

Abstracts on Sustainable Agriculture

Compiled by Jürgen Carls



VOLUME 3

1990



Deutsches Zentrum für Entwicklungstechnologien – GATE

Deutsches Zentrum für Entwicklungstechnologien – GATE – stands for German Appropriate Technology Exchange. It was founded in 1978 as a special division of the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH. GATE is a centre for the dissemination and promotion of appropriate technologies for developing countries. GATE defines „Appropriate technologies“ as those which are suitable and acceptable in the light of economic, social and cultural criteria. They should contribute to socio-economic development whilst ensuring optimal utilization of resources and minimal detriment to the environment. Depending on the case at hand a traditional, intermediate or highly-developed can be the „appropriate“ one. GATE focusses its work on three key areas:

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– *Research and Development:* Conducting and/or promoting research and development work in appropriate technologies.

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GATE has entered into cooperation agreements with a number of technology centres in Third World countries.

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Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH

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- providing an advisory service to other agencies also working on development projects
- the recruitment, selection, briefing, assignment, administration of expert personnel and their welfare and technical backstopping during their period of assignment
- provision of materials and equipment for projects, planning work, selection, purchasing and shipment to the developing countries
- management of all financial obligations to the partner-country.

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PREFACE

This is the third GTZ publication to bear the title "Abstracts on Sustainable Agriculture".

These Abstracts grew out of the supraregional intercropping project financed by the German Federal Ministry for Economic Cooperation (BMZ). Once the main objective has been reached the project itself was disbanded, but the Abstracts continued to be published, due to the high, and increasing interest of the users.

Intercropping, however, is just one of the many facets of sustainable agriculture, and it has thus been decided to expand the Abstracts to deal with a broader field. To do justice to the new, enlarged subject matter they have been renamed "Abstracts on Sustainable Agriculture".

The Abstracts are more comprehensive than the usual type of annotated bibliography but they cannot substitute the original publication. For details we advise the reader to refer to the original.

We hope that the Abstracts have a valuable role to play as part of the external input in the drafting of extension programmes. They make no claim however to offer tailor-made solutions. The responsibility for adapting the Abstracts to suit local conditions rests with the reader.

Readers interested in the Abstracts are asked to adress their request to:

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Eschborn, May 1991

Jürgen Carls
Editor

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GUIDE TO READERS

Selection of literature for the abstracts has been based on the following criteria:

- Ecological Aspects

- . Sustainability
- . Resource stability
- . Soil fertility
- . Diversity

- Socioeconomic Factors

- . Promotion of smallholders
- . Integrated systems (Animal-Man-Plant)
- . Transfer of knowledge
- . Low-external-input agriculture
- . Sociocultural aspects

- Locational Factors

- . Regional- and site-specific
- . Practice-oriented
- . Alternative uses

THE ABSTRACTS ARE SET UP IN THE FOLLOWING WAY:

- (1) Abstract number
- (2) Principal key-word: traditional land-use systems, cropping systems agroecology, agroforestry, farming systems research and development etc.
- (3) Key-words; if relevant, the geographical demarcation (continent, country) or the agroecological zone is given; the key words "review", "field trial", "field study" or "farm survey" indicate the nature of the paper; common names of field crops, soil fertility, pests, diseases, socioeconomic aspects etc. are used.
- (4) Author's name.
- (5) Title in the original language.

The subject index, based on the key-words, and the geographical indices are intended to help the reader to quickly find abstracts on specific aspects or areas of sustainable agriculture. The index of authors is intended to help the reader to find all publications by a particular author.

I TRADITIONAL LAND-USE SYSTEMS

514

90 - 1/41

Traditional land-use systems.
Review, sustainable agriculture, rural development, indigenous knowledge, development scenarios, IIED, SIDA

WARREN, D.M. and K. CASHMAN

Indigenous knowledge for sustainable agriculture and rural development.

GATEKEEPER Series No. SA 10; International Institute for Environment and Development, Sustainable Agriculture Programme, 3 Endsleigh Street, London WC 1H ODD, UK, 1988, 15 pp.

