uphoff. 1992. Cornell International Institute for Food, Agriculture and Development (CIIFAD). 448 p. ISBN 0 8014 2589 1. US$ 36.50. Cornell University Press, 124 Roberts Place, Ithaca, NY 14850, USA.
Tells the story of the successful rehabilitation of an obsolete and deteriorated irrigation system under very adverse conditions in a region in Sri Lanka. High population pressure and past resettlement schemes had led to a largely unfulfilled water demand and, hence, to many conflicts among farmers. Individual farmers' motivation and collective action were triggered through increased farmers' organisation. This is quite a voluminous book, with rare illustrations, giving a detailed overview of how the project evolved. As such, it is of interest to social scientists and development practitioners. It is not the kind of publications you can grasp easily by reading portions here and there. For instance, there is no handy summary, apart from the text on the cover. (WB)

Indigenous knowledge in resource management: irrigation in Msanzi, Tanzania
by O Mascarenhas, PG Veit. 1994. Center for International Development and Environment, World Resources Institute (WRI), 1709 New York Avenue NW, Washington, DC 20006, USA. 58 p. ISBN 0 56973 007 5. US$ 10.00. African Centre for Technology Studies (ACTS), PO Box 45917, Nairobi, Kenya. (From the Ground Up Case Study series ; 6).
A report of a field study undertaken in a village in Southwest Tanzania, Msanzi, examining a successful indigenous irrigation and water-drainage system. The goal was to analyse the factors that led to effective water management and to identify the policy options that could encourage other rural communities to make a similar progress. Irrigation in Msanzi was triggered off by local innovators as a result of a severe drought in 1966. The irrigation system was expanded after the villagization process of the '70s, which resulted finally in over-use and collapse in 1984. By 1988 a Rural Development Programme (RUDEP) and the village of Msanzi agreed to rehabilitate the irrigation and drainage system. The case of Msanzi shows a combination of local innovation, community leadership, favourable resources and external assistance. It leads to four recommendations: 1) improving traditional smallholder irrigation schemes 2) shifting to a participatory approach to irrigation development 3) strengthening local management of smallholder irrigation 4) improving information exchange between farmers.
Although this case is specifically Tanzanian, it also has general significance as it shows a community that successfully adapted its traditional systems to "modern" pressures. (IHG)

Village republics: economic conditions for collective action in South India by R Wade. 1994. International Center for Self-Governance, Institute for Contemporary Studies (ICS), 720 Market Street, San Francisco, CA 94102, USA. 238 p. ISBN 1 55815 387 X (pbk). US$ 14.95. ICS Press, San Francisco , USA.
Examines community organisation in villages in South India. The author studies conditions that must be present for villages to develop co-operative management of common resources. It becomes clear that rural communities are quite capable of making the best use of natural resources without state intervention. It has often been argued that such collective action would only take place in rare situations and that common property resources would normally be over-exploited. From this study, it appears that only those villages make an effort of collective management of natural resources where the need for this is most acute because of impending social conflicts and poverty. Interesting reading material for social scientists and development practitioners, but by no means a "light" book. (WB)

Pacific islands farm manual
N Glover, L Ferentinos (ed.). 1994. Agricultural Development in the American Pacific (ADAP) Project, Tropical Energy House, University of Hawaii, Honolulu, HI 96822, USA.



A collection of leaflets about crop production on Pacific islands, that have been published over time by the ADAP Project. There are sections on taro, tropical perennial vegetables, and cover crops, completed with leaflets on farm tree cultivation produced by the Nitrogen Fixing Tree Association (NFTA). The last section of the manual reports on on-farm research trials on taro intercropping and the use of cover crops for weed control. The language is practical and the manual is well-illustrated, with even nice colour pictures. Being a collection of leaflets from two different sources, lay-out and presentation are not

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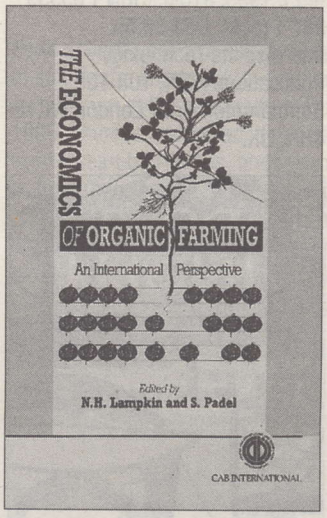
homogeneous throughout the publication, but this only presents a minor inconvenience. (WB)

