

# ILEIA NEWSLETTER

FOR LOW EXTERNAL INPUT AND SUSTAINABLE AGRICULTURE



**CARING FOR OUR LAND**

# 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 1994.

**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 international workshops; and supporting regional networks in the Third World.

The opinions expressed in the articles do not necessarily reflect the views of ILEIA.

Readers are encouraged to reprint or translate articles with acknowledgement. Please send a copy of any reprint or translation to ILEIA.

**COVER PHOTO:** Villagers of Mwanga district, Tanzania, use a model as tool for discussion and planning how best to utilize their land. The model is made of paper and glue and fitted on a table. The full paper in which this approach is described can be obtained from ILEIA (see contributions). Photo: Fungameza-Fischenich.

## DEAR READERS

*Some farmers manage to increase their yields and maintain this higher level by keeping more animals that graze non-cropped land and produce the manure needed for the farms. But what will be the long-term effects of this practice for sustainability of the grazing areas and, thus, of the farms? In the concern for sustained yields of individual plots and farms, questions such as these are often overlooked. Resources outside the farm, be they grazing land, forest, rivers and their banks, often play a crucial role in ensuring smallholders' survival. The challenge for us is to include this perspective in working with farmers, to match up with their holistic vision of their entire livelihood system.*

*The natural resources beyond the farm are often called the "commons". Cases in this Newsletter show that access to these resources has been regulated by different degrees of community control. Now that indigenous systems for managing the commons have come under increasing pressure, the challenges facing them are enormous. Not only agroecological challenges, about which so much is still unknown or heavily debated, but especially challenges to help communities to adapt, recreate or develop new ways of managing their resources in the face of changing conditions.*

*Privatising the commons is clearly not the answer. Nor is putting all commons under government control. Any organisational model imposed from outside will do more harm than good. Effective arrangements can be developed only if they grow out of indigenous concepts and practices of resource management: the principles of LEISA and PTD applied in local institutional development.*

*We salute the very few programmes, some reported in this Newsletter, which manage to combine sound agroecological analysis and activities with openness and sensitiveness to decisive institutional and cultural issues and challenges.*

The editors





Photo: Andrew Campbell

## Landcare in Australia

Over 2000 voluntary groups are working to develop more sustainable systems of landcare. This means over 2000 different approaches to counter ecological, social and economic stress. In Australia, communities develop their own approach, breaking away from limiting notions such as "top-down" or "bottom-up".

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Photo: Lars Johansson

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Photo: Fungameza - Fischerlich

## Caring for our land

*Until now, ILEIA has looked mainly at questions of agricultural sustainability at the level of plots or farms. However, to maintain such sustainability and for their survival in general, many farmers depend on resources beyond their farm. This issue looks at the wider landscape of which individual farms are a part: how rural communities organise the use of natural resources in their territory to ensure that they can continue to live from the land.*

### Editors

**F**armers depend on and affect resources on and around the land they cultivate. These resources "beyond-the-farm" are often known as the commons, which may include forests, wastelands, pastures, riverbanks and fallow lands. There, villagers gather plant matter for mulching or collect fertile soil to enrich their land. A very important role is played by animals grazing or stalled with grass from uncultivated areas, as farmers use the manure to maintain or enhance soil fertility. Jodha (1991) estimates that small and marginal farmers in India would lose on average 72% of available draft power and 39% of animal manure if they had to rely on their private land alone.

The rights to use certain areas of land for cropping or grazing animals, for collecting tree products or for using the local natural resources in any other way are regulated by resource tenure systems. The rights for different uses of a resource at different times of the year or in different years may

be allocated to several individuals or groups. For example, one individual may have grazing rights to a piece of land, which is subject to the hunting rights of another, the transit rights of a third and the temporary cropping rights of a fourth. Community tenure systems may even include the possibility of granting use rights to members of other communities. There are a multitude of different land tenure regimes, finetuned to the needs and situations of different communities. They play an important role in sustainable agriculture by preventing over- and mis-use of natural resources.

### **Roles of common land**

Outsiders, especially those who grew up in systems with widespread private ownership of land, often regard areas controlled by communities rather than individuals as "commons" from which each person extracts as much as possible before the next person can. Thus the misconception arose of the "tragedy of the commons", which supposedly faced inevitable degradation. Too little was known about the regu-

lations which governed the use of these commons and "institutionalised" their sustainability.

Rist shows how the land-tenure regime of the Aymaran people in Bolivia secures continuity of production and maintains social and economic stability. Here, an experiment with privatising the commons had to be stopped, as management of the private farms could not be finetuned to the extreme ecological conditions of the Andes mountains. For communities who have to survive under such difficult conditions, collective management of natural resources plays a pivotal role in permitting sustained use of the available land with minimal effort and risk. In this case, the common land-tenure regime makes it possible to maintain the fertility of arable land while preventing crop damage by free-ranging animals. The rotational allocation of land is organised to adapt the cropping sequence to climatic fluctuations.

Stroosnijder and Turner demonstrate the importance of common land under similarly difficult ecological conditions. In semi-arid West Africa the spatial and temporal variability of rainfall is very high. Herds have to follow the rains to make optimal use of the available vegetation. This demands great flexibility of land use, which only common land-tenure regimes can provide.

### **Roots of continuity**

The strength of traditional landuse systems is their focus on continuity in the interrelated web of earth, plants, animals, humans and spiritual world. In the minds of

people, landuse systems have their ethical but also their "folk-scientific" roots. The way people perceive the physical and spiritual world around them is reflected in the institutions that regulate resource use, not only land tenure but also landuse practices such as rotation systems, timing of cultural practices and duration of fallow periods. Religious ceremonies often provide a fixed calendar for planting of crops, as one example. This combination of motivation and regulations ensures that farmers respect the rules that provide the basis for their survival.

### Degrading forces

Lack of attention or misconceptions by development planners about traditional landuse systems can lead to enforced changes that degrade common property resources. But also population increase forces people to claim common land for private farming, leaving an ever decreasing area to provide fuelwood, fodder and nutrients. Intensification of cropping requires increased use of manure, forest litter etc. The commons then become overexploited.

In many cases indigenous ways to manage common resources have been seriously undermined. Increased market orientation and changing consumption patterns are also triggering privatisation, as well as disrespect of traditional authorities and indigenous knowledge. Where specialisation and "modern" farming techniques have been adopted and a shift was made from subsistence to market-oriented production, land use and tenure have also changed. The growing influence of world religions and market economy, as Bunyard argues, has led to "desacralisation" of local spiritual systems and thus the collapse of many indigenous land-tenure regimes.

States have often assumed control over resources by drawing up new land laws and forest codes which deny customary landuse rights and authority. Common land has been converted into state land. However, most governments have neither the human nor the financial means to manage the environmental capital. As a result, what used to be communally controlled land becomes open-access land ("free-for-all"), subjected to unregulated use by migratory and poor people with no rights to privatised land. Thus a vacuum is created: landusers do not know which rules prevail, or effective rules are completely lacking.

In other cases, governments have granted private individuals or firms rights to exploit natural resources, without the consent or sometimes even the knowledge of the community living there. Apart from the inequitable nature of such policies, they have fixed individual rights to many areas where common management is necessary for productive and sustainable land use. As common-property regimes often evolved in more marginal and vulnerable areas, inappropriate changes in land tenure can lead to more rapid degradation

than when relatively "high-potential" land is privatised.

### Constructive forces

Population increase does not always lead to land degradation. As the example in the semi-arid Machakos District of Kenya (Tiffen et al 1994) shows, it can open up new ways to intensify collective management of natural resources. This does not automatically mean that more external inputs must be used. Improving the use of the available resources often has, for economic and ecological reasons, higher priority. Turner argues that, in semi-arid West Africa, it is possible to build on the diversity of indigenous strategies for intensification, eg, by modifying manure and rangeland management on common and private land. Researchers are called upon to support such an approach by enhancing insights into underlying processes and generating further low-external-input options.

Landuse arrangements which make it possible for communities to reclaim control over their resources and to derive benefits from improved resource management are pre-conditions for intensification based on better use of local resources. Mlenge shows that this can be achieved by revitalising traditional institutions for resource management.

Stroosnijder stresses that good management of natural resources is a precondition for any intensification based on increased and more efficient use of external inputs such as chemical fertilisers. He also points to the importance of expanding local markets to increase demand and availability of external inputs and consumer goods at lower prices and hence to stimulate farmers' interest to intensify production and improve landcare. However, Rist and Bunyard indicate the dangers of increasing market involvement and "modernisation". This is obviously a point of debate.

### Organising landcare

Where natural resources are becoming scarce or degraded, farmers are increasingly prepared to defend their interests and to take action to improve landcare. They demand not only return of the land, forests and waters that were taken from them, but also greater say in decision-making and powers to limit external influences which endanger sustainability of their livelihoods. At the same time, governments, especially in Asia, increasingly recognise their limited capacity to control land and some are now ready to negotiate with local resource users to take over at least some responsibilities in land management. This has led to numerous new initiatives such as participatory land use planning, watershed management and, in francophone areas, *gestion des terroirs villageoise*.

Several articles in this issue describe successful experiences with such

approaches. They share an explicit interest in what happens beyond the cropland and include the use of the commons in the planning process. All mention the importance of local control over resources and benefits, strengthening of local institutions and capacities, and cooperation between communities and government. Continual monitoring, learning, searching, adapting and reorganising is needed for the evolution of livelihood systems.

### Choices and challenges

As the focus area of such action, the watershed concept - although logical from a biophysical point of view - may not always be the best choice. For strategic reasons, smaller areas such as individual villages could be chosen. Institutional considerations also play a role in this choice. For instance, what areas do villagers themselves consider manageable? One option is to concentrate on establishing or strengthening local institutions first (Shah). However, the article of Brombacher and van Dijk shows that starting with simple entry-point activities and letting institutions develop around these can also be a promising approach. When local institutions are created or revitalised, they will interfere with local governments. Therefore, the division of responsibilities, financial resources and revenues needs careful consideration.

Another challenge is how to really give a voice to the marginalised farmers in the participatory planning process. Brombacher and van Dijk focus on successful farmers, who are likely to be the most powerful in the community. In contrast, Joldersma and Fane focus on the community as a whole. The most effective approach will doubtless differ according to situation.

As Stroosnijder pleads and Campbell shows in practice, a multitude of approaches is needed, leaving ample room for adjustment and private initiatives according to local variations in culture, history and management. There is no blueprint for standard procedures and ideal organisational forms. Even in a single village, it is unlikely that one local organisation is suitable for handling all concerns in natural resource management. At each specific site, in a step-by-step approach to enabling better local-level landuse management, a different complex of institutions will grow out of indigenous organisational concepts and practices. Planning land use becomes facilitating landcare in all its diversity.

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- All other references are to articles in this Newsletter.

The Andes region is one of the zones with the highest ecological diversity in the whole world. This diversity also exists at watershed level, which means that frequently very distinct agroecological zones can be found within the limits of a single community. Despite the often extreme ecological situation, about half of the Andean population lives in this mountainous area which covers only 20% of the country. To overcome the ecological limits to production of food and goods, a high level of organisational, social and technological creativity is needed. The peoples of the Andes have developed production systems which seek a dynamic equilibrium between society and nature. Respect for ecological principles and integration of cultural, ethical and agrotechnical dimensions strongly contribute to this equilibrium. This explains the sophistication and sustainability of Andean "agri-culture".



Photo: Hans Carlier

## The Aynokas: sustaining agri-culture

**Stephan Rist**

The *ayllu* (administrative land unit) of San Antonio de Mujlli, in the department of Cochabamba in Bolivia, lies between 3700 and 4500 m above sea level. It has a surface of 18,415 ha on which about 270 families or 2400 Aymaran people live. The climate has a rainy season from December to April, the annual precipitation is about 700 mm and the average temperature is 8°C. The *ayllu*, which covers more or less a watershed, is subdivided into four parts or catchment areas. Each part is again subdivided into 10-13 vertical sections known as *aynokas*. Each *aynoka* has its own characteristics in terms of ecology, microclimate and production, intimately known by the inhabitants. All land is communal property and decisions concerning access to land are taken at community level.

The agricultural system of the Aymaran is based on a rotation of one year potatoes, followed by one year quinoa (*Chenopodium quinoa*) or canahua (*Chenopodium pallidicaule*), one year barley or oats and 7-10 years of fallow. Each year in a particular *aynoka* only one type of crop is grown. This means that all the families have to sow, for example, their potatoes, quinoa or barley in the *aynoka* destined for that purpose. Barley and oats, which because of the altitude do not produce seeds, are used as fodder. During the fallow period, the *aynokas* are converted into communal pasture with free access for all the families year-round.

Because of the huge ecological variability, the yields vary according to their location: the yields of potatoes vary between 5000 and 15,000 kg/ha, whereas quinoa produces 800-900 kg/ha in prosperous years and canahua around 1200-1500 kg/ha.

### Private complements common

The sequence of rotation of the *aynokas* is decided at community level. The rotation is generally consecutive unless climatical or agroecological characteristics, such as soil fertility reached during the fallow period, make it advisable to skip an *aynoka*.

In each *aynoka* a family has the right to cultivate a minimum number of plots with different agroecological conditions. Depending on the ecological variability, the families use between 15 to 55 plots in one *aynoka*. As these plots are the same as they or their parents cultivated previously, the families consider themselves "owners" by way of a temporary right of usufruct. The community can redistribute land use rights yearly, to equip all the families of the community with sufficient land for food production. Although the total area of land per family varies, the area per family member remains relatively constant. Distribution of land is the task of the traditional authorities. These posts, which are occupied by the older, more experienced men of the community, are subject to annual rotation.

Since ancient times, the families have not only cultivated the plots of the *aynokas*, but have also received other land from the community which is excluded from the *aynoka* rotation. These lands, called *sayañas*, are

usually close to the houses and are surrounded by stone or mud walls. They are used by the families to complement the production of the *aynokas*. Cultivation and rotation is free but, like the *aynoka*, the *sayaña* can be redistributed if it is no longer used.

Apart from complying with the crop rotation, the family has sole responsibility for crop production. This means that the family takes autonomous decisions regarding management, technology, use and destination of their production.

### Social reciprocity and the market

Another characteristic aspect of Andean communities are the interfamily relations, which are based on the principles of reciprocity, complementarity and redistribution. A number of agreements exist which, in essence, mean a redistribution of productive resources, based on the family requirements as a function of its life cycle. If a family possesses more land than it can cultivate with its own labour force, it associates itself temporarily with another family which has an excess of labour force. Thus complementing each other, both families can increase their production. The products obtained are then distributed between the two families (see Fig. 1).

As soon as the fields are harvested, the dry and cold period begins, when agricultural activities become impossible. This is why most families pursue off-farm activities. Relatives and friends are visited in bordering, lower-lying valleys, where cheese manufactured in the rainy season is exchanged for maize, rice and coca leaves. Money can

be earned by selling one's labour in the urban centres and agricultural industries, but as such work is available mainly during the cropping season, few people migrate to seek it.

As families have access to products from other families and communities and labour force can be assigned for reciprocity, the need to participate in the market is reduced. Despite the links between peasant communities and the market, the logic of the market economy has only limited influence on the landuse system.

### Built-in risk avoidance

As plots within an aynoka vary in elevation by about 200 m, each sector has a high diversity of microclimates. If the indigenous climatic forecast indicates a dry year, the plots are located in the higher parts where it is more humid. In rainy years, to minimise problems with fungal diseases, the lower plots are given priority, as they are warmer and drier.

The difference in elevation between the lowest and highest aynoka is about 500 m. The inhabitants indicate that this characteristic must have been considered by their ancestors when they established the order of rotation. The highest aynokas are normally cultivated during the driest years, and the lowest aynokas are cultivated during the more humid years. There is a certain correlation between the cycle of rotation of the aynokas and the long cycle of macroclimatic conditions. By making use of the ecological diversity, climatic risks are minimised.

The controlled rotation combined with long fallow periods is also a strategy to avoid losses caused by plagues and diseases. One of the most severe problems in plant health in the Andes are the nema-

todes, whose population is drastically reduced during the long fallow periods.

### Crop-livestock integration

The integration of crop and livestock production is a factor which strongly influences the agroecological sustainability of the system. Raising livestock means a diversification of activities, which increases the food security. It actively influences the flow of nutrients and the dynamics of soil fertility. The accumulation and application of animal manure permits nutrient transfer from the pasture lands to the cultivated plots. In accordance with the level of fertility reached during the fallow period, each potato plot receives organic manure at planting time. The amount varies in quantity and quality, depending on availability and the requirements of the different varieties. Figure 2 shows the nutrient cycle for a highly productive tuber crop. The nutrient balance shows that the applied organic manure not only covers the requirements of the first crop but also favours the following crops which are not fertilised.

With regard to optimising the use of human and animal labour, the rotation of potato - Andean grains - cereals is the best option. After a fallow period of seven years, much energy is needed to bring the plots back into cultivation. After removal of the heavy vegetation, the land is ploughed. Harrowing must generally be done two or three times with plough and oxen. The plot is then ready to be planted with potato. As planting, earthing-up and harvesting the potatoes involves turning the soil each time, the land becomes sufficiently loose for sowing quinoa/cañahua in the following year.

### Stock redistribution

Livestock-keeping is a family responsibility. The llamas, sheep, donkeys and some cattle graze freely in the whole territory of the community, except for the aynokas during the period when they are cultivated.

A first analysis of animal ownership per family shows a marked differentiation. Some families have only 15 animals, while others have up to 120 head. However, if animal ownership is analysed in relation to the number of persons in each family, the degree of differentiation is reduced drastically. This again leads to the conclusion that ownership and hence access to the common lands is, in the first place, adapted to the needs of each family.

Redistribution of animals is not a communal decision, but takes place mainly by inheritance and gifts. When a couple forms a new family, the man inherits part of his father's land, while the woman receives some animals from her family and relatives. Thus, the young family has both land and animals. According to the growth of the family, it gains access to more cropland and the initial herd will multiply.

### Strategies to control overgrazing

In many research studies, signs of overgrazing have been found. Demographic growth is the main reason for the increase in animal population. Unlike the arable land, the pasture land cannot be extended. This leaves two options to avoid agroecological deterioration in the medium term: either reduce the number of animals or increase the supply of fodder. The first would not be very viable because it would reduce the total production of each family. Therefore, some 20 years ago, the community autonomously started to grow barley and oats to increase the production of fodder. This has

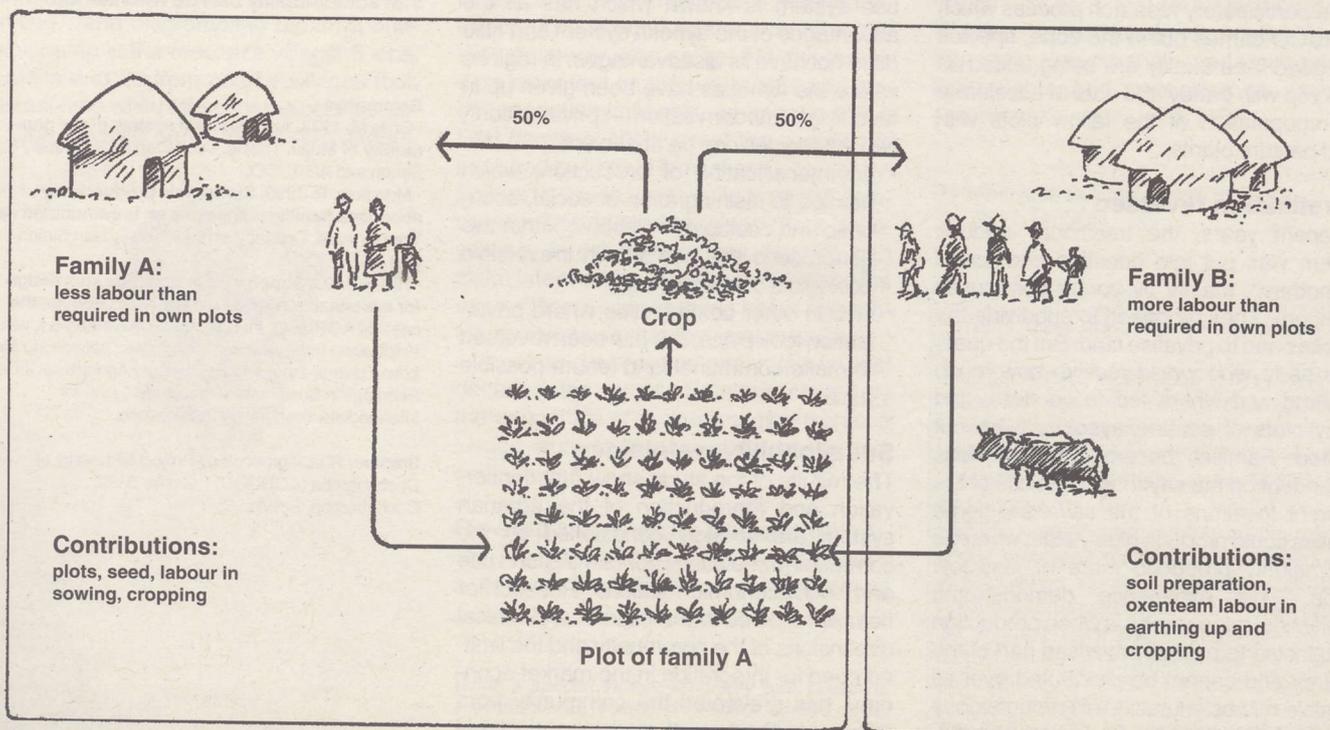


Figure 1. Functioning of the waki - a social relation of reciprocity between families.