Many technological solutions that have been proposed to address problems in rural communities have failed in the field because they do not take into account the local culture, particularly society's preferences, skills, and knowledge. Success in development is more likely to be achieved when local people are involved in the planning and implementation of development projects; and project officials who are familiar with indigenous knowledge are better equipped to facilitate participation by the local populations.

Indigenous knowledge can be defined as the sum of experience and knowledge of a given ethnic group that forms the basis for decision-making in the face of familiar and unfamiliar problems and challenges. Farmers of agrarian, as well as industrialised, societies have sophisticated ways of looking at the world. They have names for many different kinds of plants, ways to diagnose and treat human and animal diseases, and methods to crop fertile and infertile soils. This knowledge has accrued over many centuries, and is a critical and substantial aspect of the culture and technology of any society.

Indigenous knowledge functions within the given socio-economic and spatial boundaries of the society and plays an active part in the culture of the population concerned, being preserved, communicated, and used by its members to serve some purpose in relation to productive activity within the society. It can be transferred by quite elaborate systems, often involving oral transmission using stories and myths. Yet few examples have been methodically recorded, and fewer still have been studied with the purpose of developing an integrated approach to solving agricultural and rural problems.

The following scenarios outline some problems encountered by international development specialists, illustrating in particular how development strategies incorporating indigenous skills and wisdom are more likely to lead to appropriate processes for effecting technical change. Some of these focus on the way that external knowledge can be incorporated into indigenous knowledge systems, thus helping to augment and reinforce indigenous

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capabilities for the acquisition, absorption and use of imported technology:

- Scenario 1 - Overcoming biases in extension communication
- Scenario 2 - Improving existing production systems
- Scenario 3 - Incorporating new technology into existing knowledge
- Scenario 4 - The design activities of research and development programmes
- Scenario 5 - Change within societies
- Scenario 6 - Creation of an indigenous technological foundation

The Center for Indigenous Knowledge for Agriculture and Rural Development (CIKARD) was established at Iowa State University in October 1987. CIKARD has 3 main functions: it collects published and unpublished materials and makes them available to development practitioners; it develops and pursues approaches that foster integration of indigenous knowledge into agricultural research and extension; and it conducts training courses on techniques for documenting and using indigenous knowledge. It is hoped that CIKARD will serve as a prototype for other regional and national centres interested in documenting and applying indigenous knowledge for the improvement of small scale production systems in developing countries. In this way it can assist in the development of regional and national repositories of indigenous knowledge, and support collaborative research ventures with overseas institutions.

The CIKARD repository of indigenous knowledge and decision-making systems is one way to enhance understanding and communication between development practitioners and clientele groups. From a combined knowledge of the past and the present, the indigenous and the scientific, it is hoped that development may enter a wiser phase.

The Gatekeeper Series is produced by the International Institute for Environment and Development to highlight key topics in the field of sustainable agriculture. Each paper reviews a selected issue of contemporary importance and draws preliminary conclusions of relevance to development activities. References are provided to important sources and background material.

The Swedish International Development Authority (SIDA) funds the series, which is aimed especially at the field staff, researchers and decision makers of such agencies.

Traditional land-use systems
 Latin America, Peru, Andes, land-use, agricultural production, peasant economy, traditional methods, GTZ, UNO

DIAZ, A.F. and M.V. RISCO

Proyecto Piloto de Ecosistemas Andinos, Cajamarca, Peru. (Pilot project on andean ecosystems, Cajamarca, Peru).

Report of the UN/GTZ-Project "Proyecto Piloto de Ecosistemas Andinos", Cajamarca, Peru, 1986, 92 pp.

In this report the results of extensive investigation on the characteristics, problems and potentials of Andean Agriculture in the Central Project Area, are presented.

The results are based on a survey of 101 peasant families out of 456 living in the project area (22%) and are divided into three main chapters:

- Land - use
- Agricultural and animal production, and technology
- Peasant economy

In the project area smallholders are predominant who can only survive by exploiting the scarce natural resources (soil and water) and by employing the human resources (their labour force) in many different ways: exchanging, lending, giving as a present or unifying it with neighbours, friends, godfathers or the members of the family.