Building on indigenous natural resource management: forestry practices in Zimbabwe's communal lands by J Clarke. 1994. Research and Development, Division of the Forestry Commission, PO Box HG 595, Highlands, Harare, Zimbabwe. 55 p. ISBN 0 7974 1407 X.
Describes how trees are integrated in indigenous farming in Zimbabwe. Woodlands have always been an important factor in survival strategies by smallholders, although this has been largely disregarded by government authorities, past and present. In the recent past, deforestation has become important, though. This is the result not only of colonialism, with its emphasis on industrial agriculture and its disregard for indigenous management of natural resources, but also of serious droughts and of increasing population pressure putting an enormous strain on the resource base. As a result, traditional conservation ethics are breaking down, being replaced, more or less successfully, by new legal enforcement. It is the value of this publication to provide detailed descriptions of ways in which smallholders manage available resources, allowing the development community to absorb these practices and spread them around. A very richly illustrated book providing the reader with much insight into Zimbabwean small-scale farming. There is much attention for participatory techniques in evaluating the merits of various tree species and social forestry practices. (WB)

Stressed ecosystems and sustainable agriculture by SM Virmani, JC Katyal, H Eswaran, IP Abrol (eds.). 1995. 441 p. ISBN 1 886106 14 2. US$ 80.00. International Science Publisher, 52 LaBombard Rd. North, Lebanon, NH 03766, USA.
Contains 34 invited papers presented during this international workshop and an overview of the major findings of the workshop. Those ecosystems are considered as stressed environments that are degraded or that cannot support their original communities without high external inputs. Such ecosystems are mainly found in the semi-arid tropics. The purpose of the workshop was to devise alternative systems of land management, that would restore degraded lands back to productivity, optimise natural resource use, and stabilise dryland production. The papers centred around the themes: global issues, resource base and related stresses, resource management to counteract stresses, sustainable resource utilisation and technology for mitigating stresses. The working groups produced recommendations regarding the need to develop farming systems for different agroecological zones, the need for assessment and monitoring of stressed agroecosystems and research needs in relation to reducing biotic and abiotic stresses. Although not a cheap book, it gives a good general overview of the present mainstream thinking and approaches on this subject, and has some interesting contributions. (IHG)

Livestock and sustainable nutrient cycling in mixed farming systems of sub-Saharan Africa by JM Powell, S Fernández-Rivera, TO Williams, C Renard (eds.). 1994. Vol. I: Conference summary. 50 p. Vol. II: Technical papers. 560 p.
ISBN 92 9053 294 7. US$ 40.00. International Livestock Centre for Africa (ILCA), PO Box 5689, Addis Ababa, Ethiopia.
The International Livestock Centre for Africa (ILCA) hosted a conference, where experts in livestock, nutrition and management, ecology, agronomy, soil science and socio-economics reported on various livestock feeding and nutrient-cycling strategies in mixed farming systems in sub-Saharan Africa. The papers presented dealt with issues related to how animals acquire and utilise nutrients for their productivity, the fate of nutrients excreted by livestock, methods to improve nutrient uptake and recycling and the social and economic processes that influence the availability of nutrient sources and flows in mixed farming systems. Resource management is discussed at field, farm, community and regional levels. Vol. I summarises the major discussions and recommendations of the conference, as well as the presented papers, vol. II contains the full texts of the presented papers, with each an abstract in French. (IHG)

The economics of organic farming: an international perspective by NH Lampkin, S Padel. 1994. Dept. of Agricultural Sciences, University of Wales, Aberystwyth, UK. 468 p. ISBN 0 85198 911 X. £ 49.95. CAB International, Publications Department, Wallingford, Oxon OX10 8DE, UK.