Source: Mendieta, 1993.

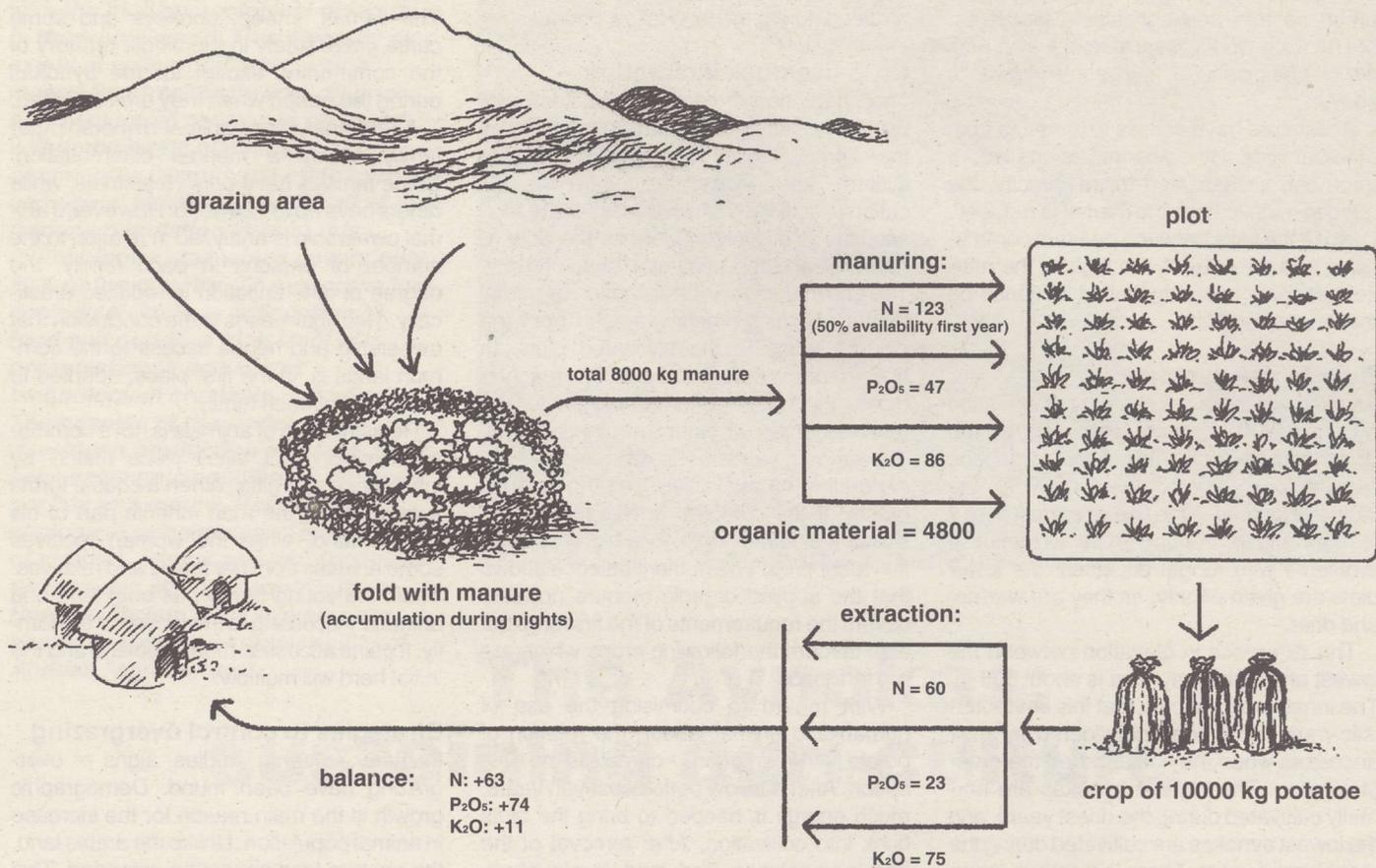


Figure 2. Transfer and balance of nutrients from the livestock to the cultivation of sweet potatoes (in units of kg/ha).

increased feed supply by about 12% (Jerez 1989). Lately, there has been a tendency to substitute barley by oats, as this produces more dry matter (5 t/ha rather than 2-3 t/ha).

In a participatory research process which AGRUCO carries out in the zone, species with good feed quality are being tested as intercrop with barley and oats to accelerate the repopulation of the fallow plots with good pasture plants.

### Privatisation reversed

In recent years, the traditional landuse system was put into question and called "unmodern", mainly by young community members. They proposed to subdivide the aynokas and to privatise land. But the questions as to who would receive how much cropland and where led to conflicts, and many plots of potatoe aynokas were not planted. Families became more or less dependent on the sayañas. Because of the different locations of the sayañas, some families could produce high yields, whereas the majority produced more or less low yields. This experience demonstrated clearly how dangerous it is when production is restricted to a small privatised part of the territory and cannot be distributed over all possible microclimates in this mountainous terrain. For this reason, in February 1994, the community - with the agreement of the

young farmers - decided to stop all privatisation and to strengthen the aynoka system again.

Until today in Bolivia, no alternative land-use system is known which has all the advantages of the aynoka system and also does not have its disadvantages. In regions where the aynokas have been given up in favour of "modernisation - privatisation", two tendencies can be observed:

- an intensification of production, which has led to disintegration of social, economic and ecological relations; within two generations this has shown irreversible ecological consequences;
- also in other communities where privatisation took place, this has been reversed to make communal land tenure possible again.

### Sustainability maintained

The results of the study show that conservation and reproduction of the agrarian system are strongly conditioned by the community regulations concerning land use and socioeconomic relations. Respect for nature, reflected in the cultural and ethical dimensions of the community and the limited need for integration in the market economy, has prevented the community from falling into the trap of modern agricultural development. As long as the traditional

system of social and ecological ethics and community regulations functions and the community succeeds in adapting its farming system to population growth, it is expected that sustainability can be maintained.

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# Revival of customary landcare

Wendelin Mlengi

**T**he Sukuma are agropastoral cattle-keepers who also grow food crops and cotton. Over the last 60 years, the State has tried to stop land degradation in semiarid Sukumaland by compulsory destocking, erosion control and tree planting, but without success. The villagisation scheme in the 1970s was justified by planners as replacing an exploitative indigenous system by intensive landuse, replacing "traditional" ignorance by "modern" knowledge.

## Research by "insiders"

In July 1992 a team of local researchers set out to study local knowledge, attitudes and practice (IKAP) related to natural resources in Bariadi District. The team consisted of a former chief well versed in the culture and good at creating *Mhola* (Sukuma for good relations); a school-teacher with a prodigious memory in oral history; a party youth leader with good organisational skills; a woman shopkeeper knowledgeable about local plants; and a community development woman keen in listening. All came from the study area. The Tanzanian forest officer who initiated the study was in the team, but had little influence as he did not know the local language. A Swedish consultant and a 2-person film crew from Dar es Salaam accompanied the team.

During four weeks in the field, informal groups came together for discussions, mapping, transect walks, tree inventories, ranking, venn diagramming etc. In a one-week camp in the teacher's village, 5 local persons and 20 from nearby villages took part full-time while others came occasionally. One meeting drew over 1000 villagers.

*A forest officer in Tanzania shows that traditional institutions able to regulate landuse can be revived by "insiders" through participatory action research. These institutions can be re-empowered if policymakers recognise customary rights and accept diversity.*

Special meetings were held with musicians, medicine (wo)men, herbalists, village leaders, pupils and traditional age-set groups.

The study revealed opportunities to promote sustainable landuse through local institutions which previous research had overlooked. The team discovered a wealth of local knowledge on plants, soils and ecology and developed new understanding of how this is learned and shared within the community. Customary institutions which regulated access to natural resources came to light, including a Sukuma practice of enclosures for natural regeneration, which had been disrupted during villagisation.

## The dagashida

The potentially most powerful customary institution is the *dagashida*, an assembly which formulates law and sanctions villagers who violate it. The *dagashida* is open to all men in the community. The middle age-set of men in their early 30s organises a *dagashida*, announces the agenda and maintains order during meetings.

Everybody can speak if he follows the rules. First, the youngest age-set negotiates publicly about the issue until they reach consensus and make a recommendation. The second age-set continues in the same way, and so on. Finally, the elders comment on the arguments and recommendations of each age-set and give a final decision. Violation of the decision is punished by fines in form of cattle or money. Failure to pay leads to exile from the community. This procedure gives great transparency in decision-making. Nobody can claim later that he was not informed of the rules. Often a song is made about *dagashida* decisions so that they are recalled.

As state governance expanded in past decades, the range of matters settled by the *dagashida* shrank to magico-religious issues and organising defence against cattle raids.

## Re-empowering the dagashida

The team asked the responsible age-set if a special *dagashida* on environmental

*When a special village assembly was called on environmental issues, the elders agreed to let women attend and speak out - contrary to traditional practice.*

issues could be arranged and advocated that women take part, as issues important to them would be discussed. After initial hesitation, the elders in the three villages approached agreed to invite women, more or less as a trial.

The first *dagashida* was a small neighbourhood one. The second was in a village where the *dagashida* is still held regularly. The third was in the teacher's village. Here, no *dagashida* had been held for 18 years, and the elders had to teach the procedures before the meeting. In all three cases, the villagers proposed:

- that the *dagashida* resume responsibility in regulating access to natural resources and that District authorities withdraw in these issues;
- sanctions on blocking cattle tracks and grazing cattle on fields without consent of the person with crops there. This was especially important for women, who leave food crops in the field after harvesting the main crop;
- recognition of tree tenure by those who use the land for farming and grazing.

## Policy support

Appropriate policy would offer a chance for resource management by *dagashida*. A policy workshop in Tanzania called for land tenure reform to evolve from recognition of customary rights and acceptance of diversity. When the *dagashida* results were discussed with District authorities, they agreed to bring about the suggested changes in resource control. However, there is a risk that they become over-enthusiastic and start to use the revived *dagashida* as a tool to meet their ends. Reinforcing the *dagashida* implies reducing state interference and recognising local rights and capacities to manage resources.

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## Forests Trees and People Programme

A longer version of this article, describing the action research in more detail, appeared in the Nov. 1993 Newsletter of the Forests Trees and People Programme (FTPP). A video film presenting this work is available in Kiswahili and English.

FTPP supports the sharing of information about improved methods of planning and strengthening community forestry activities. For more information about how to obtain copies of the programme's newsletter and the more than 40 other publications and videos (available in English, French and Spanish) contact: FTPP, IDRC, Box 7005, S-75007 Uppsala, Sweden, Fax +46 18 671209.

# Bringing back the balance

## Alternative economics for the Colombian Amazon

**F**ifty years ago 38 million hectares of Colombian Amazon were covered in closed rainforest, but colonisation has left as much as 6 million hectares converted into poor quality pastures for cattle ranching. Concern over the deteriorating state of the rainforests in Colombia has undoubtedly contributed to the government initiative in granting indigenous community rights to the land. Indeed, through resurrecting old colonial laws, and through the new Constitution, indigenous communities in Colombia have full rights to live according to their traditions and customs on their own land. The basis of land rights resides in territories known as *resguardos* in which indigenous peoples own communal, inalienable rights. Thus, the State cannot capriciously bring about the dissolution of the *resguardo* nor parcel it out without coming into direct conflict with the laws of the Constitution. Equally, since the land is held communally, individual members of the community cannot acquire or sell off any part of the *resguardo*. More than 18 million hectares of the Colombian Amazon have now been transferred into indigenous hands, comprising some 50,000 people from 59 different ethnic groups.

### Land use

The forest throughout vast areas of Amazonia has been transformed through human activities. Indigenous knowledge of medicinal properties of animal and plant products, their use of a wide range of different tree species and vines for construction of traditional communal dwellings or *malocas*, bows, arrows, blowpipes and canoes indicate a long history of interaction with their environment. There is evidence too of specific areas made fertile - *terras pretas* - through the composting of wastes and forest litter. Walschburger and von Hildebrand (1988) found that a small community of Yucuna, living beside the lower reaches of the Caquetá River, use at least 16 types of ecosystem to furnish them with their basic necessities. In the orchard, covering some 2-3 hectares around the communal *maloca*, they cultivate fruit trees such as avocado, papaya, lemon and mango. Meanwhile the nearby forest provides materials from some 168 different plant for a great number of purposes. This same area also provides game, especially small animals and birds. Further from home, the Yucuna families go to hunt and to collect materials not avail-

**Market economy systems, often in the name of "development", have caused serious damage to the rainforest, not only destroying the resource basis for a sustainable livelihood for forest people, but undermining traditional economies of reciprocity and exchange. However, recent governments in Colombia have set about encouraging traditional use of the land by indigenous peoples, not least in its share of the Amazon Basin.**

**Peter Bunyard**

able in the nearby forest. The nearby lake provides fish during the summer months when the waters are low, while the *cananguchales*, areas that are permanently or seasonally flooded, are important for the *canangucho* tree (*Mauritia flexuosa*), which bears nutritious fruit and attracts game.

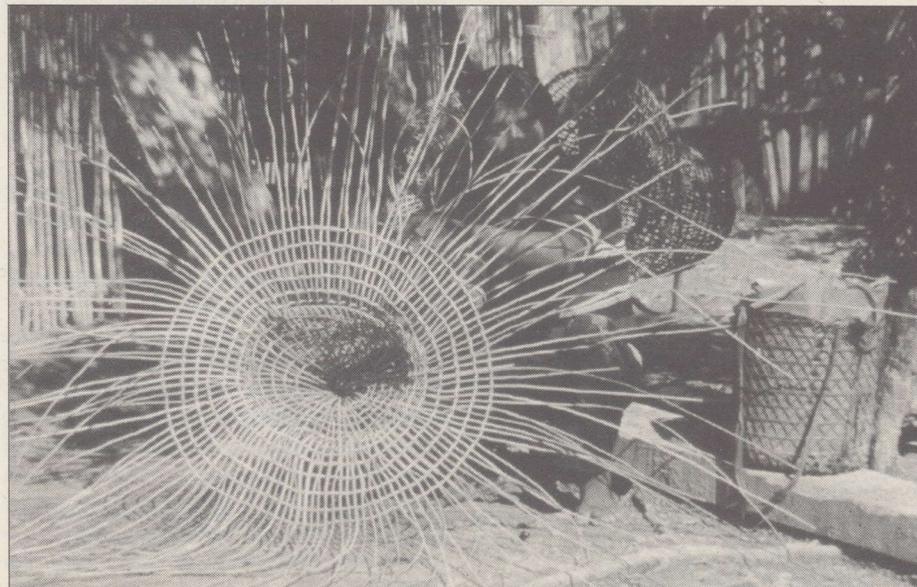
### Mimicking nature

The *chagras* or garden areas where the Indians grow a variety of crops, form a relatively small part of the territory the Indians need to subsist. Since they can be used for 2-3 seasons at most before being abandoned, the area around the *maloca* is dotted with *chagras* at different stages of regeneration. The Yucuna make their clearings in primary forest which must have little understorey and relatively few surface roots, since well-developed root mats hinder clearing and indicate a nutrient-deficient soil. Natural clearings appear when a few trees fall, leaving open spaces

of up to 500 square metres. Many trees in the lower storey survive the fall of the larger trees and protect the soil from direct sunshine while letting enough light through to stimulate the rapid germination of pioneer species that lie dormant in the soil. A natural clearing also harbours many animals which bring in the seeds of woody species in their excrement. In contrast, when the Indians create their *chagras* they fell all the trees and the sudden insurgence of direct sunlight kills young plants and stunts the growth of others. About three months after cutting down the trees, the Indians fire the fallen wood, killing the shoots of many pioneer species. However, to encourage regeneration, they purposefully do not burn or cultivate the boundaries of their clearings. Regeneration is also enhanced through the planting of fruit trees attracting birds and bats which bring in seeds of a variety of woody plants. Recent studies of the movements of birds and bats validate the Indian's practice of keeping the size of *chagras* to approximately half a hectare, since if the clearings are too big, the animals will not venture into them. Rather than create one large *chagra* to provide more food, the Indians create one or more new ones.

### Reciprocity and exchange

Embedded in the indigenous view of the world is the notion that each living part of the rainforest must be given the opportunity to exist in order to sustain the integrity of the whole. Without that wholeness will come disease, disaster and death. Martin von Hildebrand, who as Head of Indigenous Affairs under President Virgilio Barco in the late 1980s was responsible for the creation of *resguardos*, spent several



Witoto chief uses forest resources to make a fish trap for the Igaraparana river.

Photo: Peter Bunyard



*Witoto women making crafts for sale. Options for alternative economics?*

Photo: Peter Bunyard

years in the 1970s as an anthropologist with the Tanimuca Indians of the Upper Piráparaná. He reported on the Tanimuca view of nature as participating in an intricate network of exchanges and reciprocity. The Tanimuca interpret living forms as the external manifestation of an entity, *fufaka*, which they translate as *thought*.

*Thought* emanates chiefly from the Sun. Each group of animals, plants and people needs a certain amount of thought to survive. Guardians see to it that each group has enough thought and that nobody takes more than their share. For example, the ant-eater is guardian for all hunted animals and the tapir for wild fruit. The guardian of human is the jaguar-man or shaman. When people or other living creatures become sick and die, they release thought which then can recycle and be trapped by animals, plants or indeed people. When people hunt or collect plants they must do so under the direction of their guardian or shaman so as to obtain thought or energy for their group. However, if a person consumes too much of a certain plant or animal, his thought will become visible to the guardians, who will then hunt him down. On the basis of his negotiations with the guardians, the shaman tells his people where and what they can hunt as well as how much. Permission varies with the seasons, with the animals, their reproductive cycles and the use they make of different areas of the forest. All this leads to effective control over the communal demand for natural resources.

The dynamic of the forest and the interchange of matter between one species and another, including that of the life-force, provides the Indian with a ready model of his or her existence within the community. Hence the local economy, both within the community and with neighbouring communities, relies heavily on the principle of exchange and reciprocity both among themselves and with the rest of nature. Contrary to the system engendered by the

market economy, in which a person's status increases with his wealth and possessions, personal accumulation is considered anti-social and to be deplored. On the contrary, surpluses serve to establish relations informally within the community and more formally with neighbouring communities invited during rituals and festive occasions, or when there is heavy work to be done, such as to make new chagras in the forest or to construct a new maloca.

### Commercialisation

The problem, which is not unique to the Amazon, is to equate products that can be obtained from the forest for manufactured industrialised goods. The consequence of disparities between the "value" of imported goods versus those that can be locally produced - namely artifacts from the forest - may lead to excessive exploitation of the forest as well as to exploitation of the indigenous peoples themselves. At worst the demand for commodities from the rainforest - products such as rubber or fish from whitewater rivers such as the Caquetá - have led to systems of debt-bondage whereby locals find themselves bound for life to a trader.