The central characteristics of the peasants' economy are diversified agricultural production of tubers, cereals and legumes cultivated in several forms of association, and an extensive system of exchange of products and labour force ("trueque"). Since the part of the yield dedicated to self-reliance is not sufficient for the alimentation of the family, the agricultural production is complemented by animal production and migrant work.

The summarized recommendations and propositions to be realized through the projects' work to improve the peasants' situation are the following:

- Land - use:
 - . To carry out a study on land-use classification
 - . To design and introduce a system of permanent training in appropriate management and conservation of soil and water
 - . To conclude individual contracts with the peasants in order to stimulate the realization of practices of soil and water conservation including incentives like seeds, fertilizer, pesticides, tools and technical assistance from the project
 - . To motivate the peasants to plant native trees and shrubs.

- Agricultural production:
 - . To improve the traditional plants in order to get better yields
 - . To support the introduction of new varieties
 - . To investigate the different intercropping systems practiced in the project area
 - . To improve the system of water use through several measures in order to increase the quantity of water and to avoid wasting it.
 - Technology:
 - . To carry out a permanent training in the improvement of several traditional techniques of soil preparation, seed selection, plant rotation and harvesting.
 - . To disseminate the idea of preparation of organic manure
 - . To convince the peasants to stop inappropriate techniques like burning the stubble-fields.
 - Animal production:
 - . To improve the native cattle through crossing with Brown Swiss
 - . To realize veterinarian measures like vaccination
 - . To elaborate sanitary regulations and recommendations
 - . To improve animal husbandry.
 - Pasturing:
 - . To improve the pastures (installation of seed banks, organization of pasturing systems, introduction of a system of stratified pasturing.).
 - Employment situation:
 - . To study the possibilities of training courses in tailoring, shoemaking, carpentry, etc.
 - . To develop craft workshops
 - . To support workshops for toolmaking.
- Author's summary, amended

Traditional land-use systems
 Africa, Subsahara, Mali, Niger, Mauritania, Nigeria, Kenya, arid zones, sub-humid zones, ILCA, study, indigenous cattle, traditional methods, management systems, herd structure, calving rates, cow mortality, calf growth, milk production, herd productivity

LEEuw, P.N. and R.T. WILSON

Comparative productivity of indigenous cattle under traditional management in subsaharan Africa.

Quarterly Journal of Int. Agriculture, 26, 4, 1987, pp. 377-390

This paper provides a summary and comparison of the demographic and production characteristics of five livestock production units studied for varying periods of time by the International Livestock Centre for Africa (ILCA) between 1978 and 1984.

Indigenous zebu cattle are by far the most important domestic livestock species in subsaharan Africa. This is true in respect of numbers and in terms of the contribution they make to individual and national economics.

Probably more than 90 per cent of all cattle are kept under traditional systems of management. Most studies on African cattle productivity have, however, been undertaken on modern management systems, either on results obtained on research stations or on data from commercial ranches.

For the purposes of these studies, livestock systems were broadly classified into pastoral and agro-pastoral ones. Pastoral households derive more than 50% of all household revenue (income, capital, accumulation and subsistence) from livestock or livestock products, whilst the agro-pastoral ones derive between 10 and 50% from these sources.

The data used in this paper were extracted from studies carried out on these two systems in the dry and sub-humid zones of West and East Africa. These areas cover 75% of Africa south of the Sahara, support 63% of the human population and carry 74% of the continent's cattle and 77% of its small ruminants.

Field data were collected in a similar manner in all samples. This involved regular visits at fixed periods (usually at intervals of one month) at which times all data relating to events in the herds (births, deaths, sales, etc.) were recorded. All animals studied were identified by numbered tags and also in some cases by their traditional names. The information from each animal's record sheet(s) was later transcribed for computer analysis.

All data were analysed using least-squares techniques which is the method most suited to the unequal distribution of sub-classes in the data sets examined.

Comparisons of productivity of indigenous cattle in five production environments are presented. Factors discussed, in addition to herd age and sex structure, are reproductive performance, calf and cow mortality, calf growth to one year and

milk offtake for human consumption. These parameters are used to construct indices which provide an indication of cow performance for each system studied.