Examines the economics of organic farming, in a temperate zone setting. Most cases studied stem from European experiences. It is, to our knowledge, the first exhaustive study of this scope of economic aspects of organic farming. There is much attention for conversion from conventional to more sustainable farming methods, looking at specific problems encountered in this crucial transition period. The authors have given much attention to agricultural policies. This reflects the interest by governments in evolving towards farming systems that deal more carefully with environmental protection and resource conservation. Marketing of organic produce is also examined in detail, and rightly so. Identifying and penetrating new markets is vital for every farmer. Only by reorienting agricultural production towards actual market demand, can the organic farmer hope to achieve an economically viable business. An important book, which must be based on a lot of research. The target audience is primarily scientific and policy makers. It is an expensive book. (WB)

Crop production workbook for arid and semi-arid lands by V Gibberd. 1995. 131 p. Natural Resources Institute (NRI), Central Avenue, Chatham Maritime, Kent ME4 4TB, UK.
This book is based on the work of the Dryland Adaptive Research Project (DARP), which assisted small-scale farmers in the semi-arid lands of Kenya from 1988 to 1993, as part of the national Arid and Semi-arid Lands (ASAL) programme. It includes simple theoretical background, gives experiences of DARP's trials and stimulates experimentation by the farmers themselves, on topics such as planting time, soil fertility, soil moisture, pests and crop varieties, and soil conservation. Practical advice on how to set up an adaptive research programme is given. Although specifically written for the arid and semi-arid lands of Kenya, it may prove useful to other arid and semi-arid parts of the world with a few modifications and a bit of ingenuity. (IHG)

The future of community lands: human resources by E Ndione, Ph de Leener, M Ndiaye, P Jacolin, JP Perier. 1995. GTZ Supraregional Project "Natural Resource Management by Self-Help Promotion", Wachsbleiche 1, D-53111 Bonn, Germany. 236 p. ISBN 1 85339 248 0 (pbk). US$ 28.50. Intermediate Technology Publications (ITP), 103-105 Southampton Row, London WC1B 4HH, UK.
This detailed account of the experiences of the Research-Action-Learning Group (GRAF) of ENDA (Environment and Development Activities in the Third World) in Senegal traces the history of relationships between local people and external agents, both governmental and NGO. The cases refer to tree planting on community land in the Thiès area and dam building in the Kaolack area.

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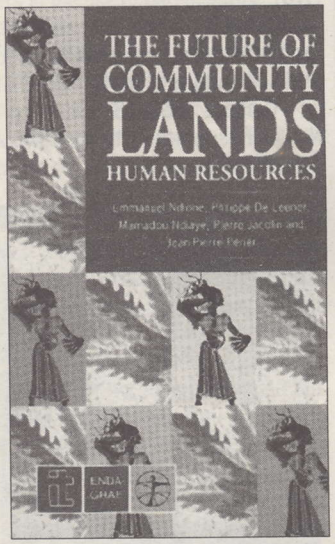
Differences in perception of natural resource management become obvious when tree planting in Africa is seen in the context of de- and afforestation in Europe: in the eyes of the Africans, trees were instruments of colonial domination. The fascinating history of development in the Thiès area, related by local farmers themselves, points to numerous indigenous projects, experiments and

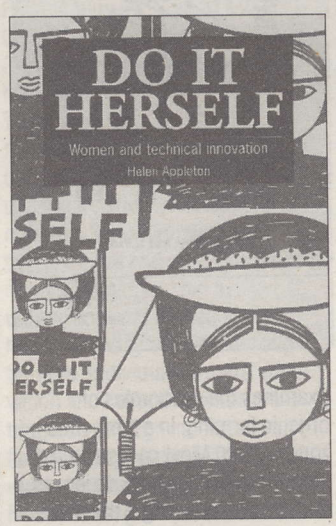


innovations without external assistance. The history is told from only one viewpoint; other ethnic groups in the area, such as the Fulani herders, might have enriched (and confused!) it. ENDA-GRAF makes a very honest and revealing analysis of the convoluted path of interaction between them and the various local interest groups, and uncovers the greatly diverse interests and power issues within each "community". Some very useful ideas for analysis of actors and motivations are given. Creative management of uncertainty and reflective analysis of failure and confrontation were important keys in the learning process by both villagers and fieldworkers. The book gives much food for thought. This publication originally appeared in French, but, strangely, the original is not mentioned. (AWB)

Formation de promoteurs d'élevage: guide méthodologique by J Thonnat. 1993. Vétérinaires sans Frontières, Espace Rhône Alpes Coopération, 14 avenue Berthelot, 69007 Lyon, France. 76 p. ISBN 92 9081 09 39. Technical Centre for Agricultural and Rural Co-operation (CTA), PO Box 380, 6700 AJ Wageningen, The Netherlands.