Through missionaries and priests, indigenous communities entered into trade for goods that cannot be produced within the rainforest and have now become necessities. In return the communities are expected to abandon their traditions and ultimately their beliefs and take on christianity. But the priests and missionaries have not been content with simple conversion and, with rare exception, require that the entire traditional lifestyle be abandoned. The large community houses - the malocas - are usually the first cultural symbols to be destroyed, since these represent the traditional cosmology of the community and the authority of the traditional leaders, including the witch doctor. Also the practice of shifting cultivation and supplementing the basic diet with hunting,

fishing and gathering is likely to be transformed into a more sedentary existence. A loss of respect for the traditional leaders and hence a breakdown of community itself goes with a loss of tradition.

The communities have begun to address the problem of resolving the best way to satisfy their needs. Within the context of the market economy the answer would be simply that the communities must find a market for goods that they can produce from the land, whether timber, minerals, medicines, nuts, rubber or fish. But the forest's very heterogeneity and extraordinary diversity makes any gathering an extremely labour-intensive process. Transportation too, especially in the Colombian Amazon where many rivers are not easily navigable, can be a problem and transport by air is hardly a viable option, given its high cost. On the other side of the coin, imported goods, which are brought in by air, have a very high cost relative to their cost closer to the lines of international and national trade up in the Andes. The communities would therefore have to operate in the market with a heavy handicap. This imbalance is a fundamental reason for the debt-bondage relationship that became the norm throughout many parts of the Amazon.

### Alternative economics?

Martin von Hildebrand has suggested a very different approach whereby essential goods are acquired through a relationship that mirrors the surplus/exchange mechanisms that were traditional. What would the indigenous communities gain? First, assistance, both legally and politically in protecting the areas under their authority. Second, the space granted to them and held by them would enable them to continue to live, if they so wished, within the traditional norms rather than those imposed upon them by a commercial world. Third, in order that their remaining "outside" the market economy did not penalise them in terms of goods forgone, a means would have to be found of meeting their essential needs. As their part of this reciprocal bargain, the indigenous communities would conserve and protect large areas of rainforest. This conservation should be seen as an essential service, given the dire necessity in today's world to protect the rapidly dwindling natural resources of the planet.

This article is based on *New responsibilities: the indigenous people of the Colombian Amazon*. 1993. The Ecological Press. Copies available from the author (£20 p&p incl).

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# Improving land care in West Africa



Photo: Ann Waters-Bayer.

*As author of numerous studies on agricultural improvement in semiarid areas, Leo Stroosnijder highlights various important issues here. Limitations of space do not allow detailed analysis of these issues, but his statements should stimulate further discussion.*

**Leo Stroosnijder**

**R**ainfed agriculture in the West African Sahel is in transition between shifting cultivation based on renewable resources and more permanent farming with addition of external inputs. Typical for this transition is that arable farmers are now also starting to keep livestock. This rapid change in land use and farming systems was triggered by land degradation (Stroosnijder 1994).

Farmers are well aware that their natural resource base is deteriorating because of

nutrient depletion. They have responded in two seemingly contradictory ways: intensification and extensification. They became interested in animal husbandry primarily to move nutrients, in the form of manure, from common property areas to their own plots. By fertilising the fields immediately around their dwellings ("champs de cases" or "compound farms") the drop in grain yields could be halted on at least part of their land. However, they do not have enough organic fertiliser and time to intensify the use of all their land in this way. Therefore, at the same time, they expand their area under shifting cultivation.

This has led to a decrease in rangeland area at a rate twice as fast as population growth and to lower fertility of this land. This over-exploitation of both range and arable land leads to chemical and physical degradation because the organic matter content of the soil is depleted and runoff and erosion increase (Stroosnijder 1992).

## **Agricultural intensification**

Intensification of farming systems can halt further environmental degradation and increase food security. Although the need for selective intensification is widely recognised, it is not known where and how to start and how long it will take. At present Sahel farmers produce mainly for subsistence, except in some regions where cash crops like cotton and groundnuts are grown. Labour productivity is low, chemical fertilisers and pesticides are expensive and only profitable to produce cash crops. Demand at domestic and international markets is low, as are prices. Thus, farmers have no incentives to produce more than for subsistence. This results in low national food security and little income from trade or export.

The only demand and supply market that can and should be developed is the local market. Farmers should be able to sell their surplus over subsistence needs at local market so that they can use revenues to buy "modern" agricultural technology. Development of local markets, eg. by stimulating rural crafts and small-scale industry or by increasing demand by import substitution, is the key to technological change.

Agricultural intensification starts earlier in areas with relative land shortage, i.e. in areas with high population density (Tiffen et al. 1993). It might even be a condition for making such intensification work that the population density surpasses a certain threshold. Landuse planning (Stroosnijder et al. 1994) may help to indicate whether a certain concentration of farmers is needed to surpass a threshold for development and can indicate where such concentration is most likely or viable.

## **Water and nutrient management**

The Sahel is characterised by short-duration, highly variable, intensive rainy sea-

sons. Still, nutrient shortage more often limits crop yields than water shortage, except where nutrients are conserved or added to the system. Therefore, a balance between water and nutrient conservation must be sought, such as in Burkina Faso where the use of stone bunds combined with compost pits is showing great promise.

Where possibilities for such on-site conservation are limited, water and nutrients from a larger area (the catchment) can be concentrated on a smaller area. The introduction of permeable dams in valley bottoms is an example of this type of concentration (Vlaar 1992).

### Common range and private plots

As long as chemical nutrients are not readily available, farming systems should be maintained and further developed in which communal lands provide nutrients and water for private arable plots. In northern Burkina Faso each hectare of rangeland with 50% annual runoff may provide 25 kg of plant-available nitrogen to arable land.

The importance of communal rangeland as supplier of nutrients implies that the management of this land must receive the same priority as arable land. There is an urgent need for applied research on the mixed farming systems now developing in the Sahel. Experiments by farmers with more intensive forms of livestock-keeping (supplementary feeding, zero grazing) should be stimulated to test their viability and sustainability.

### The role of sheep and goats

Traditionally, cattle are the most important animals in the Sahel, and they continue to serve a variety of purposes, including that of a savings account for smallholders and investment by the urban rich. However, sheep and goats are becoming increasingly important in more settled forms of livestock-keeping and create new opportunities for integrated farming systems. A gradual shift is expected from the savings to the production goal, so that the number of animals will drop while production increases. This requires year-round availability of fodder of medium quality, which cannot be supplied by annual grasses only. Therefore, farmers will shift to (leguminous) perennials like trees and shrubs.

### The role of trees and shrubs

Trees and shrubs play a crucial role both in controlling environmental degradation and in developing mixed farming systems. The many beneficial effects of trees and shrubs are well known by local people and development workers, but the introduction of woody species is hampered by the recognition that they compete with crops for water and nutrients. However, this view is too simple and short-term. With more woody species in the system, more rainfall will be used effectively (in transpiration instead of evaporation), producing cover

and biomass that can halt the further decline in organic matter content of the soil, which has caused the present physical land degradation and low recovery of chemical fertilisers.

More use of trees and shrubs should be made on the communal range as well as on farmers' fields. In the latter case, trees and shrubs will indeed compete with crops, but this should be compensated by agricultural intensification leading to sufficient production increase on the remaining arable land. Nurseries should produce the species that farmers want. In a survey in Ethiopia, among the 10 most desired species only two were grown in nurseries.

### Farmer-driven development

The production technology that farmers use is constantly developing under influence of exposure to outside knowledge. There is no strict separation between "traditional" and "modern" knowledge. National guidelines for agricultural intensification, essential as they are, are not sufficient to trigger actions by millions of farmers. In combination with national planning, a bottom-up approach must be taken.

Recently an experiment was started in Ethiopia with farmer-driven technology development. The underlying idea is that each farmer has some idea of how to earn a little more money by selling some produce at the local market. The experiment honours such initiatives by providing tailor-made assistance.

Only one Development Agent (DA) maintains the contact with any one farmer. The DA is a local person who knows the local language and conditions and takes ample time to gain the farmers' full confidence. The DA is supported by an multidisciplinary expert panel guaranteeing the quality of the assistance, creating an individual package for each farmer. The confidence between farmer and DA leads to



Development of local markets is a key to technological change in agriculture.

informal implementation contracts to which both parties contribute.

### Combination of approaches

Most suggestions for development in the Sahel present polarising opinions, shifting from one extreme to the other or advocating one approach above another. Only few plea for room for a variety of approaches (Blokland & Stroosnijder 1994): bottom-up and top-down, implementation and research, indigenous techniques and "modern" ones. Gradually, the multitude of approaches should merge into a flexible continuum where analysts at the regional level play a role as important as researchers and DAs in the villages, and where ample room is left for adjustments and private initiatives according to local variations in culture, history and management.

The complexity of development demands an interdisciplinary approach, for which methods are being rapidly developed. An example is landuse planning, which has evolved from a centralised process done by experts far from the field to an integrated, interactive process (Fresco et al. 1994), often achieved simultaneously at national, regional, village and household level. Working in a multidisciplinary team on interdisciplinary issues requires an open mind, modesty with respect to one's own discipline and respect for other disciplines.

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# Grazing options to intensify land use

*Farmers' practices in managing livestock and crops vary greatly. Matthew Turner stresses the importance of analysing this variability to see what opportunities these practices provide for maintaining soil fertility and intensifying land use.*

## Matthew Turner

There is a long history of interaction between mobile herders and settled agropastoralists in the West African Sahel. Livestock managers provide manure and draft power to farmers through a number of different economic arrangements. Many observers feel that a fuller integration of crop and livestock husbandry would be a viable low-input strategy for sustainable agricultural development in the semiarid tropics. There are obvious limitations to the much promoted strategies like manure harvesting and mixed farming on privately owned and managed farms. But what other options do farmers have where chemical fertilisers are not available?

### Limits of manure harvesting

Traditionally, farmers pursue mixed strategies to maintain the fertility of their croplands. Important components of their strategies are fallowing and "harvesting" manure. With fallowing alone, a minimum fallow/cropland ratio of about 5:1 (20%

cropland) is needed to maintain productivity. Under increasing land pressure, harvesting manure from grazed rangeland is often promoted as the way to intensify land use. But analysts have found that, in many parts of semiarid West Africa, there is not enough rangeland to maintain the fertility of continuously-cropped areas through manuring alone.

Such conclusions are based on comparing regional noncropped/cropped ratios to sustainable Rangeland Cropland Ratios (RCR). These are calculated by multiplying the estimated annual nutrient deficit of cropland (kg/ha/yr) by the ratio of the carrying capacity of the range (ha/Tropical Livestock Unit [TLU]) and the annual nutrient excretion by livestock on cropped areas (kg/TLU/yr). Estimated values range from 10-240 ha of range to sustainably support 1 ha of cropland through manuring (Schlecht et al. 1993; Swift et al. 1989, van Keulen & Breman 1990). It is thought that a combination of reductions in livestock productivity, manure quality, crop productivity and pasture productivity will occur with lower RCRs. After some time, this will lead to reduction in continuously-cropped area and local presence of livestock. These calculations place a ceiling on manure-supported cropping fractions (4-9%) well below that of total cultivation fractions currently in many areas of the Sudanian zone.

There are many uncertainties in the parameters for calculating RCRs, and other strategies of managing soil fertility are not included. Nevertheless, although the

sustainable RCRs will be considerably lower than normally calculated, such estimations support arguments that the potential to increase the area of continuous cropping or to increase productivity levels without additional soil fertility management strategies is limited in semiarid West Africa (van Keulen & Breman 1990). However, such calculations have provided surprisingly little insight into appropriate policies and technologies to maintain or increase productivity under existing and growing population densities and income levels.

### Other options needed

Inorganic fertilisers or feed supplements and settled mixed farming are often seen as the most promising options to intensify cropping. However, inorganic fertilisers have been adopted only to grow cash crops such as cotton and groundnuts. Application on food crops is economically not attractive, among other reasons, because of unfavourable pricing.

Many observers have felt that, induced by population growth, a fuller, more reliable and less volatile integration would occur if livestock and cropland were jointly owned and managed by family units on mixed farms (McIntire et al. 1992). The settled mixed farming model has become the dominant model of agropastoral organisation promoted by development practitioners. However, its record of adoption has been limited on account of labour shortages, fluctuating livestock ownership and inadequate animal-keeping or cropping skills in the individual households (Niamir 1990).

What other options for intensification do farmers have?



*Animals transfer nutrients from grazing land to cropland where they are kept overnight. Such manure management practices can be combined with other low-external-input options to maintain soil fertility.*

### Analysis at village level?

A major reason behind the large variation in sustainable RCR estimates is the great difference in assumptions made about agronomic and livestock management practices. These differing assumptions do not result from inaccurate information about the "farming system" but rather reflect the high local variation in management characteristics that affect fertility maintenance.

Each of the three major components of sustainable RCR calculations are sensitive to agronomic and livestock management. Cropland nutrient deficits are affected by agronomic practices such as the extent of weeding, interannual regimes of applying manure/urine, ways of working manure/urine and crop residues into the soil, removal of crop residues, and ploughing. The amount of excretion-bound nutrients deposited on cropland per animal unit is affected by management decisions concerning herd composition, crop-residue grazing, transhumance and where the livestock stay overnight. Rangeland carrying capacities, while often treated as biophysically-determined, depend greatly on herd composition and the temporal and spatial patterns of grazing pressure, all of which are affected by livestock management decisions.

Therefore, while much of the debate on sustainability of farming in West Africa has revolved around regional land use, very little attention has been given to the variability of those management practices that significantly affect the efficiency of nutrient cycling. The importance and variability of management practices become very clear when analysis is made not at the regional level but rather at the village level where land use decisions are made.

### Opportunities in management

To illustrate this point, let us consider the importance of grazing management by analysing different options practised by two neighbouring villages in southeast Niger. These two options can be explained by using a simple model of village land use.

Around the village, circular zones indicate the three main types of land use: manure-supported continuously-cropped land near the village, surrounded by a ring of unmanured fields and fallows, and rangeland at the outside. For simplicity, assume that all land outside the continuously-cropped zone is open for grazing and the village can regulate its livestock population to maximise manuring potential. This ignores differences in management between unmanured fields and rangeland and assumes no externally-imposed boundary.

The grazing perimeter for the village's livestock is determined by the nocturnal location and effective grazing radius (GR) of its herds. The effective grazing radius is influenced by livestock species and herding practice. The area with continuously-

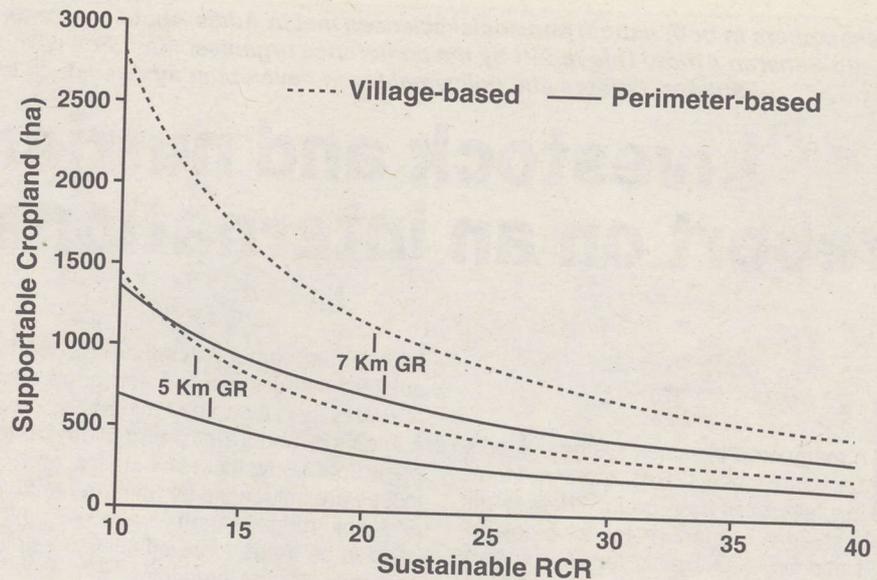


Figure 1. The relationship between supportable continuously-cropped area to assumed sustainable rangeland-to-cropland ratio (RCR) as predicted by a simple landscape model. Different types of grazing management are reflected in two different grazing radii (5 and 7 km) and whether animals spend the night at the edge of the continuously-cultivated perimeter (dotted lines) or in the village (solid lines).

cropped land is determined by dividing the grazed area by the assumed sustainable RCR. Figure 1, based on the data from the two villages, shows how two different cases of grazing radii (5 and 7 km, which is about the maximum GR) and nocturnal locations (in the village and at the perimeter of the continuously-cropped zone) can affect the amount of continuously-cropped land which can be supported by the manure.

The interesting feature of this simple model is that it shows that, over a wide range of sustainable RCR (eg. 20-40), the supportable continuously-cropped area is determined more by the livestock management options taken by village households than by the sustainable RCR itself.

### Conclusions

Estimations of sustainable RCRs have demonstrated the limits of manure harvesting as a strategy for improving soil fertility management. As long as inorganic fertilisers and/or feed supplements are not affordable in West Africa, farmers have to maintain soil fertility with local resources. The false promise of privatised settled mixed farming has indirectly reduced the management options available to livestock owners. It provided justification for government indifference towards protecting transhumance corridors from encroachment by settled farmers, despite the fact that greater herd mobility has become more necessary in heavily cultivated areas because less pasture is available there.

An over-reliance on regional-level analysis has obscured the potential for improved fertility maintenance through changes in livestock or cropland management. Among villages and households, there is large variation in those management practices that are so important for fertility

maintenance. This variation results from differences in production goals, knowledge and access to resources, eg. land and labour. Better analyses of these management practices is needed to gain a better understanding of which management practices are applicable when and where. Also other options for managing soil fertility, such as harvesting sediment and improving fallow vegetation with leguminous fodder crops, need further attention. More efficient nutrient management with existing resources can be promoted by participatory research to better define production goals and constraints, followed by an interactive network of small-scale development projects.

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*Researchers in both natural and social sciences met in Addis Ababa to examine the role of livestock in nutrient cycling in sub-Saharan Africa. This report by the conference organiser Mark Powell indicates the strategies they have chosen to support farmers and policymakers in developing more sustainable food production systems.*

# Livestock and nutrient cycling report on an international conference

**Mark Powell**

In many crop-livestock systems in sub-Saharan Africa (SSA), more nutrients are taken out than go in. There is not enough animal manure for all cropland, and access to inorganic fertiliser is very limited. Innovative strategies to manage crops, livestock and soils are needed to increase food production. The International Livestock Centre for Africa and its co-sponsors (see box) held a meeting to review the state of knowledge on nutrient cycling in mixed farming and to identify research priorities to improve the role of livestock in nutrient cycling.

In an initial overview, nutrient cycling patterns were found to vary greatly across ecological zones, among different animal species and crop combinations, among different groups of farmers, and between years and seasons. Researchers must recognise this diversity and the potentials within each specific farming system.

Five sessions dealt with: how animals use nutrients, the fate of the nutrients they excrete, methods to improve nutrient capture and recycling, modelling flows in mixed farming systems, and socioeconomic influences on nutrient cycling.

## Plant-animal-soil interactions

In the session focused on nutrient intake and use by ruminants, papers addressed nutrient harvesting from rangelands, including the effects of range productivity, animal nutritional status and supplementary feeding on nutrient intake and excretion. The extent of "nutrient mining" is not yet well understood. Some participants thought that transferring nutrients from grazed pasture to manured fields has long-term negative effects on mixed farming systems. Others disagreed. The cut-and-carry system in Indonesia, based on forages from field boundaries, roadsides etc, has been operating for 200 years. Nutrient inputs and outputs were found to be balanced in a rangeland studied in Mali. Where such nutrient balance is found, the internal checks and balances must be understood before starting research to improve them.

Nutrients must be added to sustain crop yields on the inherently infertile soils of SSA. Since animals are part of many farming systems, their manure is a low-cost source of nutrients. The fertilising value of manure depends on several factors, eg. its

total nutrient content (dependent on fodder quality), manure storage and application practices, and the rate of mineralisation of nutrients in manure into inorganic forms for plant uptake. Nutrient mineralisation and losses are influenced by manure handling and soil management practices, which need to be made more effective in capturing and recycling nutrients.

Agronomic aspects of intercropping forage and food legumes with cereal crops were also examined, including the effects of legumes on forage quantity and quality, animal performance and soil fertility.