Although the component parameters that determine productivity of cattle herds vary considerably, the indexed values represent a much narrower range. The highest values were recorded in Masai herds at the better end of the rainfall gradient, but these data were obtained during a favourable period and long-term productivity might be considerably lower. Although the studies in the other systems were conducted over longer periods, the impact of drought and other adverse conditions on productivity cannot be assessed fully within this time frame. It should be noted, however, that the three West African systems show very similar productivity despite differences in climate, scale of operations and goals of the livestock enterprise. This seems to indicate that environmental and nutritional stresses are overriding and do not differ much over a wide climatic gradient.

It should also be pointed out that aggregate values of average herd productivity ignore the variability that exists between individual producers within systems and between individual animals within herds. Variability in animals within herds was shown for calf growth, lactation length and milk production and it may be postulated that a large pool of genetic resources is available within traditional African livestock systems herding indigenous breeds of cattle.

Similarly the low productivity indices for individual cows mask the fact that productivity per unit area can be high because of heavy stocking rates. Individual productivity should not therefore be the sole criterion for judging the efficiency of livestock systems where a major function of those systems is to provide a living for the maximum possible number of people.

Traditional land-use systems
Asia, Sri Lanka, review, traditional methods, religious ceremonies, underground tank systems, pest and diseases, intercropping, seed storage, crop sanitation, biological control, mechanical methods, ILEIA

UPAWANSA, G.K.

Ancient methods for modern dilemmas.

ILEIA Newsletter, 3, 1989, pp. 9-11

In this paper the wealth of indigenous Sri Lankan agriculture are displayed and it is proposed to turn to the ancient methods for modern dilemmas.

Modern agriculture has evolved using an exorbitant amount of fuel, mineral fertilizers and other poisonous agrochemicals. As they appear as a threat to life, scientific, technological and philosophical communities began searching for 'alternative agriculture' in which crop protection is an important aspect. Desirable practices must sustain healthy agriculture, be ecologically sound, non-polluting and not lethal to life in general.

Sri Lanka with its long history of agriculture is a rich source of such practices which may surprise the modern agriculturist. Fundamentals of Sri Lanka agriculture are to maintain a healthy ecosystem by proper land-use, water-shed management, optimum use of natural forests, nutrient recycling and appropriate cultural practices. When there was a disturbance in the form of a surge in some pest insects, mechanical, botanical and cultural measures were taken. A special feature was the integration of some rituals, religious ceremonies and habits to keep the insect population low.

Chena is the term for shifting highland cultivation, which is considered now as a wasteful use of land, but was then a resource utilization in the ecological complexity created by man. In Sri Lanka it provided food, fuel, timber, pasture for animals and nutrients for intensively cultivated low lands down below. The soil and nutrients washed down settled in benched and terraced paddy fields and tanks.

The village jungles, which provided land for shifting cultivation, the homestead by the village tank, the tank and paddy fields were knitted together. In such a manner, the ecological balance was maintained by a package of land-use patterns, watershed management and agriculture, including animals. The manure was usually heaped up where animals were herded. Similarly, ash and paddy husk were collected in heaps. Both these heaps were taken seasonally to the paddy fields. The dung and urine of grazing animals, manure brought from homestead, and nutrients brought from high land, kept the paddy fields fertile and conserved productivity of the land.

In all agricultural systems for the tropics, mixed cropping is an essential condition. This was the practice in Sri Lanka in

homesteads and in 'chenas'. The paddy fields and chenas which were cropped with annuals, had definite cropping patterns synchronized with the climatic rhythm. The decisive factors in selecting crops were daily rainfall variations, availability of irrigation water etc. Cropping patterns adopted provided some kind of crop rotation, as well as an opportunity for other salient features mentioned above. The cropping pattern was a barrier for continuous multiplication of specific insects, thus reducing pest problems. The seed for the next season were separated soon after the harvest, dried, and stored. Pulses were stored, mixed with wood ash and dried leaves of citrus and margosa (*Azadirachta indica*). Red onion (shallot) bulbs were hung on the roof without removing the leaves. The maize cobs and millet, without hulling were stored on the broad rack of the fire place called 'dummassa'. Well dried paddy threshed in good weather was stored in wooden boxes or in an earthen walled container, called 'bissa'. The smoke, low moisture in seeds, low humidity, and sometimes low temperature due to good ventilation and the repellent effects of botanicals, protected the seeds from insects.