A small handbook for training animal health workers in developing countries, based on the experience of the NGO Vétérinaires sans Frontières (VSF) in Guatemala. Although the title refers to animal husbandry, the content of the training is very much focused on animal health. It is not meant as a training model but rather to give ideas for reflection by trainers designing courses relevant for their own situation. It includes some useful training tips and tools, and a very strong section on the planning of training programmes. (AWB)

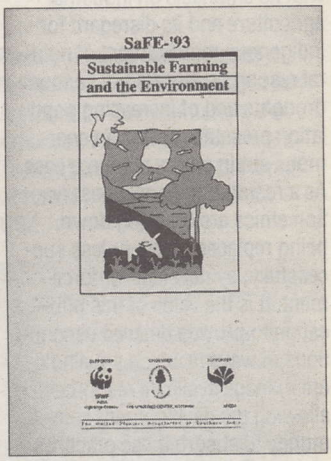
Do it herself: women and technical innovation by H Appleton (ed.). 1995. 310 p. ISBN 1 85339 287 1 (pbk). US$ 28.50. Intermediate Technology Publications (ITP), 103-105 Southampton Row, London WC1B 4HH, UK.



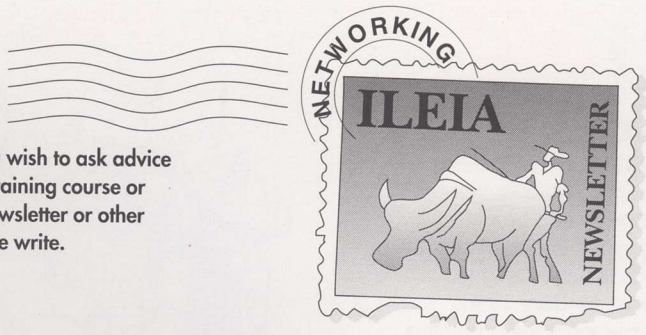
Studies a number of case studies on how technical innovations by women at grassroots level take place and which effects they have. In most cases, such innovations take root in a situation in which women have fewer rights and resources and in which their achievements are not highly valued. In many development projects, this gender focus has not been identified sufficiently, leading to situations in which women not only did not profit from new technology but actually saw their position deteriorating as a result. Also, innovations generated by women remain invisible and local and are not considered at their proper value, but merely as changes on a domestic level. To name but one example, women's contributions to subsistence farming have consistently been underestimated in comparison with men's involvement in cash-crop production in many parts of Africa. This book does justice to experimenting women, often outside the scope of official projects and the successes obtained by them in local settings go well beyond the traditional boundaries of their own homes. The descriptions of technologies are practical, detailed and in simple language. (WB)

Women and water-pumps in Bangladesh: the impact of participation in irrigation groups on women's status by B van Koppen, S Mahmud. 1995. Department of Irrigation and Soil and Water Conservation, Wageningen Agricultural University (WAU), Nieuwe Kanaal 11, 6709 PA Wageningen, The Netherlands; Bangladesh Institute of Development Studies, E-17 Agargaon, Sher-e-Bangla Nagar, GPO Box 3854, Dhaka 1207, Bangladesh. 174 p. ISBN 90 6754 414 0. Dfl 25.00.
Since the early '70s, mechanised lift irrigation pumps in rural Bangladesh have become available to NGO-supported groups of poor people, to use the water for irrigating household land and/or for sale. In this book, the findings of research on gender-specific participation of poor people in irrigation groups in Bangladesh is presented. It focuses on the impact of women's involvement in irrigation on their economic, social, educational and psychological status. This study included 35 female and mixed-sex irrigation groups, supported by 6 different rural development agencies. The approach by the NGOs, the group characteristics and the main aim of the enterprise, appeared to have a strong influence on the outcome. In female-managed irrigation enterprises, in which male relatives are only financially involved, women's status improved considerably. On the other hand, where women were merely intermediaries for loan taking, it resulted only in a limited impact on their status. General policy recommendations are formulated to broaden programmes supporting women's conventional income-generating activities. The book is very readable, not in the least by the mix of facts and research findings with life histories and quotations from interviews of women involved. A Bangla version of this report is also available. (IHG)