## Modelling to guide decisions

Models were designed to answer the question: how can plants, animals and soils be managed to replenish nutrient losses from cropland? Based on technical parameters from farming systems in Europe, the Sahel and Kenya, the nitrogen input/output relationships between animals, trees and crops were estimated by tracing the movement of organic materials within the systems. Besides simulating how various combinations of inputs affect soil nutrient status, the models predict cropland productivity and the amount of range needed to support enough animals to produce enough manure. Combined with economic data, these models indicate the financial returns to different input combinations.

## Scenarios for development

Socioeconomic studies ranged from low-input millet systems in the Sahel to inten-

sive high-input maize-coffee-milk systems in the Kenyan highlands. Manure supply is affected by factors such as herd size, grazing rights to communal range, and access to manure exchange contracts with mobile herders. Better manure management depends on available labour to collect, process, transport and spread manure on fields and cash to build animal enclosures and to buy animals and carts for transport. Viable returns from this investment depend on market prices and infrastructure.

Two scenarios were envisaged. One involves making nutrient cycling more efficient by mobilising on-farm resources, eg. legume fallows, soil conservation, better manure management. The other involves more reliance on external inputs such as fertilisers, mechanisation and small-scale irrigation. Both scenarios may converge when population density raises land values, making investments in fertility maintenance profitable. Better access to markets and greater inflows of non-farm income would also help the intensification process.

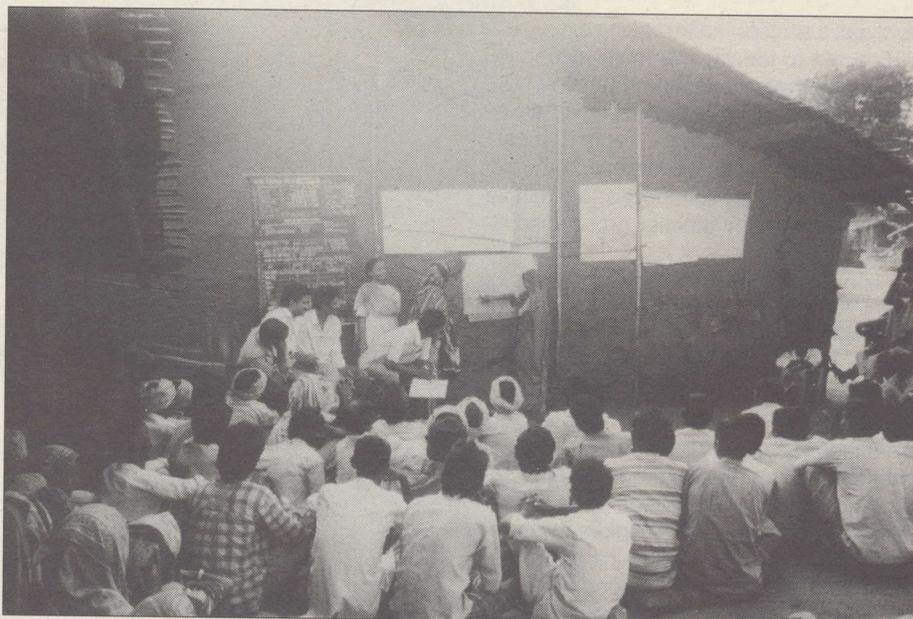
## Research needs identified

Constraints to better agricultural productivity include inadequate feed supplies, low returns to fertiliser use, inappropriate policies and poor communication among researchers, policymakers and farmers. To guide policymakers, researchers should quantify nutrient balances and develop models to predict trends in existing and improved farming systems. Socioeconomic research should address ways to permit wider use of farm inputs and to develop markets to assure farm profitability. Technologies are needed to improve the management of natural vegetation and the nutritive quality of feeds and to reduce nutrient losses from manure and urine. Research methods such as Rapid Rural Appraisal and attention to indigenous knowledge would help involve farmers in the technology development process. ■

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The conference Livestock and Sustainable Nutrient Cycling in Mixed Farming Systems of Sub-Saharan Africa held by ILCA in Addis Ababa in November 1993 was co-sponsored by the International Crops Research Institute for the Semi-Arid Tropics, the International Centre for Research in Agroforestry, the International Fertilizer Development Centre, Swiss Development Cooperation and the Canadian International Development Agency. The proceedings will come out later this year. Volume I contains abstracts of all papers in English and French and summarises the main findings and recommendations. Volume II contains the full manuscripts of the plenary sessions. For more information, contact: Head of Publications, ILCA, POB 5689, Addis Ababa, Ethiopia.

*The Aga Khan Rural Support Programme (AKRSP) is an NGO working with a participatory approach to promote watershed management. They work with village communities in three districts of Gujarat, India. The author explains how the approach of AKRSP is based on formation of village institutions and development of indigenous extension systems.*



## Local institutions and para-professionals in watershed management

**Parmesh Shah**

**A**KRSP initially took up the role of facilitator to involve the village community in the process of appraisal and planning. The formation of the village institution is supported, so that the sustainability of any activity taken up for watershed management is ensured. This also makes the community more willing to take certain risks that the farmers would not take as individuals. At village level, a search for technology is then facilitated and at the same time external sources are consulted. Further important activities of AKRSP are training on skills not available within the community and connecting these with skills already existing in the watershed. A local cadre of para-professionals is created who can handle the implementation, management, financial, upgrading and investment aspects of the watershed management programme. There is a strong emphasis on building local capacity and local institutions before substantial financial investments are made. After this project phase is over, AKRSP join the local cadre in the technology adaptation and evaluation process. They also support local institutions in developing better financial and monitoring systems at village level. In the last phase, AKRSP works to build federated support institutions for these villages. These do not only sustain the development of watersheds in their own areas, but also take up responsibility in neighbouring areas.

### Participatory appraisal

An inventory is made of all natural resources of the community. Indigenous practices, socioeconomic relations and focus groups, local institutions and existing management systems are all studied. It is important that initially the village territory and not the watershed is used as a unit for interaction and appraisal with the community, as people are more familiar with village resources. A sequence of methods are used enabling a joint appraisal exercise by the external team of the support institution and the community (Mascarenhas et al, 1991). This is to ensure that the analytical capacity, the existing indigenous knowledge and the innovations carried out by the inhabitants are used as a basis for planning.

The first activity is for villagers to prepare a base map of the village which shows major natural resources, landmarks, boundaries and divisions, drainage points, housing areas and so on. To prepare this map local materials are used such as seeds, twigs, leaves, flowers, lime, dung, thorns, etc. Using the methods of transect walk, mapping, sketches and ranking, farmers make an inventory of the indigenous practices, technologies and perceptions. This enables the villagers to observe the experimentation and risk taken by other farmers and evaluate external advice in relation to that. An appraisal exercise carried out in Bharuch district by the extension volunteer, Mathur Raiji, revealed sixteen indigenous soil, water, nutrient conservation and concentration practices. Some of

these practices were diversion ditches at the top of sloped fields to harvest organic matter and silt from common property resources during the first run-on, field drains with waste weirs leading to the lowland paddy fields, low cost stone checks across rills, stone and brushwood barriers, short-term fallowing, deep ploughing in summer, gully checks (earthen with stone pitching) to create new fields, growing *Va* (pulse crop, botanical name not known) on new structures for stabilisation and food and growing tobacco, gram and sorghum on residual moisture. People rank the practices based on their effectiveness and also analyse the constraints to adoption of these practices.

### Participatory mapping

A number of small thematic maps are drawn by local experts like:

- Delineation of the watershed, and all major run-off and water courses and drainage outlet groups. Water flows include soil and nutrients and therefore they are also important for soil fertility maintenance;
- Local landuse and soil classifications. Some of the local criteria used are soil texture, profile, moisture retention and crop compatibility.
- Indigenous soil, water and nutrient conservation techniques;
- Problems in landuse management showing the location and the extent.

To ensure that wider consultation is carried out and the poorer and less articulate members of the village community are

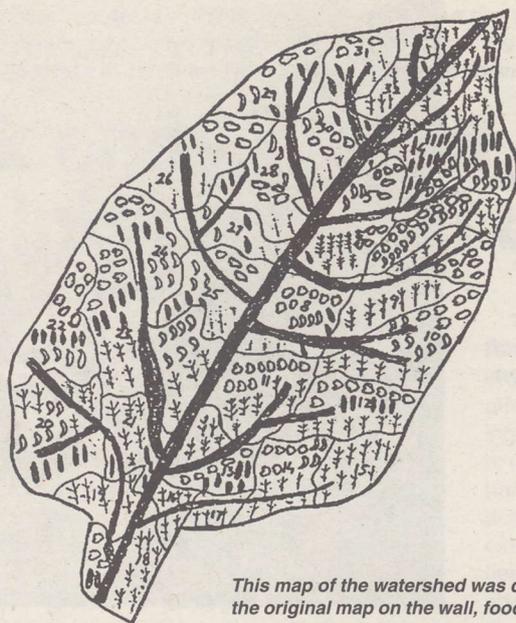
involved, a simple wealth ranking exercise is carried out to identify the major economic groups in the village community. Then, focus groups discuss their specific situation, problems and opportunities. Experience shows that a larger community meeting is more participatory and effective when preceded by smaller group discussions.

It is not enough to make an inventory of technologies as they are only one part of the solution. For most watershed technologies effective group management and community institutions are needed. For example, the use of common land is organised in a variety of institutional forms. These need to be understood before promoting any new village institution. Similarly, it is important to explore the community track record of maintaining community assets like the village pond, percolation tanks, village forests, grazing lands and roads. A discussion about informal and formal group management systems which exist or existed earlier is therefore organised. The possibility to use these institutional forms and arrangements for evolving rules, regulations and management systems for community resources is evaluated.

### Para-professionals

After the village has participated in the appraisal and shown interest in developing the watershed they are stimulated to strengthen an existing or form a new village institution. This institution should represent at least 70% of the watershed inhabitants and landholders including all landholders and farmers owning or using sloping uplands. The institution takes responsibility for functions of appraisal, planning, implementation, conflict resolution, group action, extension and monitoring. It selects a group of three extension volunteers from among the villagers. These volunteers are selected based on their interest and knowledge of the soil and water conservation practices in the village, track record of experimentation and their willingness to take up facilitation at village level.

The group of trained volunteers manages the programme on behalf of the village institution. At village level they work in teams of three with one volunteer concentrating on the soil and water conservation activities, another on dryland farming and



### Legend

- † drainage outlets of microwatershed
- 100 kgs of cotton production
- ∩ 100 kgs of groundnut production
- 100 kgs of pigeon pea production

numbers 1-33 refer to farm holdings

*This map of the watershed was drawn during a session in Bharuch District. In the original map on the wall, foodgrains were used by the farmers as symbols.*

the third on credit and commercial activities. They help the village institution in preparing plans to be presented to the government for resource allocation and support. The institution monitors the performance of the extension volunteers.

Volunteers have been compensated by the village institutions in different ways in different watersheds. Most incentives are performance related and are linked with increase in productivity and income. Most volunteers performed better than existing government village functionaries. Some volunteers have shown initiative in taking up community extension, beyond their villages and in some cases beyond their watershed. They helped other villages in planning and appraisal, identifying new extension volunteers, organising farmer-to-farmer extension and in forming village institutions. They have also taken up responsibility for training and supervising new volunteers.

### Skill development

Volunteers are trained "in the field" in appraisal methods, communication techniques, technology development and making and presenting plans and proposals. The programme starts with all the volunteers from different villages making a presentation about their village, including the various maps and matrices prepared by them. Discussion among them is encouraged. This enables them to articulate their viewpoint and develop capacity for analysis and discussion. Later, depending on the needs generated in the process of technology development, a training programme for further skill development is organised. This includes technical skills needed for the preparation and quality control of a treatment plan for the watershed; extension and communication skills such as development of visual extension aids in local language and manage-

ment skills such as preparing project proposals and financial management.

### Making plans

Based on the appraisals, problems and opportunities for watershed development are identified. These are then put in a matrix and used to start up discussion in village meetings. During these meetings inter-group dynamics become clearer. If there is a strong resistance by one group towards a priority identified by the other group, there is a need to further explore the relationship between the different groups and their resources to understand the reason for a potential conflict. Most villages have an intensive meeting on these issues and come to an agreement on conflict issues. However, in highly stratified situations more interaction is required before arriving at a consensus. The opportunities identified by the community lead to shorter but intensive topical appraisal exercises with the focus groups. Technical feasibility of the solution, financial viability, the extent of benefits and the impact on the poor, resource investment and contribution by the community, institutional framework and training inputs required are aspects considered.

The process takes place at varying speed in different villages. In some villages the participatory appraisal and planning process takes less than a month and in other cases it can take up to six months. The final output is an action plan which indicates options people would like to experiment with, the ones they would try out with own resources and those requiring external support. The plan is shared with external agencies who want to fund the implementation of the plan, like AKRSP, government or banks. This action plan also becomes a future reference for monitoring and evaluation of the programme.

Gujarat state in Western India has diverse agroecosystems. These are degraded natural forests in South Gujarat, semi-arid areas in Central and North Gujarat and coastal areas with problems of salinity. Only 16% of the cultivated area is irrigated and most cultivators depend on rainfall for agricultural production. Common property resources are an important source of livelihood for most poor and landless households.

## Generating technology

Participants are asked to identify and observe problem solving technologies practised by farmers in different zones of the village. The external support institution also suggest adaptations and new solutions. Volunteer extensionists also organise small focus group meetings with farmers to ascertain existing practices and experimentation in the village. They identify constraints to increased and sustained productivity for different groups of farmers and present this information in the village meetings encouraging discussion and analysis. Farmers are also encouraged to suggest specific changes and adaptations. Some examples are replacing large physical conservation structures by small physical structures using vegetative material and growing leguminous crops on the physical structures for food, cash and green manuring. Then technologies are evaluated for experimentation and dissemination.

At the end of the agricultural season, technologies tried out by the farmers are evaluated through feedback sessions in the field. After a period of experimentation the village institution takes decisions about further experimentation or for trying out some technologies on a larger scale. An analysis is made of what external support is needed and farmers are encouraged to save money to create a capital base. These savings are used to negotiate a credit line with commercial banks to open opportunities for production and marketing. The advantage of this approach is that volunteers and farmers become more observant and are involved in a dynamic learning process encouraging innovations.

## Institution building

It is envisaged that after producing functional and tangible results in their watersheds, village institutions and volunteers would come together to form a support institution. In the long run, this local institution is expected to undertake a resource inventory and appraisal of the area to generate options for watershed management, to interact with other external research institutions, to organise villagers for community and individual action and to provide cost effective services to the community for increased production.

The impact analysis of the programmes shows that watersheds have become better protected, the productivity of resources increased significantly and livelihoods have become more secure and diversified. Village institutions and volunteers have been able to mobilise local savings, diversify economic activities and initiate community operations such as ploughing, plant protection, use of post harvest equipment, group credit and pooled marketing of agricultural produce to get better prices. The institutions also developed norms for usage and usufruct rights for community

land and joint decisions are taken about penalties and fines. Systems of voluntary protection and management evolve and in some cases village people are hired and given incentives to manage the resources on behalf of the village institution.

The management costs of the programme are about Rs 1340 per ha, compared with Rs 3000-7000 per ha incurred by various government administered watershed management programmes.

The experience shows that if an external support institution takes the role of facilitator in the initial phase of watershed development programmes and spends time on the participatory process and institution building, the programmes are cost effective, more effective in resource use and can be scaled up by the local institutions with low overheads. Substantial financial investments should be made only after building local capacity and local institu-

tions. This approach requires organisational reversals in design of external support institutions and a change in the present project cycle.

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## References

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## Managing Watersheds

Purna Chhetri and Anil Shrestha have worked for more than eight years in development projects. The points they raise here represent typical problems and factors for success associated with watershed management programmes.

- **Focus on people.** Watershed management is often defined bio-physically: planting trees, building checkdams, stabilizing gullies, controlling torrents, managing run-off. However, watershed problems are a result of human disturbance in efforts to earn their livelihood. Therefore, people must be the focal point of watershed management programmes and innovations should be planned with their needs in mind.
- **Accountability of project workers.** Project workers are generally accountable to their supervisors for crop failures or checkdam bursts, but not to farmers, who have contributed significant amounts of time, faith and resources.
- **Stakeholders' perspective.** The key to success is to involve farmers as stakeholders. Their involvement should not be limited only to problem identification, but should include implementation and evaluation.
- **Quantifiable indicators** are often physical and generally do not relate to the watershed as a whole. Foresters are evaluated for the number of trees planted, agronomists for increases in yield, engineers for the number of checkdams built. All these are easy to measure, visible and appreciated by both donors and supervisors. However, the number of trees that survive is more important than the total number of saplings planted. Storage facilities must accompany yield increases. Improved varieties bring in new pests so pesticides must be made available locally.
- **Mini-watersheds.** Often, the general tendency is to acquire communal lands and plant them with trees. This will benefit the watershed as a whole and meet the project objectives. However, a watershed is composed of mini-watersheds representing a farm and communal lands are used for

grazing (Kharel, personal communication, 1988).

- **Need for social expertise.** Programme staff are often dominated by technicians. It is crucial that a staff anthropologist or sociologist be involved in the planning process to access under-represented groups and encourage their participation and ensure distribution of project activities and benefits.
- **Holistic approach.** Some donors finance only limited activities, such as irrigation or agroforestry, but watershed programmes need a holistic approach. For example, farmers in west Nepal wanted drinking water supplies in their village and renovation of leaking school roofs. They refused to participate in project activities unless these issues were included. The funding agency must be flexible to accommodate unforeseen circumstances.
- **Indigenous knowledge.** Local people are often not consulted for their expertise. While the goal of watershed management programmes is long-term, projects are generally short-term. The first phase of the project "must produce tangible results". Fast growing tree species replace slow growing locally available and adapted trees. High yielding varieties replace low yielding but stable local ones with greater market and storage values. Indigenous systems may not work in every situation, but the integration of local and external technologies can result in appropriate solutions.
- **Project evaluation.** Evaluation methods currently used by many governmental, bilateral and non-governmental organisations must be reconsidered. Directors are often evaluated on the basis of money spent and/or the number of new projects started. Big-scale projects may look economically attractive, but small-scale projects, if implemented carefully, may be more equitable.

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**Watershed management planning generally means that first a plan has to be finalised before implementation can start. This article from Nepal presents a different approach, where planning and implementation go hand in hand according to a "plan-and-implement" step-by-step approach. In fact, the plan is in full operation by the time it is finalised.**



Photo: Pauline Brombacher

## Planning by doing

**Pauline Brombacher,  
Natascha van Dijk and RDP Yadav**

In Nepal, watershed planning receives increasing attention. A bigger impact can be achieved through this approach as the watershed integrates all up- and downstream bio-physical elements. Scarce resources can be better allocated when concentrated in watersheds than when activities are scattered over a larger area. In order to make the planning process truly participatory the programme in the Pereni watershed chose to do it step-by-step. The first step was to plan and implement an "entry point" activity. After this, the next step can be planned and implemented based on people's needs, available resources and institutional capabilities. Thus planning becomes a never ending process.

### The Pereni watershed

The watershed is located in Dang district in the mid-western region of Nepal. The total area is 380 ha. Average farm-holding is less than 1 ha and little is produced for the market except for some lentils, potatoes and mustard. Chemical fertiliser and pesticides are hardly used. Livestock plays an important role, not only as the major source of draught power and milk but also to produce manure. This is mixed with straw and applied to the fields. Livestock plays a crucial role in the fertility management systems of the farmers.

For their survival and to ensure sustainability of their farming systems the villagers do not only rely on their agricultural lands (42% of the area) but also on the grazing wastelands and the forests (40% and

18%). The nearby tropical mixed hardwood forest with *shorea robusta* as dominant species provides fodder, fuelwood and timber.

### Degradation

The indigenous people of the valley, the Tharus, used to practise free grazing in the forests as there was enough space. They have no tradition of stall feeding, nor of using fodder trees. Since the eradication of the malaria mosquito from the valley in the 1950ies, people from the adjacent hill areas moved to this valley in massive numbers. This contributed to increasing land pressure, with many consequences. First of all, overgrazing in forests and grazing areas is now a major source of land degradation. It leads to loss of vegetative soil cover, followed by loss of top soil. The density of livestock (mainly cattle, buffaloes and goats) per unit area in this district is one of the highest in Nepal (estimated 7 heads of cattle per household in the case study area). Pressure on forest lands is also caused by local use of wooden logs to construct small dams in the river for irrigations purposes. As these are often washed away in the rainy season, they need to be rebuilt frequently requiring a tremendous amount of young wood.