The seasonal cultivation commenced with clearing the boundaries of the section of fields to be cultivated. At the same time, irrigation channels were cleaned, desilted and repaired. The bunds of terraces were cleaned and plastered once or twice before sowing. The fields, bunds and surroundings were clean, free of weeds and insects. There was greatly reduced competition for nitrogen between the crop and the bacteria putrefying organic matter, as the organic matter by this time had completely decayed. These factors were contributory to subsequent protection of crops from pests and diseases.

Rituals and similar practices were mainly meant to attract and foster birds, the main biological agents in traditional agriculture. Offering to local deities in the evenings, before commencement of cultivation consisted of a standard mixture of roasted pulse, food, flowers, and many lighted oil lamps. The lamps attracted insects. The food and pulse attracted birds, and reduced the insect population before the cultivation. Big trees and wooded highland were allowed to stand around the paddy tract and threshing floors, to provide nesting and resting places for birds. Common orchards were established for birds. A section of the paddy field closer to highland or jungle was reserved for birds.

Mechanical methods of disease and pest control and botanical pesticides are explained further in this paper.

Land use pattern, resource utilization, rituals and religious performance, cultural practice and use of biological, mechanical, botanical and other methods of control did not eradicate insects, but minimized the number, they did not pollute soil or air, were not harmful to earth worms and other creatures, except for a particular species. All this helped to maintain ecological balance.

Abstract from ILEIA, shortened

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Traditional land-use systems
Africa, Ethiopia, highlands, land-use systems, soil erosion,
deforestation, tree planting, community nurseries, extension
technique, sustainability, CARE, USAID

KERKHOF, P.

Gursum land - use project, Ethiopia.

In: Agroforestry in Africa - A survey of project experience -;
Publ. by Panos Ltd., Angel House, 9 White Lion Street, London N1
PD, UK, ISBN 1-870670-16-7, 1990, pp. 79-86

The Gursum Land - Use Project (GLUP) is situated in the Hararghe Region of the Eastern Highlands on the border with Somalia. The region covers an area of some 25,000 square kilometres and has a population of about 4 million people. Most live in the higher altitude areas, at a height of 1,800 metres or more above sea level.

Only the mountain plateaux, which occupy a tiny proportion of the area, are suitable for crop cultivation. They receive an annual rainfall of 1,000 mm and are densely populated. The rest of the area is dry scrubland fit only for poor grazing. Like most of the country, Hararghe has been through a great deal of turmoil in the past decades.

Only a small number of isolated pockets of population high up in the mountains remained outside the scope of the villagisation drive.

The new villages consist of rows of neatly arranged houses, each one surrounded by a tiny garden. Families also have their own land holdings which vary in size between 0.5 and 5 hectares. This land is owned individually and inherited from father to son, but cannot be sold. With the growing pressure on land resources, young people and newcomers receive an increasingly smaller piece of land. Land transfers are arranged through the Peasant Associations (PAs) which are the governing bodies for clusters of villages.

The village communities grow sorghum, sweet potatoes and a small grain called tef, but food aid still remains important. Hills, river valleys and dry bush land are used for grazing cattle, sheep and goats. Many parts are over-grazed and show signs of soil erosion and land degradation. Much of the area has been deforested for ages, but concentrating people in villages has put further pressure on the remaining tree resources.

The land in Gursum is poor and over-grazed. Erosion has stripped away much of the soil from the mountain slopes and rangelands.

A major effort to improve and protect the land by getting farmers to grow trees has been under way for the past three years.

Given the obstacles, the project has made considerable progress. The project objectives of soil improvement and protection required the use of leguminous species like *Leucaena leucocephala*. Project extension staff were taught how such trees improve plant yields and which species are best planted for the purpose.