SAFE-'93: sustainable farming and the environment. 1994. 216 p. UPASI R&D Centre for Rubber, Union Club Road, Kottayam 686 001, Kerala, India.



As the introduction tot the proceedings of this workshop says: a workshop by farmers and for farmers. From looking at the programme and the participants' list, one might get a different picture: out of 10 sessions, only one had been reserved for farmers to speak out ... The workshop dealt with a wide range of issues in relation to crop production: eco-philosophy, pest management, holistic farming, genetic resource conservation, renewable energy, marketing and policy issues. That is a lot to cover in one workshop of three days, with 43 presentations in 10 sessions for 400 persons. Still, the collected papers contain much valuable information about farming practices, both on small-scale and larger-scale levels, in the Indian setting. (WB)



NETWORKING is open for (short) contributions from readers. If you wish to ask advice from other readers, or if you wish to announce a workshop or training course or if you just want to react on articles that appeared in the ILEIA newsletter or other hot news items related to sustainable agriculture, please write. We may have to shorten submitted contributions.

Botany - what's in it for drylands development?

This symposium organised at the Royal Botanic Gardens in Kew, UK on 5 July 1996 will focus on the role of botany in drylands development, and explore practical ways of integrating botanical expertise on useful plant resources with that of other disciplines. It is aimed at a wide audience from NGOs to scientists, especially those who want to cross bridges into other fields. For example, how can plant scientists help NGOs and others to contribute to the local implementation of the Convention on Biological Diversity and the Convention to Combat Desertification? How can species-based information be incorporated into multi-disciplinary development plans? What data are needed, and by whom, and what is the best way of presenting and distributing them? Where do local people meet the policy makers, and scientists the funders? Kew Gardens will give information on its Survey of Economic Plants of Arid and Semi-Arid Lands database and the role of the Kew Seed Bank in the *ex situ* conservation, distribution and utilisation of tropical dryland species.

The symposium is part of a five day conference on "Plants for Food and Medicine". Some funds are available for attendance and travel costs fro e.g. NGO delegates at the Dryland Symposium.

For full conference details please contact: The Linnean Society, Burlington House, Piccadilly, London W1V 0LQ, UK. Fax +44 171 2879364; email: marquita@linnean.demon.co.uk.

Symposia on Farming Systems Research and Extension

The worldwide symposium of the Association for Farming Systems Research-Extension (AFSRE) will be held in Sri Lanka, 11-16 November 1996. The purpose is twofold: to encourage debate on several themes of general interest to the farming systems community and to strengthen the farming systems profession and stimulate linkages among farming systems practitioners in order to develop agricultural sectors and in particular resource-poor and food insecure households. There will be thematic workshops on trade and policy issues, on empowerment, on household food security, on methodological issues and on systems questions to basic disciplines. Forum discussions will focus on e.g. agroecosystems and alternative frameworks for monitoring farming systems development, sustainability indicators, farmer perceptions, gender issues, indigenous knowledge, human resource development for Farming Systems Approaches and changing roles of institutions. The call for papers will be distributed soon.

The European Group of AFSRE will hold its second symposium in Granada, Spain, 27-29 March 1996. The intention is to intensify discussions between social sciences and bio-agro-technical sciences. Workshop topics include designing sustainable agro-ecological systems, integrating social and technical perspectives in natural resource management, making the most of agri-ecological diversity and local knowledge, policy and institutional development and training.

Further information: Werner Doppler, University of Hohenheim, Institut für Agrar- und Sozialökonomie in den Tropen und Subtropen (490), D70593 Stuttgart, Germany. Fax: +49 711 4593812.