### Learning from mistakes

Because of this severe degradation, the government's District Soil Conservation Office (DSCO), started to work in Pereni sub-watershed some five years ago. They aimed at greening a piece of 16 ha of barren, infertile lands surrounding the village, dissected with gullies. The DSCO first wanted to establish a nursery. However, the villagers at this stage were not interest-

ed at all in soil conservation activities. With a lot of persuasion and advance payment for labour done by the villagers, the nursery was established, trainings were given and reforestation began. The villagers saw the success of the seedlings growing, but were not yet motivated to play a leading role in conservation. They also did not completely trust the government agency, because of a bad experience in the past. Moreover, the proposed area for conservation, where people used to graze their cattle, was private property and the owners did not seem to take any interest in improving the site. The villagers, as appeared later, also did not believe that these poor lands could be converted in more productive lands again. At this point, now three and a half years ago, the DSCO realised its approach would not work: a new strategy was necessary.

### Step by step

The DSCO then approached three village leaders and organised with them a first village level workshop. Out of 100 households some 40 people, men and women, attended. The purpose of the two-day workshop was to increase people's participation in identifying needs and planning conservation activities. In an open brainstorming session two key problems became clear: lack of fodder and lack of irrigation facilities. In fact, this workshop could be considered the "entry point activity" for participatory planning in this area.

In order to address the first problem, exogenous varieties of forage species were introduced as the second step. This had two objectives: to meet farmers' need for forage and to reduce erosion in uncultivated land. Out of 24 species tried, 6 were

*A farmer showing the fishpond constructed near her homestead.*

found suitable. Criteria used were fodder quality and easiness of seed collection (farmers' criteria), soil conservation capacity and drought tolerance. Especially napier grass proved very effective in stabilising small gullies, especially in combination with small scale bio-engineering techniques like bamboo checkdams (see photo). The use of forage species expanded to private lands near the homesteads enabling some farmers to practise stall feeding. The production of forage seed has become an additional income generating activity for others. At the same time, other activities addressed the irrigation issue.

### Local organisation develops

To realise all this the farmers came together every few weeks, with the DSCO acting as a facilitator. Especially in the beginning the group process needed quite some attention. It resulted in the formation of a users' committee, which would be responsible for the management of the nursery and the reforested area. As it developed new sub-committees emerged and a system of sanctions was set in motion. This made it possible for the farmers to decide to not only protect the 16 reforested hectares, but also the old forest (150 ha). A zero-grazing system was adopted in both sites and a watcher was appointed, who was initially paid by the DSCO. A process is now taking place where the forest is handed over to the villagers as community forest. With help of the Forest Office and the DSCO a forest management plan is being developed.

In the momentum thus created farmers collaborated in trials with improved seed varieties and quite a few are using improved maize, mustard and wheat varieties now. Vegetable growing (onion, potato and cauliflower) increased with

extra irrigation facilities. On their request, farmers were trained on vegetable growing. Fish farming has been improved with the construction of fishponds.

### Achievements

One of the most prominent and visible achievements is an increase in crown cover of 50% in at least half of the existing government forest. The 16 ha of reforested badlands have an increase in ground cover of 80%. Impressive regeneration has thus been possible around Pereni village. Not so easily quantifiable, but certainly clearly visible, is the soil conservation impact: siltation problems downstream of gullies are reduced, major gullies (more than 5 m width) are stabilised due to less surface runoff from the forest and badlands and smaller gullies are controlled by bio-engineering methods. Farmers report that the ground water table slowly rises. The programme has helped to increase forage supply from 25 to 50% of the demand.

The Pereni watershed has developed into prominent resource centre for forage seeds and napier sets. For example, this year the amount of seeds produced was 238 kg, equal to a cash income of 31,000 Nrs (an unskilled labourer earns 900 Nrs per month). In the long run people will also be able to receive income from timber, fuelwood and fruit trees. Agricultural production of the farmland downstream of the protected area has increased because of decreased siltation and a higher ground water table.

However, the non-physical outputs of the process are perhaps even more important, especially the establishment of a well functioning, independent users' committee. Only now and then the DSCO is requested to facilitate the process, e.g. when a conflict arises. The committee now also takes responsibility for the negotiations with outside and inside institutions. For example, the lease contract had to be

made with the owner of reforested land. Villagers' awareness on environmental protection and improved management of badlands and forests has increased. Within the larger watershed (2500 ha) the effect has already spread to other areas: conservation activities are taking place in other villages and new requests for support have been formulated. Pereni has set an example for the whole district. Farmer-to-farmer visits are an important tool for disseminating the success, within and even outside the district. Two years ago, the success of Pereni led the Department of Soil Conservation to adopt a nationwide policy to allocate the majority of the resources to pocket areas on a watershed basis. A nice example of grassroot success which found its way "up" to central policy level.

### What can we learn?

The experiences in Pereni show that a "plan-and-implement" step-by-step approach can be effective. Motivated farmers are the key. They become actively involved through the first, often relatively uncomplicated activities. Early success highly contributes to this. By their involvement in the whole process of decision making and implementation, watershed management will gradually become more and more their own responsibility, which enhances sustainability of resource management. This approach makes it possible to replace a formal comprehensive plan, mentioning all activities to be implemented, by a working document in which the development process is recorded step-by-step. Monitoring by villagers as well as DSCO played a crucial role in this case. Something that could certainly still be improved upon.

The approach will, however, only be effective if sufficient time and attention is given to building a good relationship with the villagers. Village leaders should be involved to facilitate the community development process. And long-term aims of intervention (soil and water conservation) are to be combined with short-term ones, with direct benefits for the farmers. This may imply that drinking water and irrigation issues are also addressed. Listening to farmers is essential, assisting them in finding solutions which address their needs, both on public and private land. Stimulating people in their own decision making directly strengthens their institutional capabilities.

Pauline Brombacher, Natasha van Dijk and RRP Yadav, PO Box 1966, Kathmandu, Nepal.



Photo: Pauline Brombacher

*Behind the bamboo checkdams sedimentation took place, improving the water storing capacity of this spot. Napier established well after 1.5 year.*

*In 1989, villagers of Kaniko and Try in Southern Mali complained that many "outsiders", often town-based users of their village wood reserves and grazing lands, also benefited from erosion control measures the villagers were carrying out. This led to the initiation, together with four other villages, of an innovative "Village Land Management" programme in a zone they baptised Siwaa or Dry Bush.*



## The Siwaa experience

Village land management in southern Mali

Rita Joldersma and Negueba Fané

Mali's most important rainfed farming area lies in the south of the country, where average annual rainfall ranges from 800 to 1200 mm. It produces cotton as export crop, millet-sorghum and maize. Since the 1960s the system of shifting cultivation has changed to a system of permanent cultivation. The introduction of cotton as a cash crop and animal traction for land cultivation led to an increase in cropped area, as did the increased population pressure. In the region to which the Siwaa zone belongs, more than 50% of the total area is now cultivated. During the last decade village herds have increased rapidly due to the need for draft oxen and the tendency to invest surplus income from cotton in cattle. Farmers also increasingly recognise the importance of livestock to produce organic manure. "Contracts" between farmers and pastoralists for manuring the fields by nomadic herds have become less frequent, because of the competition for fodder.

### Pressure increases

All land is in principle "State-owned", but the State recognises traditional land-tenure arrangements. These give individual villagers the right to cultivate. Fallows, not cultivable lands, are open for everybody to graze animals and collect firewood. The government regulates access of outsiders to village wood resources (*Code forestier*). The communal lands play an important role in the local farming system. Livestock graze there and their manure enhances

soil fertility of cropped land, although soil fertility "mining" still represents an amount equal to 40% of the farmers' total agricultural income (Van der Pol 1992). Furthermore, without firewood, food preparation would become extremely difficult.

The expansion of land under cultivation has greatly diminished the grazing area. Together with the increase in animal numbers, this leads to a livestock pressure exceeding the carrying capacity with current husbandry practices (Leloup & Traore 1989). Deforestation is another threat to the village lands. A study of the degradation in Kaniko village area (Jansen & Diarra 1992) shows an increase in severely degraded lands from 18% in 1952 to 94% in 1987. As management practices for communal lands receive little attention, they are more degraded than the individual fields (Kaya 1992).

### Outsiders benefit

Faced with increasing degradation, the government initiated erosion-control activities. Initially (1980-86) action research was carried out by the national farming systems research institute DRSPR (Département de Recherche sur les Systèmes de Production Rurale) and since 1986 extension activities by were carried out by the Division de Défense et de Restauration des Sols (DDRS) within the Compagnie Malienne du Développement des Textiles (CMDT). The latter is the principal development organisation in the area and presently reaches more than 600 villages with its erosion project. However, the villagers of Kaniko and Try, involved since 1984, complained that others benefited

from their work. Firstly, they referred to commercial exploitation of wood by transporters (carters) supplying the nearby town of Koutiala. In accordance with the Forestry Law, the Water and Forest Service granted them felling permits. Villagers had no influence on this permit system and do not benefit financially or otherwise from it. Secondly, they referred to town traders owning large cattle herds which contribute to degradation of the village pastures.

### Villages join to manage land

Following the request by these two villages, the DDRS/CMDT and the DRSPR formed a Technical Group with the Livestock Service, the Water and Forest Service and the Local Government, and suggested a pilot programme of "village land management" (*Gestion de Terroir Villageois*) for Kaniko. This approach, which is increasingly adopted in francophone Africa, aims at decentralising decision-making about use of natural resources. It is assumed that natural resource management will be more effective if users are responsible and receive benefits from their investments. The villagers from Kaniko and nearby villages were interested to collaborate in a joint scheme. A zone of nearly 12,000 hectares bordered by roads was agreed upon, comprising parts of the village lands of Sinsina, Kaniko, Try I, Try II, M'Peresso and Nampossela. The villagers baptised this zone *Siwaa*, meaning "dry bush". As they gained more confidence in the programme and its anticipated benefits, they decided to extend the zone to 16,000 ha, covering most of the six village territories.

*After managing to reduce wood exploitation by outsiders, villagers in Mali became more aware of their own wood consumption and began to think of how to economise in using fuel.*

The village communities later realised the need to structure the intervillage collaboration. They created an intervillage committee, with 3 representatives from each village, including a woman. The intervillage committee serves as an intermediary between the villages and the Technical Group. Recently, a member of the intervillage committee has joined the meetings of the Technical Group.

### Villagers control woodcutting

At first, the villagers defined the wood problem as one of over-exploitation by outsiders. They asked the Water and Forest Service to stop giving permits, which was verbally agreed. This reduced the use of wood by outsiders to some extent but was not fully effective, as responsibilities of the local community and the government authorities were not clearly defined. For example, villagers were verbally permitted to take sanctions against woodcutters from outside, but they hesitated to do so, feeling insecure facing the wood transporters without any written authority.

After political changes at national level in 1991 which gave more room for local participation and decentralisation, the Water and Forest Service can now, in principle, issue a permit to a village willing to sell wood to outsiders, if it has a proven wood surplus. In such a system the village community can determine at which price to sell the wood and to whom. Benefits accrue to the village community and no longer to the Government and outside transporters. In Siwaa this system is not yet operational, as several questions have to be clarified, such as: Should villagers pay for wood collected on the lands of neighbouring villages? Will control by villagers alone be strong enough?

As the use of wood by outsiders decreased, villagers became more aware of their own wood consumption. To support this growing awareness, DRSPR developed

a simple method to quantify and analyse fuelwood use. Using this method it was concluded that only one village has enough wood for commercial use (Table 1).

The intervillage committee then set annual quota of three cartloads per woman for own consumption and prohibited the commercial use of wood by villagers. It suggested to the market gardeners to use the wooden stakes needed to support the tomato plants for at least two years. The women organised themselves to promote the use of improved cooking stoves. However, alternative income-generating activities to replace the selling of wood by villagers, especially women, has not yet been found.

In all these activities, the issue of social consensus has become a crucial challenge. A system of sanctions has been proposed by the intervillage committee. But its full application seems to be difficult as yet within the local sociocultural context.

### Improved use of pastures

The second problem, over-exploitation of pastures, was initially attributed to the herds of town traders. Commercial cattle raisers were encouraged, by the intervention of the Livestock Service and the Local Government, to leave the zone. Once their frequency decreased, the villagers acknowledged the pressure of the growing number of their own cattle. A diagnostic study showed that the pressure of village herds at 5047 TLU (Tropical Livestock Units) for the Siwaa zone exceeds its carrying capacity of 2667 TLU by 90% (Toure et al 1991). The results were discussed during village meetings and a "problem tree" was constructed to analyse the problem, its causes and consequences. The solutions suggested by the villagers are partly institutional (eg. regulating access to pastures, diminishing the straying of cattle) and partly technical and socioeconomic (eg. growing fodder crops, destocking by large herdowners). Upon the request of some livestock owners, a joint research programme is now being carried out. This is meant to find ways for different types of village livestock owners to improve herd

management and fodder production, while encouraging a more sustainable use of the pastures.

### Lessons

The Siwaa example shows that villagers are interested in managing natural resources beyond the farm level, once these resources become scarce. They are willing to assume responsibility for resource management. This needs, however, a clear definition of responsibilities of village communities and (local) governments and a redistribution of means between them. Effective new regulations and arrangements have to be developed with the villagers. Supportive research into such institutional issues is therefore important. Currently, while awaiting the review of the Forestry Law and the concretisation of the decentralisation policy, there is a tendency towards establishing "local conventions", i.e. agreements between villages and government services, about the use of natural resources. However, villagers have some difficulty in managing differences of interests within and between villages. The local institutions will have to develop ways to handle these, while establishing their authority.

Village land management on its own is not sufficient for more sustainable land use. Alternative solutions have to be found for different types of users (villagers, pastoralists, urban dwellers) to guarantee certain productive and consumptive functions of the natural resources while diminishing the pressure on them.

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Table 1. Local wood production and consumption in the Siwaa area ("cartloads" \*/year).

Village	Production	Consumption	Balance
Kaniko	1533	2912	-1379
M'Peresso	1820	1240	+580
Nampossela	960	2702	-1742
Try I and II	1348	2598	-1250
Sinsina	1450	3224	-1774
Total	7111	12676	-5565

\* 1 cartload = 0.5 m<sup>3</sup>

Source: Joldersma & Diarra 1992.

# Landcare in Australia

**Andrew Campbell**

**T**he Australian Landcare movement is highly differentiated so one cannot describe a "typical" Landcare group, except in broad terms as a voluntary group of (usually rural) people working together to develop more sustainable systems of land management. Groups often involve 20-30 members, covering areas ranging from several thousand to several million hectares. Common activities of Landcare groups include:

- field days and farm walks
- demonstration projects (usually land degradation rehabilitation works)
- development of a catchment or district plan to coordinate the approach towards sustainability
- facilitating the development of individual property plans within the context of the catchment plan by employing consultants, running workshops, and coordinating incentives and resources
- active involvement in natural resource monitoring programmes, often together with schools, state agencies and scientists
- providing equipment for hire to members and other land users
- research and development trials with state agencies, universities, agribusiness, national research organisation
- production of educational pamphlets, videos and manuals.

## Groups start up

Usually Landcare groups start when someone - a farmer, local activist or government officer, perceives a land management issue, feels that a Landcare group is the way to go, talks it over with friends, neighbours and perhaps government extension staff or someone from a neighbouring Landcare group, and calls a meeting. The meeting elects a steering group, which investigates local problems, interest, resources and available assistance, then calls another meeting to launch a group and elect a committee. The committee may be the entire group or an executive subset of the group. The group then decides on its name and defines its problems and what it knows about solutions. Boundaries, goals and membership are determined. The group identifies sources of assistance, usually becomes incorporated (for legal and insurance purposes) and maybe applies for government funding, often depending on the type of input from local government extension staff. The local community becomes aware of the group, which grows quickly and develops relationships with local and state government agencies and other sources of assistance.



Photo: Andrew Campbell.

***In Australia, a grassroots revolution called "landcare" has turned land conservation extension on its head. More than 2000 voluntary landcare groups involving about one third of Australian farm families are working to develop more sustainable systems of land use. They are supported by a national 10-year funding programme, based on a proposal developed by the National Farmers' Federation and the Australian Conservation Foundation in 1989. Andrew Campbell reports on a diversity of groups and activities to counter ecological, social and economic stress in a tremendous diversity of environments.***

Factors influencing the effectiveness of Landcare groups are discussed in detail in Campbell (1992 and in press). These include the available human resources, group leadership, the way in which the group deals with apathy, conflict, making decisions and delegating responsibility, openness to new members and diversity of members, availability of practical, profitable, technically sound solutions to environmental problems, and access to appropriate technical and facilitatory support. There is no single recipe for handling conflict, or for planning and implementing deci-

sions. A great diversity of responses are evolving in a great diversity of biophysical, social and institutional contexts.

Some Landcare group members would like to see a national Landcare organisation with state and regional branches which would interact with government at all relevant levels and officially represent the interests of Landcare groups. Others are involved with Landcare simply because it is unstructured and flexible and locally responsive. They believe there is already too much paperwork and too many meetings, and that if they wanted to be involved

*The involvement of children in environmental monitoring and restoration (land literacy) alongside their parents in community groups is a key feature of the Landcare approach.*

in a bureaucracy they could join the farmer organisation. There is a tension here between reaching a sufficient degree of institutionalisation to counter the tendency for government agencies to appropriate Landcare for their own ends, and swamping a great deal of voluntary, part-time effort with bureaucracy.

### Who pays and why?

Most funding for Landcare groups comes from the National Landcare Program (NLP). Several hundred Landcare facilitators and coordinators are also funded by the NLP, employed within state agencies, local government or by Landcare groups directly. Many groups are able to fund small-scale activities by raising money or seeking in-kind support from local business and local government.

It is interesting to ponder why the number of Landcare groups has grown so quickly, during a farm financial crisis, when the amount of money available from the NLP (maximum US\$ 10,000 per group per year) is quite limited. The argument that Landcare would wither if funding dried up seems difficult to sustain, given the momentum of Landcare in such difficult circumstances with so little direct funding. Conversely, policy makers perceive Landcare funding to be very good value for money, given the number of people involved and the amount of voluntary work and in-kind support generated for each public dollar (multipliers from 5 to 20 have been calculated).

Governments fund Landcare because groups are tackling issues such as pests, weeds, water quality, salinity, wildlife habitat conservation and landscape improvement, which have a high public-good component. There is also a compelling case that many land degradation problems in Australia stem direct or indirectly from government policies and it is simply not fair to expect one generation of land users to pay for the mistakes of previous generations and governments. Private sponsors fund groups to "green" their image.

### Working together is fun

People form groups because they recognise that they can more effectively access information and resources, locally and externally, in groups than as individuals. Problems like salinity, rabbits and weeds demand cooperation. They are able to share the stresses of rural decline. People in Landcare groups also mention a sense of satisfaction and fun from working together. They extend their personal networks, meeting like-minded people through Landcare, and are often able to do things by applying their own labour and

equipment with in-kind support from local government and businesses which would not normally be possible for non community-based projects.

Thus Landcare groups tend to make better use of their own resources and knowledge, they mobilise external resources and information, and they operate at a scale which enhances the potential for this effort to make an impact. Recognising the success of Landcare in rural areas, the Australian government launched a "City Landcare" programme in 1993 to encourage urban people to form groups to look after public land and environmental assets in cities. There is a great potential for bridging programmes between urban and rural groups.

### Having a go at sustainability

It is still too early to measure many of the wider impacts of Landcare, but roughly one in three farmers are involved in the programme or rely on Landcare groups for information. In some areas in southern Australia over 70% of the farming community are Landcare members. This is a significant penetration of Landcare into rural communities over a period when many people could have been expected to be preoccupied with immediate financial survival.

Landcare groups can potentially, through cooperative coordinated approaches, solve problems at a district scale which cannot be effectively tackled at the individual property level - especially water-related issues (eg. salinity, erosion, waterlogging, water quality decline and irrigation management) and nature conservation (preserving biodiversity and managing vertebrate pests and weeds).