Biotechnology and development monitor scholarship programme

The *Biotechnology and Development Monitor* offers several 4-month, part-time scholarships to enable young professionals from developing countries to improve both their knowledge regarding socio-economic developments related to biotechnology and their writing and editing skills. For this programme they are looking for suitable candidates. Since 1989, the journal has reported on socio-economic and policy issues related to developments in biotechnology which are of special interest to developing countries. They would like to come into contact with people who can combine this part-time scholarship with already planned work or education in the Netherlands. The scholar should come from a developing country and intend to work there in the near future, be available for 2 to 3 days per week for a period of 4 months, demonstrate an interest in socio-economic or political issues concerning biotechnology and development and have a good command of English.

The closing date for the coming scholarship is 1 January 1996.

Contact for further information: Biotechnology and Development Monitor, Oudezijds Achterburgwal 237, 1012 DL Amsterdam, Netherlands. Fax: +31 20 525 2086; email: monitor@sara.nl.

Food security and innovations. Under this title a number of case studies of successful and failed innovations will be discussed at an international symposium at the University of Hohenheim, Germany, 11-13 March 1996. Themes addressed include the generation of innovations (agricultural research priorities, endogenous innovations) and the role of national agricultural research, diffusion processes (institutional requirements and determining factors), the impact of innovations at farm/household level, and approaches/methods fro evaluating innovations, their diffusion/acceptance and impact. Unfortunately, the deadline for sending in papers has passed, but further information can be obtained from:

Prof. Dr. F. Heidhues, Institute for Economic and Social Sciences in the Tropics and Subtropics, University of Hohenheim (490), D-70593 Stuttgart, Germany. Fax: +49 711 4592582; email: fadani@ruhvm.rz.uni-hohenheim.de. Information through Internet: http://www.uni-hohenheim.de/ www490a/transfer.html.

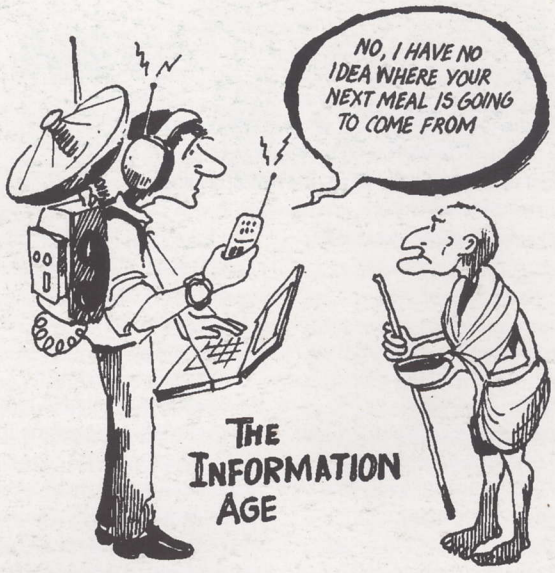
Tip on weeds

"I just did a fast browsing through your last ILEIA Newsletter. Weed management (not eradication or poisoning) has all my sympathy for a number of reasons, so I will read it with great interest. In the meantime allow me to send you a tip. A few years ago in Zambia a friend who knew my biases gave me this "Field guide to important arable weeds in Zambia" published in 1983 by R. Vernon at the Mount Makulu Central Research Station, Dept. of Agriculture, Chilanga, Zambia. It shows 53 "weeds" with a photo of each, scientific and local names and short notes on recognition, distribution, importance, similar weeds, as well as uses. It also shows pictures of seedlings of the most important "weeds". It does not discuss weed control, since, as written in the introduction, "recommended methods of control particularly those involving chemicals change more quickly than the weed flora." I hope this might help you and other readers.

From Robert E. Brasseur, Parkstraat 217, B-3000 Leuven, Belgium. Email: robert.brasseur@asro.kuleuven.ac.be

PTD Circular

The fourth issue of this update on publications, videos, conferences and training opportunities in participatory methods is scheduled to appear in January 1996. This issue includes a training module from **La Canasta Metodológica**, a manual for training of local "agricultural promotors" in Nicaragua by SIMAS (Servicio de Información Mesoamericano sobre Agricultura Sostenible). If you are interested to receive this publication, please inform Marika van de Brom at ILEIA.



Source: **Down to Earth, a science and environment fortnightly**, published by the Society for Environmental Communications, 41 Tughlakabad Institutional Area, New Delhi 110 062, India.

Renew your subscription for 1996

In the heart of this issue, please find a new subscription card. If you wish to continue receiving the ILEIA Newsletter in 1996, please take some time to answer the questions and send the card back to us as soon as possible. The questions are meant to get to know you better so that we can better respond to your interests. Thank you!

ILEIA Newsletter on Internet

Many of our readers will have heard about the possibilities offered by the Internet. The Internet is a network of computer networks. The number of computers having access to the Internet has increased enormously over the last few years. This growth has not been limited to developed countries: various countries in Central and South America and Asia have shown a tremendous increase. In Africa, there are still few countries that provide Internet access, but this is expected to change over the next few years. ILEIA has plans to make information available via the Internet. This information can be read on a so-called Home Page, a window through which a number of information items can be consulted. At this moment, we are thinking about which information to make available and how. For example, the ILEIA Newsletter could allow Internet users to gain access to all articles, past and present and also to select articles on a certain subject. It will also give readers a chance to react to articles directly. We definitely do not intend to publish this electronical journal instead of the paper version, but rather as an extra option, allowing non-subscribers to access the information in the Newsletter. All this is as new for us as for most of our readers and it will take time to make the ILEIA Home Page operational. We hope to be able to start within 6 months from now. Please write us about your fears and hopes in this respect, and about any good ideas you might have. Our electronic address is: ileia@ileia.nl

Future issues

The July 1996 issue will focus on agriculture in humid lowlands. For this issue we are looking for articles from the Philippines as well as from other regions in the world with similar agroecological conditions. Apart from overview articles describing the trends in farming in these environments, we are looking for contributions on subjects like

- indigenous technologies and livelihood strategies, like integrated rice-fish farming
- access to the market and how it influences agricultural production, the role of agroindustries and how they influence village food supplies, their influence on variety selection and genetic erosion
- the role of livestock (important means of transport and soil preparation, livestock and gender, interaction with crops)
- migration to towns and lowlands
- farmers´ organisations, how they evolve and enhance or limit the development of sustainable agriculture, women´s organisations, their role and potential
- the role of NGOs and universities as the public service outreach systems shrink
- the influence of religion, imported faiths (evangelists) and local cosmovision
- lowland irrigation (e.g. new projects following age-old indigenous technology, or modifications on imported technology)
- experiences in communication (radio, magazines, farmers' contests, cultural festivals)
- local terminology for resources
- herbal medicine and traditional healthcare
- and any other interesting experiences relevant for development of sustainable agriculture in the humid lowlands

If you're interested to contribute, please send us an outline of your article before 1 March 1996. Detailed guidelines are available from ILEIA.

Next issue

Vol.12 No.1 "Mountain valleys" is scheduled to appear end March 1996.

BACK COPIES of the ILEIA Newsletter are available: (US$ 5)

Vol.3/No.2:	Diversity
Vol.4/No.3:	Participatory technology devt
Vol.4/No.4:	Enhancing dryland agriculture
Vol.5/No.1:	Discussion on sustaining agriculture
Vol.5/No.2:	Intensifying agriculture in humid area
Vol.7/No.1/2:	Assessing farming techniques
Vol.7/No.3:	Learning for sustainable agriculture
Vol.7/No.4:	Searching for synergy
Vol.8/No.2:	(reprint) Let's work together
Vol.8/No.3:	Livestock sustaining livelihoods
Vol.9/No.1:	Keep rolling
Vol.10/No.2:	Caring for our land
Vol.10/No.3:	Wastes wanted
Vol.10/No.4:	Farming at close quarters
Vol.11/No.1:	Room for farmers
Vol.11/No.2:	Research and reality

(issues not listed are out of print)

Also available: **Participatory Technology Development in sustainable agriculture: an introduction**. 1989. 40 pp. US$7.50. Third World readers may request a free copy.

ILEIA PO Box 64 NL-3830 AB Leusden Netherlands