The groups create a collective social pressure in favour of developing more sustainable farming systems, reinforcing and supporting the efforts of individual farmers already having a go, and exerting others to become more involved, or at least better informing them of the issues (Cock 1992). Landcare groups thus generate commitment to the goal of sustainability at an individual and community scale, and play an increasingly important role in gathering and managing information, in education and raising awareness (Campbell 1992). They re-establish a community focus, creating networks for social support, for sharing the stress of rural decline and for doing something constructive about it (Carr 1992). The groups provide a useful structure, at an ecologically and socially sensible scale, for more efficient and effective use of government, private and community resources.

### Community first

Landcare in Australia is an example of a community-based response to the challenge of sustainability during a period of severe resource constraints. The key ingredients of Landcare are its lack of structure, the primacy of land users in

### Tumby Bay

Tumby Bay is a pleasant town of 1100 people on the southeast coast of the Eyre Peninsula in South Australia. The Eyre Peninsula is an infamous land degradation "sore spot" in the Australian landscape, with a history of large-scale erosion and, in recent years, the emerging spectre of dryland salinity and waterlogging due to the combined effects of overclearing and farming systems which upset the hydrological balance. The main farm products are wheat, barley, grain legumes, sheep for wool and some prime lambs for meat. Rural decline is rampant. Barry Stirling, a farmer and leading member of the Tumby Bay Landcare group, describes in bald terms the deep social and economic crisis of this region:

"Farmers are suffering from advanced AIDS (Acquired Income Deficiency Syndrome). We have had below average seasons from 1985 to 1989 and since then a drop in prices. When 400 farmers out of 2000 walked off their farms, they were bought up by other farmers. With high interest rates, most are now in trouble. Now with wool prices falling and land not selling at all, 70% of the farmers are technically bankrupt."

The Tumby Bay Landcare Group was formed after an initial public meeting in 1989. It has a committee of 22 farmers and townspeople, about 50 active adult members and about 120 schoolchildren regularly involved in activities. Three hundred of the older people in Tumby Bay have offered to help. NLP funds a full-time coordinator, and the group has been working on a wide range of projects:

- formulating a district environmental plan, considering farmland, swamplands, the town environs and the coastal zone including mangroves, with priority given to salinity control;
- involving schoolchildren in identifying native tree species, collecting seed and propagating 10,000 seedlings per year;
- direct seeding of roadsides with indigenous vegetation and helping members with their own seed collection activities;
- involving local schools and Landcare members in "Frogwatch";
- running farm planning workshops, to help local farmers develop their own property plans consistent with the land conservation needs of the whole district;
- rehabilitating a 300 ha natural wetland adjacent to Tumby Bay, which had previously been drained;
- making a conscious effort to involve underemployed people, senior citizens and jail inmates in Landcare projects.

Barry Stirling sums up the Tumby Bay approach: "At Tumby Bay, we are publishing a policy of environmental responsibility without being seen to be radical, and not losing sight of the economics of our situation. The good thing is the way farmers and urban people are working together. Our farmers, now within the catchment planning phase, are looking past their own boundaries and we have a new level of acceptance for other peoples' rights and ideas."

determining group directions and activities, the integration of conservation and production issues, the involvement of people other than farmers in groups and the extent to which groups assume responsibility for their own problems and resources. Landcare group activity often involves innovative approaches to monitoring land status (land literacy) and participatory approaches to planning better systems of land management at farm and catchment scales.

Institutional and technical constraints include: limited human resources in rural areas, a lack of technically sound, practical and profitable solutions to land degradation problems, institutional cultures within research and extension agencies which militate against genuinely participatory approaches, the overwhelmingly technocentric training of professionals in research and extension in Australia (Reeve et al 1988) and a feeling among farmers of being blamed for land degradation, which does not foster a stewardship ethic. Finally, the essentially colonial structure of Australian agriculture, producing raw products which are mostly processed and marketed abroad, means that Australian farmers are very exposed to declining terms of trade. If these constraints persist, then it is difficult to see how Landcare groups on their own can approach sustainability.

"Community First" thinking means a change in focus for agricultural researchers and extensionists: from transferring information to asking the right questions, from presenting to skilled listening and

interpretation of feedback, from starting with research outputs to building upon the diverse knowledge and inputs of many stakeholders. Community First thinking breaks away from limiting notions such as "top-down" and "bottom-up". Facilitating community synergy, assisting communities to work together to assume responsibility for defining and tackling their own problems, can inform research and extension approaches at both the individual farm level and at the institutional level.

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**Andrew Campbell**, c/o INRA URSAD, Centre de Recherches de Toulouse, BP 27, F-31326 Castanet-Tolosan Cedex, France. More information will soon be published in the book **Landcare: communities shaping the land, the future**, which contains 12 case studies of Landcare groups, 7 cases of individual land users trying to change their landuse systems, and lists of contact people and useful information.

#### Land literacy: a Landcare activity

For most of human history the ability to read and interpret the signs of nature has been crucial for survival. But since the agricultural revolution and particularly since the industrial revolution, people in industrialised countries have become more and more insulated from the immediate need to be able to read and understand nature in order to eat, be clothed or find shelter. Land literacy refers to activities designed to help people read and appreciate the signs of health (and ill-health) in a landscape, and to understand the condition of and trends in the environment around them. Many of the most important land degradation problems in Australia are complex, insidious and not visually obvious. For land degradation problems, it is wise to assume that prevention is cheaper and more effective than cure. But it is difficult to get people excited about prevention, if they cannot see or appreciate the problem.

"Saltwatch" began in Victoria in 1987 as a participatory community education initiative conceived by Terry White of the Victorian Salinity Bureau. It is now taking place in five States. By 1992 more than 900 schools and 50 Landcare groups were involved in gathering and analysing tens of thousands of water samples from creeks, rivers, reservoirs, irrigation channels and bores. Each school or community analyses its data and sends it to a central agency for processing, receiving in return a computer-generated overlay map of water quality in the district. This is displayed in the school and often the store, the hall or the pub. Data is stored on school computers as well as in government agencies, and groups are encouraged to look at trends over time within their district. The composite maps are used for interpreting, discussing and planning further action such as excursions, rehabilitation projects and displays. Schools and community groups have access to education kits, manuals and curriculum materials, and training programmes for teachers have been developed over recent years (Campbell in press).

The major value of land literacy programmes is the speed and effectiveness with which they transmit local environmental knowledge and teach people to observe and monitor the health of the land around them. Scientists were initially sceptical about the reliability of data generated by such programmes, but independent evaluation revealed quite satisfactory reliability at extremely low cost. Community groups and schools can gather more data from more sampling points than is conceivable for government agencies paying professional staff. People involved in gathering information are more interested in finding what it means and taking it seriously. They develop ownership of this information and commitment to dealing with its implications, and are less overawed by the language and aura of science and bureaucracy. This enables them to formulate much more acute questions for scientists and regulators.



Photo: Andrew Campbell

*Bob Purvis, a landcare pioneer on his 229,000 ha cattle station in central Australia, which he has carefully restored to a productive state by reducing stocking rates, careful use of patch lawning (like the Aborigines) for shrub control, skilful management of water and soil conservation banks, based on a detailed understanding of the interaction between land types, climate and management.*

**The management of common property natural resources: some conceptual and operational fallacies** by Daniel Bromley and Michael Cernea. World Bank Discussion Paper 57. 1989. World Bank, 1818 H St NW, Washington DC 20433, USA. 66pp.

A valuable paper about new insights into managing natural resources, which clearly distinguishes between open-access resources (free-for-all) and common resources managed through local institutions. Examination of past projects shows that privatisation of land has led to environmental degradation and bigger gaps between rich and poor. All agricultural projects have something to do with landuse rights and can succeed only if they understand and incorporate local institutional arrangements for land use. In each project, the most relevant unit of social organisation for natural resource management must be identified and supported. The authors draw up an agenda for action to build on rural managerial capacity and to improve policy

instruments and legal frameworks which allow local management to sustain production and protect the environment. (AWB)

**Traditional village institutions in environmental management: erosion control in Katheka, Kenya** by Barbara Thomas-Slayter, Charity Kabutha & Richard Ford. From the Ground Up Case Study 1. 1991. ACTS, POB 45917, Nairobi, Kenya and Center for International Development and Environment, World Resources Institute, 1709 New York Ave, Washington DC 20006, USA. 34pp.

Village-based institutions in semi-arid Machakos District have assumed the challenge of managing the local natural resources without external project funding. Techniques of constructing contour bench terraces and check dams, which were enforced during colonial times but rejected after Independence, were taken up again in the 1970s when the residents became alarmed about erosion. Self-help *mwethya* groups of women re-adopted the once

despised techniques in order to manage the soil and water resources in and around their farms. The residents of Katheka have thus been able to stabilise farm productivity. (AWB)

**The struggle for land and the fate of the forests** edited by Marcus Colchester and Larry Lohmann. 1993. World Rainforest Movement, 87 Cantonment Rd, 10250 Penang, Malaysia. 389pp. Case studies from Latin America, Asia and Africa illustrate how poor people are being forced into the forests for sheer survival. Meanwhile their lands are turned over to agribusiness producing cash crops. Local people must be allowed to regain control over their land and their economies. These structural issues first have to be solved before sustainable development can start. A book full of evidence. (CR)

**Gaining ground: institutional innovations in land use management in Kenya** edited by Amos Kiriro and Calestous Juma. 1991. ACTS, POB 45917, Nairobi, Kenya. 228pp.

Presents experiences with developing new organisational forms for managing the environment. Papers deal with managing indigenous knowledge, arid and semi-arid areas, watersheds, biological diversity, wildlife and forests. They stress the importance of flexibility, diversity and experimentation and the need to put institutional and policy studies back on the research agenda. Emphasis on scientific rationality and dependence on conventional institutional arrangements are likely to worsen the environmental crisis. This Kenyan case will also be of interest for landuse management elsewhere in Africa. (CR)

**Looking after our land: new approaches to soil and water conservation in dryland Africa** by Will Critchley & Olivia Graham. 1991. Oxfam Publications, PO Box 120, Oxford OX2 7D7, UK. 84pp. £6.95. Videp, 90 mins (PAL/SEC-AM/NTSC systems available). £13.

Six cases studies, from Burkina Faso, Kenya and Mali show how success has been achieved in soil-and-water conservation projects involving the local people. The

book and video are intended for development workers in arid and semi-arid Africa, and can be used in workshops and discussion groups. (AWB)

**Avenir des terroirs: la ressource humaine** by ENDA. 1992. ENDA-GRAF, BP 13069, Dakar, Grand-Yoff, Senegal. 301 p. US\$ 21.

Deals with relationships between local populations and external development agencies, and points at the strains in local communities provoked by development interventions. Because of rural people's experience with their local environment, which external agencies to do have, the latter should make as few interventions as possible and limit themselves to creating the preconditions for rural development, with emphasis on developing human resources. Any interventions that do not take local power relations into account jeopardise the development effort. (WB)

**Towards green villages: a strategy for environmentally sound and participatory rural development** by A Agarwal and S Narain. 1989. Centre for Science & Environment, 807 Vishal Bhawan, 95 Nehru Place, New Delhi 110 019, India. 52pp.

The basis of environmentally-sound participatory rural development is presented as open village-level institutions, laws and financial frameworks, and a system that creates self-reliance rather than dependence. The authors are inspired by the richness of traditional knowledge and culture derived from years of observation and experimentation to find ways to optimise resource use. The experiences of many villages and action groups with environmental management provided the building blocks of the strategy proposed. The authors claim to have reconfirmed Gandhi's concept of "village republics". An approach which deserves serious attention. (CR)

**Local level institutional development for sustainable land use and Land tenure and sustainable land use** both edited by RJ Bakema. Bulletin 331 and 332. 1994. Royal Tropical Institute (KIT), Mauritskade 63, NL-1092 AD Amsterdam, Netherlands. 63pp + 47pp.

## • COURSES •

**Conflict Resolution in Natural Resource Management**, 19 Sept - 7 Oct 1994, offers methodologies to resolve conflict situations, based on analysis of real cases. Contact: Felipe Matos, Natural Resources Program, University for Peace, Apdo 138, 6100 Ciudad Colon, Costa Rica.

**Women and Environmental Management: Gender Balance in Environmental Management**, 7 Nov - 9 Dec 1994, is a course presented by ANUTECH and the Australian National University for resource planners and environmental managers from government and non-government sectors. Contact: Valerie Brown, ANUTECH, Canberra 0200, ACT, Australia, Fax +61 6 249 5875.

**International Training Programme on Environmental Technology and Sustainable Land Use** offers various 2-week courses for management staff of governmental and non-governmental development and research organisations. Courses include: *Design of soil and water conservation programmes under subhumid and semiarid conditions* (in cooperation with the Free University Amsterdam and Royal Tropical Institute), Nov 1994 and 1995: *Gender in policy development for sustainable land use* (in cooperation with ETC Foundation), Nov 1994 and 1995. Contact: International Agricultural Centre, Lawickse Allee 11, PO Box 88, NL-6700 AB Wageningen, Netherlands (fax +31 8370 18552).

**Land Tenure Centre (LTC)** offers postgraduate training as well as various short-term, non-degree courses about land tenure and natural resource management, including the use of PRA (Participatory Rural Appraisal) techniques. For further information, contact: LTC, University of Wisconsin-Madison, 1300 University Ave, Madison WI 53706, USA (fax +1 608 262 2141).

Both booklets came out of the 1991 KIT symposium *Management systems for sustainable agriculture in sub-Saharan Africa: strategies and tools for local environmental management development*. The first contains three papers on intervention strategies towards more local management of natural resources. The need to re-orient extension services and to gain the support of various administrative levels is stressed. Papers in the second booklet point to the unhappy co-existence of traditional and "modern" land-tenure systems, creating great uncertainty for farmers. The papers present an interesting mixture of learning experiences and debate. (CR)

**Women and the environment** by Annabel Rodda. 1991. Zed Books, 7 Cynthia St, London N1 9JF, UK. 180pp.

Examines the role of women as producers, consumers and managers of resources and as agents of change, and the effects of environmental degradation on women's lives.

**Cattle, women and wells: managing household survival in the Sahel** by Camilla Toulmin. 1992. Oxford: Clarendon Press. 295pp. £37.50.

Describes life in the village of Kala on the northern edge of the farming zone in Mali, how villagers have adapted their farming system to drought, how they have invested in animal traction and built up cattle herds, and how they manage the extended households so that members want to continue to live and work together. Many families invest in soil fertility by having wells dug to provide water for migratory herds in the dry season. In exchange, the herders keep their cattle overnight on the fields to deposit manure. This transfer of nutrients from grazing to farming areas has led to good millet harvests. The village's success may be due to the relatively low population density and its isolation from government and "development" activities, so that the villagers could manage their resources as they know best, without outside interference. (AWB)

**UNRISD** (United Nations Research Institute for Social Development) has carried out

numerous multidisciplinary studies on natural resource management in different parts of the globe. Results are disseminated through conferences and publications. Of particular interest regarding landcare issues are *Development, environment and people*, based on a conference on Social Dimensions of Environment and Sustainable Development, and discussion

papers *Land tenure and deforestation* by P Dorner and W Thiesenhusen, *Ecological knowledge and the regional economy* by Kojo Amanor and *Indigenous natural resource management in pastoral areas of southern Africa* by Charles Lane. More information and a list of publications can be obtained from: Reference Centre, UNRISD, Palais des Nations, CH-1211 Geneva 10, Switzerland.

**Women, conservation and agriculture: a manual for trainers in Commonwealth Africa** by Cecile Jackson et al. 1992. Commonwealth Secretariat, Marlborough House, Pall Mall, London SW1Y 5HX, UK. 204pp. This practical manual was discussed in ILEIA Newsletter 9/3 (1993), and is available from the Women and Development Programme of the CommSec.

## • PRIMARY ENVIRONMENTAL CARE •

*Lessons learned in community-based environmental management* form the basis for a new approach to sustainable development called Primary Environmental Care (PEC). In 1990, more than 30 professionals in environmental and social sciences, health and development aid met in Siena, Italy, to discuss local environmental management in developing countries. After analysis of several case studies, some basic lessons were drawn:

- Good management of local environments is essential for national environments and economies
- For the management of local environments to be effective, environmental protection must be clearly linked with the satisfaction of the needs of local people
- A human culture cannot be defined from outside: social change is sustainable only when the concerned groups and individuals are fully involved in deciding about it and trying it out.

These lessons led to the formulation of guidelines for PEC. This is defined as a process by which local communities - with varying degrees of external support - organise themselves and strengthen, enrich and apply their means and capacities for the care of their environment, while simultaneously satisfying their needs. In synthesis, PEC tries to integrate three objectives:

- protecting the local environment
- meeting people's needs
- empowering the local community.

To make this possible, "fostering conditions" must be created by policy-making bodies and support institutions. It is necessary that:

- government allows people to organise and have a say in decisions over environmental management
- people feel secure in terms of access to resources and to benefits from investment in them
- society promotes an equitable distribution of resources and services
- information circulates freely
- professional disciplines and sectoral agencies recognise that communities have knowledge and skills
- diffusion of new technologies is based on a dialogue with local people, building on what is already there
- decentralised services provided by government agencies and NGOs respond to community needs rather than trying to control local activities
- a legislative framework exists that correctly assigns the costs and benefits of environmental protection and regulates the exploitative tendency of markets
- communities have access to financial resources such as credit facilities and can use as collateral the natural resources they have safeguarded
- communities have access to regulated markets and reliable market information
- sufficient time is given for people to understand, plan and develop specific agreements in partnership with a variety of social actors. This means: no more quick projects concocted in far-away offices.

Several international organisations such as UNICEF, IUCN and IIED regard the PEC approach as a bridge between the concerns of environmentalists, development workers and human rights advocates, and as a rallying point for a better quality of aid. Dialogue with NGOs throughout the developing world has been continuing since the Siena workshop, and efforts are being made to persuade governments and aid agencies to adopt PEC as a strategy for environmental aid.

On 4-8 July 1994 a large international workshop will be organised by IIED under the title "Community-Based Sustainable Development". This workshop will deepen understanding of how PEC could be and is being implemented in the field.

The proceedings of the 1990 workshop in Siena can be obtained from the International Course for Primary Health Care Managers at District Level in Developing Countries, Istituto Superiore di Sanita, Viale Regina Elena 299, I-00161 Rome, Italy. More case studies on PEC have recently appeared in the book *The Wealth of Communities* published by Earthscan, 3 Endsleigh St, London WC1H 0DD, UK. Information about the outcome of the July 1994 workshop can be obtained from IIED at the same address in London.

Grazia Borrini, IUCN, CH-1196 Gland, Switzerland, Fax +41 22 999 00025.

• TOP FIVE •

A team of external advisors has been helping us prepare this issue: Ab van Eldijk of the Department of Agricultural Law at Wageningen Agricultural University, Ben Haagsma from the CDCS at the Free University of Amsterdam, and Rita Joldersma from the Royal Tropical Institute. They suggested the following books as the best publications they know about local management of natural resources.

-1-

**Good farmers: traditional agricultural resource management in Mexico and Central America** by Gene Wilken. Berkeley: University of California Press. 1987. US\$ 47.50. Traditional farmers have developed effective means of managing soil, water, climate, slope and space. It is fascinating to read how they use the natural forces of gravity, wind and water to improve crop environments, thus enhancing yield levels. Many practical examples illustrated with photographs and drawings are given. It shows us that erosion should not just be regarded as a destructive phenomenon; depending on local conditions, it can be positively manipulated by farmers. More importantly, this book argues that the substitution of these traditional farming techniques by modern technology should be viewed with utmost caution in many areas. Instead, understanding and improving traditional resource management may be a much more effective strategy to support local farmers and enhance food production.

-2-

**Land husbandry** by Norman Hudson. London: Batsford Ltd. 1992. £30.00. As one of the world's leading authorities on soil and water conservation, the author confronts us with the recent huge changes in thinking on land use and degradation. The title itself exemplifies this evolution: away from the narrow engineering approach of soil and water conservation in the 1970s towards the currently accepted and much wider concept of good land husbandry. This easily readable book depicts his personal thinking as

well. It includes special chapters on resource management in semi-arid marginal areas and on steep slopes.

-3-

**Soil and water conservation in subsaharan Africa: towards sustainable production by the rural poor** by the Centre for Development Cooperation Services (CDCS), Free University, Amsterdam. 1992. This report has been produced for IFAD and it is based on CDCS' long-term involvement with IFAD-funded soil and water conservation (SWC) programmes. Some introductory chapters describe land degradation, traditional and colonial responses to it and the main lessons learnt. The main chapters cover issues of programme design and strategy, describing technical, socioeconomic and institutional factors. The report draws special attention to traditional SWC methods as important starting points for programme design. A 30-minute video has also been produced, highlighting the field experiences from Lesotho, Burkina Faso and Niger.

-4-

**Soil mining: an unseen contributor to farm income in Southern Mali** by F van der Pol. Amsterdam: Royal Tropical Institute (KIT). 1992. Dfl. 15.00. This study presents a quantitative analysis of soil degradation in Southern Mali, and is of great help in discussions on the nature and severity of the problem. It shows that current production systems are not sustainable and discusses the impact of technical options, underlining the importance of a favorable policy environment for investments in soil fertility.

-5-

**More people, less erosion: environmental recovery in Kenya** by M Tiffen, M Mortimore & F Gichuki. Chichester: Wiley & Sons. 1994. £ 22.50. This book gives a historic overview of land use and different approaches to combat land degradation in Kenya and the lessons learnt. It challenges the perception of population growth causing environmental degrada-

• NEWSLETTERS •

**The Common Property Resource Digest** is a newsletter devoted to community-based resource management, issued by the International Association for the Study of Common Property (IASCP). It brings information on ongoing and planned research activities related to common property, and announcements about meetings, courses, publications, vacancies etc. It is currently being published in cooperation with Winrock International Institute for Agricultural Development by the Economics Group, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Andhra Pradesh 502324, India (fax +91 842 2412393).

**PLEC News and Views** is a newsletter published twice yearly by the United Nations University project of collaborative research on Population, Land Management and Environmental Change (PLEC). Reports are brought from the PLEC research clusters in West Africa, East Africa, Thailand, Papua New Guinea, Brazilian Amazonia and Nepal, as well as short papers, also from other parts of the world. Contact: Harold Brookfield, Editor, Dept of Anthropology, Australian National University, Canberra ACT 0200, Australia (fax +61 6 2494896).

**Gestion des terroirs et élevage**, No. 16 (Sept 1992) of the journal *La Lettre du Réseau Recherche-Développement* focuses on land rights and local-level resource management in Africa which includes attention to the needs of livestock-keepers and their relations with crop farmers. This journal and more information about the Research-Development network can be obtained from: GRET, 213 rue La Fayette, F-75010 Paris, France.

**Proceedings of Local-Level Adaptive Planning Workshop**, No. 11 of *RRA Notes* (May 1991, 86pp), reports the discussions and findings of a workshop which took stock of experiences in local-level participatory planning processes. It also contains the summary papers. The workshop looked at the role of RRA (Rapid Rural Appraisal) in adaptive planning, institutionalisation of adaptive planning, methods and training issues, approaches to scaling-up and scaling-down, working with government or NGOs, and changing organisation and management "cultures". Also other issues of *RRA Notes* bring short accounts of field experiences of applying RRA in participatory planning. Current and back issues can be obtained from: IIED, 3 Endsleigh St, London WC1H 0DD, UK (fax +44 71 3882826).

tion and inspires hope, as it puts emphasis on the capacity of farming systems to adapt to changing conditions. One of the explanatory factors might be that ideas are more easily generated and circulated in areas of higher population density.

In addition, three articles were suggested as giving a very good background to concepts of property rights to natural resources:

- **Capitalism and the changing concept of property** by CB Macpherson, in: E Kamenka & R Neale (eds), *Feudalism, capitalism and beyond*, pp 104-25. London: Edward Arnold. 1975.

- **A perspective on indigenous land tenure systems and land concentration** by JW Bruce, in: RE Downs & SP Reyna (eds), *Land and society in contemporary Africa*, pp. 23-53. London: University Press of New England. 1988.
- **Levels of property rights, levels of law: a case study from the Northern Philippines** by MG Wiber. *Man* n.s. 26 (1992), pp 469-92.

# 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.

## New technology for peanuts

*in the ILEIA Newsletter "After the harvest", Barbara Böni wrote how women in Mali developed an improved press for palm oil. In this article, Mansour Fall tells his story of improving a press for peanuts.*

### Mansour Fall

**P**eanuts are no small potatoes in Senegal. As the country's primary export, this "miracle crop" is a food source, income generator, animal sustainer - and a major dilemma. Peanuts grow and survive under conditions that few other multi-purpose crops could withstand. Under ideal conditions, their nitrogen fixation qualities help improve soil fertility. Peanut sales are always guaranteed at a fixed price which is often slightly better than nothing but sufficient to make life livable for a few more months at least. However, producing peanuts as a monoculture over a prolonged time without an adequate fallow period is a major cause of soil degradation in the 60,000 km<sup>2</sup> zone known as the Peanut Basin. Another drawback is that, when improperly handled and stored, peanuts can produce fungi and mold containing hazardous aflatoxin.

Despite such environmental liabilities, as most Senegalese grandmothers will testify, this crop is a tough nut to crack when it comes to versatility. Peanuts can be eaten raw or enjoyed roasted as a snack. They are irreplaceable in the traditional Senegalese meal of boiled rice and peanut stew and they make other dishes more palatable. As an added bonus, peanuts are biodegradable. The straw, the hulls and the meal are fed to animals whose very survival depends on these by-products. The hulls can also be used as fuel, replacing firewood and charcoal which are becoming increasingly expensive for the pocketbook and for the environment. Perhaps most importantly, peanuts provide the only source of vegetable oil available in Senegal, which is the principal producer and exporter of peanut oil in Africa. The National Oil Factory pro-

duces it commercially at prices that most Senegalese women can ill afford. But with a little imagination and a lot of back-breaking work, they have always managed to produce their own peanut oil. As a child, I remember my grandmother shouting for me to appear toute suite to give the oil press an extra twist, squeezing the last drop out of the crushed peanut meal inside. It was nice to be a hero. My ability to "pump iron", even if it was a peanut press, always won Grandma's heart.

### Looking for change

Over the years, things have changed. Grandma has long since retired from the pressing business. I've grown up and moved several hundred kilometers away from home. Even the peanut isn't the same: it's smaller and produces more oil. The only thing that hasn't changed is the press.

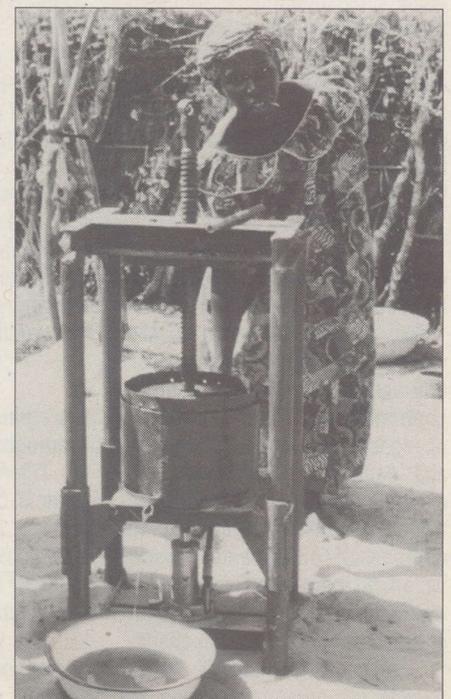
The traditional oil press, in use since the dawn of peanut civilization, consists of a "right side up technology." Heavy steel plates are attached to a screwing device which is installed inside a perforated metal bowl. The peanuts, which are first broken and crushed, are poured into a jute bag and placed in the perforated container. The plates are then screwed down tightly. Once the required pressure is reached, they are locked in place for about an hour, until the oil flow diminishes. To capture the last few precious drops, the screw must be turned manually - strenuous work for the women who do this daily. Finally, the peanut meal becomes a rock-hard block and the plate can budge no further. It is then unscrewed, the meal is removed and the process is repeated.

Many attempts have been made to lighten Grandma's work but the results hardly amounted to, well, peanuts.

Designers tried to devise a mechanism which would maximum give pressure with minimal effort. This was not an easy task for local craftsmen and importing presses was not feasible. Shipping and handling costs alone would outweigh yearly profits.

### Answer found in museum

During a recent trip to Canada, I observed a sunflower milling press on display in a Quebec agricultural museum. To the North American, it was an obsolete tool preserved for nostalgia. For this African, it was an ingenious technology idea waiting to be born. Its secret seemed unbelievably simple. I dubbed it the "upside down" technology. The sunflower seed press used the same principle as the peanut press but in reverse. A simple car jack was all that was required to make Grandma's life a lot easier. Instead of applying the pressure right side down on the steel plates as in the traditional peanut press, the new technology applies force upside down, using a hydraulic auto jack. It is installed under the press, squeezing the plates upward which requires far less exertion. It is the perfect model of truly appropriate technology in a development setting as it is



- low cost
- easy to construct, maintain and repair locally.
- a significant time and labour saver
- readily adapted, requiring little training or transition period by users
- likely to inspire local craftsmen to innovate ideas for other devices
- easily operated by women and children and is fun to use.

Once home in Senegal, I got down to work with local blacksmiths. We figured out the technical specifications and moved right to the production of a proto-type. There was nothing complicated about it. Within 50 days we had a new product ready for a trial run. Who better to test drive it than Grandma? At 90 years old, she could hardly screw in a light bulb. But with the new machine, but even she managed to squeeze out much more oil using the new technology.

### Successful enterprise

World Vision's Women in Development (WID) team began conducting product test surveys about the press with village women's associations. The acceptance rate was impressive. The cost was so low and the income generating potential so high, that practically every village could afford one. Orders poured in. Our project evaluation team went back to the drawing board, working with three blacksmiths to refine the design. They are now independently producing the presses and selling them to villagers. Over the past year, 30 units have been sold to women's groups in villages where World Vision is working. Fifty more units have already been ordered, and many more requests are expected.

In addition to easing the women's own workload, the presses provide an additional source of income. The women's associations who own the presses charge 10% of the amount of oil pressed for use of the machine. For example, for a typical day's work of 320 litres pressed, the fee is 32 litres of oil. This can be quickly sold below the market price of 250 FCFA per litre for a revenue of 8,000 FCFA. Depreciation cost on the machine is a mere half franc per litre of oil pressed. Labour costs are nil as the women in the association take turns running the machine voluntarily. It is rewarding to know that these 75,000 FCFA machines play a more useful role than inappropriate milling machines (costing 1 million FCFA) installed in some communities which have since been abandoned because of unforeseen maintenance problems.

We do not expect the new press to revolutionise the country, although it would allow Grandma to produce single-handedly enough oil for her whole village.



Mansour Fall, World Vision Senegal, BP 51, Thies, Senegal.

*Indigenous green leafy vegetables play a big role in the diet of many people in Zimbabwe despite considerable consumption of exotic vegetables. Some of them are very good sources of vitamins, proteins and minerals. They are adapted to their environments especially in relation to temperature, moisture and soil fertility. Some are drought tolerant, many are fast growing or can be harvested early. The leaf production is often extensive and the vegetables can be harvested at any time.*

## Indigenous vegetables

### challenge to researcher, extensionist and consumer

Elijah Mwashayenyi

**V**egetable jute (*Corchorus olitorius*) is a leafy vegetable found in Zimbabwe. It is known by various names like long-fruited jute, jute mallow, jews mallow and bush okra (Tindall, 1983). The plant is an erect annual herb with angular stem and branches without hairs and ovate-lanceolate leaf blades with toothed margins (Drammond 1984). It is particularly important in those areas of West Africa and other tropical countries where staple diets consist of starchy food-stuffs like rice, cassava, maize and yams. It is used to complement these foods (Fawusi, 1983). It is nutritious, high in vitamin C and protein, two important nutrients often found lacking in tropical diets. In fact, its vitamin C content is higher than that of citrus. The young shoots, seeds, pods and leaves can be used as food although the leaves are mainly used in most countries.

In Zimbabwe, vegetable jute leaves are eaten as a spinach with the staple diet "sadza", a thick porridge made of maize meal. Known locally as "gusha", "derere" or "idelele", the plant grows naturally during the rainy season and is left out in the field during weeding (Drammond, 1984). The crop is harvested later. It virtually disappears in the winter, having flowered and set seed. This vegetable is particularly important because it comes at a time when Brassicas, which dominate Zimbabwe's leaf vegetable market, are almost non-existent being cool season crops. The demand for vegetables is great during this time and yet the supply is often poor, especially in the hottest parts of the country. Yet a considerable proportion of the Zimbabwean consumer has developed a liking for exotic vegetables and indigenous vegetables such as vegetable jute are considered inferior.

### Neglected by researchers

Although there has been considerable work on jute as a fibre crop and some work on it as a vegetable elsewhere, virtually nothing has been done on it in Zimbabwe where it is still largely classified as a weed, albeit a beneficial one. One of the few references available in the country is a booklet entitled *Arable weeds*

of Zimbabwe, which indicates the level of attention given to the crop. Not even the seed can be found on the seed market. The very few communal and irrigation scheme farmers who seem to be taking this crop seriously rely on volunteer plants which they may thin into lines and manage them. Again, just like most indigenous vegetables, this crop is associated with poverty and hence is shunned by many. As a result the vegetable has not been fully domesticated and its germination and management requirements remain virtually unknown. The recent series of droughts in Zimbabwe (and in Southern Africa as a whole) pose a threat to the existence of the vegetable if it remains undomesticated.

### The challenge

There is need to educate the consumer (particularly the urban consumer!) on the importance of indigenous vegetables. There is need for researchers and extension staff to work tirelessly on these crops, before they become the lost crops of the tropics. There is need to cultivate and improve indigenous vegetables for the sake of increased food supply and improved nutrition. There is need to research low-cost environment friendly inputs to be used on these crops. In short, there is need to conserve indigenous vegetables.

The Horticulture Research Institute and the Extension Department of Zimbabwe started a survey aiming to assess the role played by indigenous vegetables in the communal areas of Zimbabwe. The survey is largely based around small scale irrigation schemes or any other place where vegetables are irrigated. Hopefully this will form a basis for future indigenous vegetable work.



Elijah Mwashayenyi, Chiredzi Research Station, Box 97, Chiredzi, Zimbabwe.

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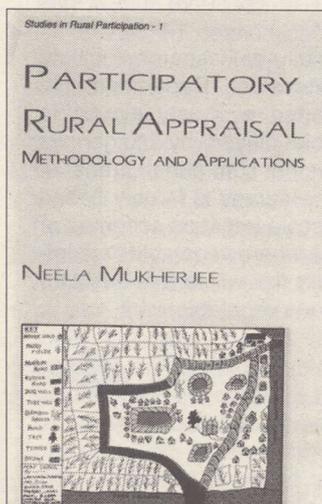
- Drammond, RB. 1984. *Arable weeds of Zimbabwe*. Harare: Agricultural Research Trust.
- Fawusi, MOA. 1983. *Quality and compositional changes in Corchorus olitorius as influenced by nitrogen and post-harvest handling*. In: Scientia Horticulturae, 21:1-7.
- Tindall, HD. 1983. *Vegetables in the tropics*. London: Macmillan.

**Ethnobiological classification: principles of categorization of plants and animals in traditional societies** by B Berlin. 1992.

Princeton University Press, 41 William St, Princeton, NJ 08540, USA. 335 p. ISBN 0 691 09469 1. £35.

A beautiful book, but expensive. The author is an authority in the field of ethnobiology. He detects numerous similarities in the way traditional societies name the plants and animals in their local environment. It is remarkable that these similarities exist across different environments, cultures, societies and languages. Berlin argues this is so because of the similarity of human beings' largely unconscious appreciation of the natural affinities among groupings of plants and animals: people recognise and name a grouping of organisms quite independently of its actual or potential usefulness or symbolic significance in human society. The first part of the book analyses individual systems and infers from these a general classification. Part Two studies the underlying processes involved in the functioning and evolution of ethnobiological systems in general. The book addresses primarily the scientific community and the student of indigenous knowledge. (WB)

**Participatory rural appraisal: methodology and applications** by N Mukherjee. 1993. Concept Publishing Co., Ashok Kumar Mittal, A/15-16, Commercial



Block, Mohan Garden, New Delhi 110059, India. 160 p. ISBN 81 7022 473 X. Rs 200.  
A study on rural participation based on Participatory Rural

# NEW IN PRINT

Appraisal (PRA). The book explains concepts and methods of PRA (such as interviews, maps, transects, seasonal diagrams, ranking, Venn diagrams, routine diagrams, livelihood analysis) and elaborates on applications of PRA (poverty, gender issues, health) in the context of rural India. The final chapter deals with policy measures resulting from PRA, and also discusses limitations of the PRA methodology, particularly the rapidity with which PRAs are often conducted, but also the failure to meet the participants' expectations. A very useful and complete book. (WB)

**Promotion of non-wood forest produce through social forestry** by NG Hegde, JN Daniel. 1993. BAIF Development Research Foundation, Kamdhenu, Sanapati Bapat Rd, Pune 411 016, India. 247 p.

Proceedings of a workshop on minor forest resources (such as gum, wax, medicinal herbs, fruits, nuts and oil seeds). Such non-wood resources have received relatively little attention from researchers, although they play an important role in meeting the subsistence needs of rural people and as a source of additional income. Themes addressed during the workshop were: identification of multipurpose tree species for non-wood forest produce; collection, processing, marketing and infrastructural needs for non-wood forest produce; potential of non-wood forest produce for income and employment generation. (WB)

**In defense of livelihood: comparative studies on environmental action** by J Friedmann, H Rangan (eds). 1993. United Nations Research Institute for Social Development (UNRISD), Palais des Nations, CH-1211 Geneva 10, Switzerland. 219 p. ISBN 1 56549 020 7. US\$ 21.95. Kumarian Press, 630 Oakwood Ave, Suite 119, West Hartford CT 06110-1529, USA. Contains seven case studies from

Africa, Latin America and Asia documenting environmental movements that integrate the needs of local people interacting with institutions at regional, national and global levels. Environment and social practices are tightly interwoven, and any attempt at environmental conservation that does not take into account the local people's access to natural resources needed for their livelihood is bound to fail. The cases vary greatly: soil erosion control in northeast Tanzania, gum arabic economy in Senegal, resistance by smallhold-



ers against large dams and subsequent displacement in southern Brazil, rubber tappers in Amazonia, squatter communities in Mexico City, popular resistance in the Indian Himalayas against the Chipko movement (thought to have become too much centrally controlled), and community forestry programmes in India. Together they clearly demonstrate the editors' views on social participation. (WB)

**Taungya: forest plantations with agriculture in southeast Asia** by CF Jordan, J Gajaseni, H Watanabe (eds). 1992. CAB International, Wallingford, Oxon OX10 8DE, UK. 149 p. ISBN 0 85198 801 6. £ 27.50. With the present rates of deforestation, forest management in the tropics is anything but sustainable. As natural forests disappear at an alarming rate, some

other way must be found to produce timber and other forest products. Plantation forestry was thought to be an answer, but plantations have often not been a success because of land-tenure conflicts with a growing rural population. In response to such conflicts, taungya forestry has arisen as a system in which peasants are allowed to cultivate crops for the first few years between the seedlings of a forest plantation. The peasants themselves plant the seeds or seedlings and tend the trees. Recently, social and economic benefits to participating families have also been introduced. Trees are central in taungya, other than in agroforestry where field crops are the primary concern. This book describes the history and current practices of taungya as it has developed in Southeast Asia since its introduction to Burma in the 1860s, and assesses its strengths and weaknesses. Taungya is not as socially concerned as is social forestry and smallholders are not necessarily the main economic beneficiaries. The book is a very well written and interesting analysis of the taungya system. A pity it is so expensive. (WB)

**Pesticides, rice productivity, and farmers' health: an economic assessment** by AC Rola, PL Pingali. 1993. International Rice Research Institute (IRRI), PO Box 933, 1099 Manila, Philippines; World Resources Institute, 1709 New York Ave NW, Washington DC 20006, USA. 100 p. ISBN 971 22 0037 X. US\$ 57.50. Studies the adverse effects of pesticides on the rice ecosystem and the farm household. A method is provided for evaluating pest management techniques not only in economic terms (input prices, production risks, net returns) but also for the effects of pesticides on human health. In the evaluation, curative applications are compared with prophylactic applications and integrated pest management practices. When including health aspects, net benefits of pesticide use in the areas studied were negative. This means there is still a strong incentive to look for other, more sustainable, pest-management technologies. Often, the natural control option, relying on natural enemies by conserving their habitat, turns out to be the most prof-

# NEW IN PRINT

itable option. An important study, but many of the findings are presented in statistical terms, which makes the report accessible mainly to a scientific public. Fortunately, there is a very clear initial chapter with general conclusions. One wonders why such a small booklet must cost US\$ 57.50. (WB)

## **Jachères améliorées: options pour le développement des systèmes de production en Afrique de l'Ouest** by H

Hoefsloot, F van der Pol, L Roeleveld. 1993. Royal Tropical Institute (KIT), Mauritskade 63, 1092 AD Amsterdam, Netherlands. 86 p. ISBN 90 6832 820 4. Dfl 20 (Bulletin / KIT, ISSN 0922 7911 ; 333).

A literature study on improved fallow as a substitute for natural fallow, no longer adequate in the West African savannas because of increased population pressure resulting in too short fallow cycles. As intensification of agricultural production has not kept pace with population growth in this region, increased land use has led to a reduction in soil fertility and widespread erosion. It is argued that improved fallow could intensify agriculture without reducing soil fertility. In this system, the plots under fallow are sown and cultivated, mostly for forage production. The central question is whether an improved fallow of 3-5 years could emulate a natural fallow of 15-20 years. The study deals principally with the technical and quantitative aspects of the problem. Still, there is some attention to farmers' acceptance of this innovation: although farmers see the advantages offered by improved fallow, they judge it hard to include in the farming system. Also to be addressed in future research are questions like how to keep out animals and how to protect the fallow plots against overexploitation. (WB)

## **Sustaining growth: soil fertility management in tropical small-holdings** by KM Mueller-

Saemann, J Kotschi. 1994. German Agency for Technical Cooperation (GTZ), PO Box 5180, D-65726 Eschborn, Germany; Technical Centre for Agricultural and Rural Cooperation (CTA), PO Box 380, 6700 AJ Wageningen, Netherlands; Verlag Josef Margraf, PO Box 105, D-97985

Weikersheim, Germany 486 p. ISBN 3 8236 1226 3.

A technically-oriented text on how to conserve soil fertility, the heart of sustainable agriculture systems. The book is packed with facts and figures, and is intended as a state-of-the-art overview of recent research findings. The layout is transparent, and editing has been done carefully. Listed are a range of practices capable of enhancing sustainability of farming systems. The focus is on smallholdings in the tropics. Techniques described include agroforestry, intensive fallowing and green manuring, the use of mulch, compost, stable manure and natural symbionts. The aim of all these practices is to maintain soil fertility using a minimum of external inputs. There is much attention to indigenous knowledge on fertility management. In view of its size and many cases (tending to be comprehensive rather than selective), the book is accessible above all to a scientifically-oriented readership. (WB)

## **Reality in rural development aid: with emphasis on livestock**

by ER Orskov. 1993. Rowett Research Services, Greenburn Rd, Bucksburn, Aberdeen AB2 9SB, UK. 88 p. ISBN 0 9520688 0 X. £ 8.

A specialist in animal nutrition who has evaluated numerous projects in Asia and Africa is very frank in expressing his views about conventional technical aid in livestock production. Of particular interest is his realistic assessment of the biotechnical constraints and possibilities of improving animal breeds and feeds and of developing milk production. With examples from his personal experience with smallholders and development professionals, the author reminds us how site- and culture-specific everybody's perception of "normality" is, causing false expectations and blindness to primary problems. "Modern" technology-led approaches to livestock development have squandered financial and human resources and

have had, on the whole, more negative than positive effects on smallholder livestock-keepers. The few positive cases of research and extension have been initially small-scale: learning from rural wisdom and exploring possibilities of low-external-input innovations together with a few livestock-keepers. This very readable book continues in the "tradition" of Robert Chambers' *Rural Development: Putting the Last First*, with a special concern for livestock development. (AWB)

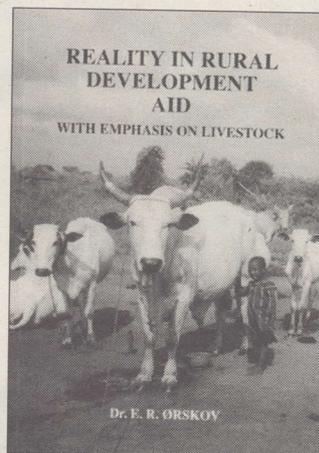
## **Agricultural production: ecological limits and possibilities: contribution to the Sahel ecology, economy and demography study**

by S van der Graaf, H Breman. 1993. Centre for Agrobiological Research (CABO-DLO), PO Box 14, 6700 AA Wageningen, Netherlands. 40 p. Written in the framework of a study for the Club du Sahel on relationships between ecology, economy and demography. This paper pleads for intensification of agriculture in order to boost rural development in the Sahel. If Sahelian countries are to keep up with population growth, without further deterioration of the eco-

cal nitrogen fixation, agroforestry, chemical fertilisers, and - in the framework of the *Projet Production Soudano-Sahélienne* - integrated agriculture. The latter term encompasses elements of ecological and intensive agriculture. The report concludes that the natural resources are being overexploited, and more nutrients must be made available for increased agricultural production. But it has been demonstrated elsewhere that economic use of chemical fertilisers is difficult in the Sahelian context. It is argued that solutions will have to be found which combine technical and socioeconomic measures, but such options have not been worked out further in this report. (WB)

## **Qualitative enquiry for rural development: a review** by J

Moris, J Copestake. 1993. Overseas Development Institute (ODI), Regent's College, Regent's Park, Inner Circle, London NW1 4NS, UK. 117 p. ISBN 1 85339 215 4. US\$ 17.50. Intermediate Technology Publications (ITP), 103-105 Southampton Row, London WC1B 4HH, UK. Pleads for the recognition of qualitative methods of enquiry during surveys, as a fast and cost-effective way of obtaining information for rural development management. Often, qualitative information is considered to be subjective, verbal and descriptive, but such a qualification could also be applied to much so-called quantitative research. Strict quantification of data leads to rigorous statistical analysis, but at the same time, the number of assumptions for the results to be valid increases, and, therefore, the applicability decreases. The authors stress that, for best results during surveys, a combination of qualitative and quantitative methods should be used. Useful reading for all interested in rural appraisal and project evaluation. (WB)



nomie situation, agricultural production should increase by 4% each year. The paper examines whether this increase is at least theoretically possible. All technical options for increased production are studied: manure, biologi-

# ILEIA NEWS

## Traditional micro-organism management

"We patterned this village-level method of Rhizobia production from a traditional Chinese method and tested it in 1983. When the mung bean reaches flowering stage, which is the peak of nodulation, it is uprooted, washed and hung under the shade. When you have to plant another crop of mung bean, you get the dried nodules and crush it in coconut water, preferably young coconut, and use it to inoculate the mung-bean seeds. The coconuts were our innovation and in our field trials the crop stand was better. We had no farmer-adopters then". Are you aware of other traditional practices of farmers to *consciously* manage micro-organisms to improve soil fertility? The above example comes from Hil Padilla, Philippines. ILEIA and Free University of Amsterdam are compiling a book on rural people's biotechnology (to make biotechnology programmes more demand-driven), but it's hard to find information on this subject. Yet many farmers used seed treatments (eg. China and Peru) and knew the benefits of Azolla (eg. Bontoc rice farmers). Some even transferred soil to inoculate new fields. Traditional farmers noted the benefits of using organic matter but, for example, did they know of the resulting suppressive effect of micro-organisms in the soil on soil-borne diseases? What are local practices and how can they be improved? On the other hand, have improved biofertilisers from the laboratory had negative effects on the farm system? Please share your experiences and with us and send (or guide us) to relevant documents. Send your reply to: ILEIA, Attn, Wim Hiemstra.

## Contribution

Fungameza D and PG Fischenich. **Planning the better use of natural resources in the North Pare Mountains, Tanzania: The participatory land use planning and the catchment approaches.**

Describes the experiences with land use planning in the context of a larger development project, in which villagers are given the key role. To facilitate problem analysis and enhance interaction among villagers and between villagers.

and field staff physical village models of paper and glue (1.5m x 0.75m) are used. A video prepared with villagers is an important tool in awareness creation. The cover photo and photo with the editorial are from this article. GTZ - TFAP North Pare Project, P.O. Box 195, Mwangi, Kilimanjaro, Tanzania.

## Future issues

This year's fourth issue is titled "Farming at Close Quarters". We have already received some interesting offers for this newsletter, but you are still invited to contribute. Perhaps you have experiences to share on your schoolgarden project? Or maybe you developed an ingenious way to grow herbs on your roof? We would like to take a look at how people manage to produce food and

generate income when they have access to little or no land. Particular attention will be paid to intensive, integrated production of crops, trees and animals, including aquatic ones like fish, not only in rural home gardens but also in towns and cities. Please send your contributions by 1 September 1994.

The first issue of 1995 will again be a "Keep Rolling" issue. We invite you to react on any subject that you have read about in the ILEIA Newsletter. Contributions should be in our office before 1 December 1994.

## Rectifications

Due to limited space, we had to leave out a reference with the article of Brent Simpson "The lifeblood of agricultural change" in the last issue of the Newsletter.

Brent informed us that many people turned to him for more information. We would therefore like to inform you that copies of **Analysis of Service Delivery Systems to Farmers and Village Association in the Zone of the Office de la Haute Vallée** by RJ Bingen, B Simpson and A Bérthe (1994) is available from the Dept of Resource Development, Michigan State University, East Lansing, MI 48824-1222, USA. Individual copies cost US\$ 7 (postage included; for airmail add US\$ 7). Cheques should be made out to Michigan State University.

The report **Towards Benefiting the Poor**, by Brian O'Riordan mentioned at the end of his article "Low-input fish farming" in Newsletter 94/1 is available from the Food Security Unit, ITDG, Myson House, Railway Terrace, Rugby CV21 3HT, UK and not from the ITDG office in London.



## Photographers

*Quite a few people reacted to our call for photographers on the back page of the last issue. If you haven't seen it, but are a keen photographer in black and white, please write to us. Here's a photo that we received from Iran, showing a farmer ready for harvest.*

Photo: GD

**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.



**L'Atelier** is a new quarterly newsletter of the Fondation Rurale de l'Afrique de l'Ouest (FRAO) or West Africa Rural Foundation (WARF), which is continuing the activities of PRAAP (Programme de Recherche-Appui des Associations Paysannes), a pilot programme that began in 1990 with the support of Development Innovations and Networks (IRED), the Ford Foundation and the International Development Research Centre (IDRC). FRAO/WARF aims at strengthening local organisations and promoting methods of participatory research and development. Besides the multilingual (French, English, Portuguese) newsletter, FRAO/WARF publishes manuals and reports on participatory technology development, produces audiovisual materials, holds regional workshops, gives training courses and provides advice to rural organisations. FRAO is presently working in Senegal, Gambia, Guinea Bissau, Guinea and Mali.

**Contact:** Fadel Diamé, FRAO, Rue 1 x D Point E, CP 13, Dakar-Fann, Senegal, Fax: +221-245755.

**The League for Pastoral Peoples** is an advocacy and support group for pastoralists relying on communal grazing. It is trying to improve the image of pastoralists among governments, NGOs and the general public by showing how important these people are for sustainable use of the world's drylands and for guarding the biodiversity of livestock breeds suited to particular ecological niches. Although the League is interested in herders worldwide, its regional emphasis is on Asia, particularly India. It asks researchers to provide information on the situation of pastoral groups in Asia, as well as on the social processes involved in forming local livestock breeds. The League recently issued a booklet "Sustainable arid land development: projects for and with camel pastoralists".

You can obtain a copy, as well as information about the League and its Newsletter, from The League for Pastoral Peoples, Pragenslostr. 20, D-6105 Ober-Ramstadt, Germany (Fax +49-6154-53642) or Dr SM Mohnot, School of Desert Sciences, 109 Nehru Park, Jodhpur, Rajasthan, India.

**The Pastoral Development Network (PDN)** links natural and social scientists, civil servants, teachers and practitioners interested in pastoral peoples and rangeland policy in developing countries. Members contribute to and receive a regular newsletter on activities and publications related to pastoral development, and papers discussing pastoral issues and field experiences. Annual subscription is £15 or agreement to exchange regular publications. Some membership places are reserved for people based in developing countries who have no funds. A register of members is distributed every 2 years, listing individuals and organisations, with a summary of professional details and recent work. The PDN welcomes new members.

**Contact:** Cathy Butcher, ODI, Regent's College, Regent's Park, London NW1 4NS, UK. Fax +44-71-487-7590.

**Pastoralism and pastoral migration in Gujarat**, edited by Ganesh Pangare, is a collection of papers presented at a recent workshop in India, where migratory livestock-keepers are under increasing pressure as cropping expands into their grazing areas. Having no formal rights to pasture, they have to adjust their patterns of movement so that they can continue to gain a livelihood from arid lands. The workshop proceedings and more information about pastoralism in India can be obtained from:

**Ganesh Pangare**, Institute of Rural Management, Anand 388 001, India (Fax +91-2692-23719).

**In order to cope with** an evergrowing need to provide sufficient and better food to a permanently increasing world population, but also to reduce con-

stantly worsening environmental conditions due to current agricultural practices, CINADCO, the Israeli agricultural organisation for technical assistance to developing countries, together with the Israel Ministry of Foreign Affairs, is organising a course and workshop on Regenerative Agriculture. The course runs from 15 November to 13 December 1994. Candidates should hold an academic degree and have at least five years' experience in their field of work.

**Further information:** Raanan Katzir, CINADCO, PO Box 7011, Tel Aviv 61070, Israel. Fax: +972 3 6971677.

**Your focus on communications**, arts and humanities/theatre projects and processes in the last issue was excellent. Industrial "agriculture" has taken the soul of agriculture away: people, community, land stewardship, what we need most are arts and humanities, music, stories and our cultural traditions which are the habitat for a sustainable agriculture. As Gary Nabham has said, to restore the land we need to re-story the land and our communities with *our* stories.

**Kamyar Enshayan**, PO Box 981, Cedar Falls, Iowa 50613, USA.

**An international workshop** on *Albizia* and *Paraserianthes* species will be held in Mindanao, Philippines, on 13-19 November 1994. The primary objectives are to increase the knowledge, use and research of these species. Appropriate information on any and all members of these genera is welcomed. Individuals interested in attending the workshop should submit an abstract of the research to be presented by 30 June 1994.

**Write to:** James Roshetko, Nitrogen Fixing Tree Association, 1010 Holomua Road, Paia, Hawaii 96779, USA.

**New electronic source for IPM information.** IPMnet is an electronic bulletin board offering individuals and institutions around the world free access to Integrated Pest Management information. This joint effort of the Consortium for International Crop Protection (CICP) and the National Biological Impact Assessment Program (NBIAP) is also structured to create a world-wide discussion and debate forum for strengthening and fostering IPM. For more information on how to participate

**Write to:** Alan Deutsch, IPMnet NEWS, c/o Integrated Plant Protection Center, 2040 Cordley Hall, Oregon State University, Corvallis OR 97331-2915, USA. e-mail: <deutsch@bcc.orst.edu>.

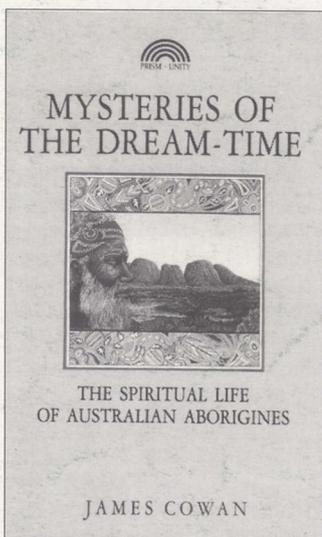
**The Natural Farming Network (NFN)** has really grown. It is an alliance of 12 Zimbabwean development agencies that promotes ecologically, economically and socially sound agricultural practices. NFN is an operational wing of the Zimbabwe Institute of Permaculture. The network seeks to reduce farmer dependency on external inputs by promoting sustainable agriculture and prudent use of the natural environment. Some activities are: staff training for member organisations and training of farmers, establishing working and inspiring examples of natural farming, gathering and disseminating information and new ideas on sustainable agriculture, strengthening institutional capacity of member organisations, coordinating policy activities and monitoring, evaluating and supporting initiatives in natural farming. Their latest activity is a pilot project with schools in partnership with the Ministry of Education to introduce permaculture into communities through schools. Students will study permaculture in the classroom and do practical work on the school grounds.

**Contact:** N.S. Muzuva, Director, Natural Farming Network, PO Box CY 301, Causeway, Harare, Zimbabwe.

## Aborigines care for their land

Australian Aborigines have learned the ways of living in harmony with the earth, for them a desert environment which demanded all ingenuity to survive. Aboriginal caring for the land is based on a sacred perspective on the natural world. Their spiritual life deals with the *Dreaming*: that mythical time when the Sky heroes created the earth. They fulfill sacred obligations through songs, rituals, dance, initiations, ceremonies and myths. Artistic expressions and rock paintings are created, also to record the sacred images. Spirit places and sacred rain centres are embedded and maintained in the landscape. Aborigines have a totemic identity, which unifies the Aborigine through a natural object, usually an animal or a plant, with his pre-existence, thus his sacred link with the

*Dreaming*. The landscape is an embodiment of mystical order, and therefore categories of sacredness can be seen in the landscape. It thus becomes a "Dreaming landscape". Aborigines recognise



how important the land is to help them recall events from the *Dreaming* Landscape is an important partner in the dialogue between mankind and earth. A visual language has been created out of rocks, contours, flora, fauna, etc. It is this bond that Aborigines have always observed, feeling themselves



A poster from the Australian CSIRO-DPI project "Improving Research through Extension".

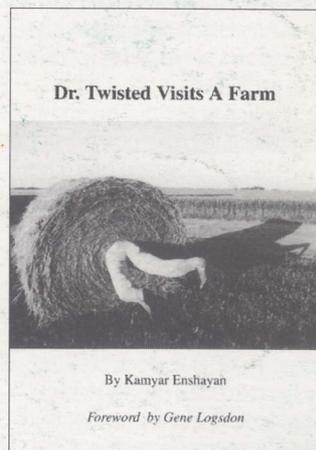
as heirs to a celestial landscape which must be handed down in a same condition as it came down to them. For Aborigines, the ancestors still exist in the landscape itself.

Cowan, J. 1989. **Mysteries of the dream time**, 1989. Prism Press, 2 South Street, Bridport, Dorset DT6 3NQ, England. ISBN 1-85327-038-5

## Pastoralists in Peril

Lebte Ngaynaaka Hannde (Pastoralists in Peril), a report by Mark and Karen Schoonmaker-Freudenberger with special reference to Senegal, is available in the Fulfulde language from Associates in Research and Education for Development (ARED), BP 5270, Dakar-Fann, Senegal. The English version can be obtained from the Drylands Programme of the International Institute for Environment and Development (IIED), 3 Endsleigh St, London WC1H 0DD, UK (Fax +44-71-3882826).

**Dr. Twisted visits a farm** is a booklet by Kamyar Enshayan, criticizing certain parts of the



researchers' community in a very humorous way. It can be ordered from the author, PO Box 981, Cedar Falls, Iowa 50613, USA.

## PTD Circular

Missed the halfyearly circular on Participatory Technology Development, inserted in the last issue of the ILEIA Newsletter? If you are interested to receive this 4-page update on recent publications, seminars and audiovisuals on PTD, please send us a note

## Next issue OPTIMAL USE OF RESOURCE FLOWS

Dealing with efficient recycling of resources to increase production. Scheduled to appear mid-October.

**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.5/No.4: Local varieties  
 Vol.7/No.1/2: Assessing farming techniques  
 Vol.7/No.3: Learning for sustainable agriculture  
 Vol.7/No.4: Searching for synergy (reprint) Let's work together  
 Vol.8/No.2: Livestock sustaining livelihoods  
 Vol.9/No.1: Keep rolling  
 Vol.9/No.2: Cutting back on chemicals  
 Vol.9/No.3: After the harvest  
 Vol.9/No.4: A strong case for diversity  
 Vol.10/No.1: A new look at information (issues not listed are out of print)  
 Please do not order more than four back copies

Also available: **Participatory Technology Development in sustainable agriculture: an introduction**. 1989. 40 pp. US\$7.50.  
**Le développement participatif de technologies**, a translation into French of ILEIA Newsletter Vol.4/No.3 (US\$). Third World readers may request a free copy.