The project, however, had neither the time nor the resources to carry out a research programme. Instead, the usual "success package", in which *Leucaena calothyrsus*, *Sesbania sesban* and other nitrogen-fixing trees are used for intercropping in food crops, was promoted.

The results were not at all impressive. When it began in 1986, the project selected 25 men and women and trained them to become extension workers. All have had secondary education and in some cases have had higher education, up to university graduate level. They supplement the 14 Ministry of Agriculture extension workers in the project area, but are employed by CARE.

Development projects face formidable obstacles in Ethiopia. The highly centralised administrative structure and the unstable security position make it extremely difficult to promote the degree of genuine community involvement required if programmes are to be self-sustaining in the long run. The project staff members are relatively well trained and educated. They are also well paid and are given considerable means to carry out their work. Motor-cycles are available to most extension workers, field officers have cars at their disposal, and extra lorries are put to work for seedling transport in the rainy season.

On the other side (of the balance) however, it is clear that the project has so far contributed little in the way of local institution-building. The training provided for the project staff contributes to the general manpower development of the country, but there is no framework within which their skills can continue to be exercised if the project funding ends. In that case, the responsibility for continuing the programme would rest with the Ministry of Agriculture, a task which, with its scarce resources, it may not be able to assume.

The dependence of the programme on food-for-work is another weakness. Food-for-work tends to have an immobilising effect on community development and means that work is carried out simply to obtain food irrespective of whether people believe in its relevance. Under such conditions, it is extremely difficult to establish tree growing and soil protection activities on a self-sustaining basis.

In addition, it has involved local communities in the design of food-for-work schemes. It has also made a beginning with more sustainable activities. Tree planting and seedling production are now done to some extent without a food aid incentive. Extension has made a beginning in increasing the awareness and self-confidence of the villagers. In the longer term, this will contribute to people becoming more self-reliant.

Traditional land-use systems
Africa, review, shifting cultivation, subsistence culture, forms
of transition

SEAVOY, R.E.

Hoe shifting cultivation in east african subsistence culture.

Singapore J. of Tropical Geography, 8, 1, 1987, pp. 60-71

Generally speaking, areas with the highest rainfall in East Africa have the highest population densities. Peasants living in high density areas practice little or no shifting cultivation. Peasants, however, who live in areas that receive intermediate amounts of rain, where population densities are lower, have the choice of several techniques of shifting cultivation.

Closed canopy shifting cultivation is practised in forests where peasants clear a field by felling and burning the trees and bushes. Burning usually takes place near the end of the dry season. This timing produces a hot burn that consumes most of the dry vegetation, kills a high percentage of bushes, and fully exposes the ground to sunlight. Most of the cutting and burning of trees is done by men and most of the labour of planting is done by women. Women also do most of the labour of weeding and harvesting. Immediately after the first rains, seeds are broadcast sown or dibbled into the ground. In the past, the most common first year crop was millet with intercrops of maize, sorghum, legumes and cassava. Presently the first year crop is usually maize with intercrops of sorghum, cassava, and legumes.

Most fields are cultivated for only one year because the bare ground that has been prepared for planting becomes infested with weeds. During planting weed seeds arrive in large numbers and unless sufficient weeding is done they become intense competitors of food grains. Pulling weeds by hand is very laborious and minimum amounts are performed so that harvested fields have a continuous groundcover of weeds. Weeding labour is minimized in the following year by shifting cultivation to a new plot of closed canopy forest.

If a field is cultivated a second year, peasants plant tall cultivars. They are maize (*Zea mays*) sorghum (*Sorghum bicolor*, *Sorghum vulgare*), sesame (*Sesamum indicum*), cassava (*Manihot utilissima*) and pigeon pea (*Cajanus cajan*) because only tall cultivars can compete with weeds. In time, an abandoned field reverts to a closed canopy secondary forest. After the canopy closes, it shades grasses and weeds into attenuation, or kills them. The secondary forest is then cut and burned and the ground recultivated. In the semi-arid zones of East Africa the growth of a closed canopy secondary forest takes 20 years or more depending on rainfall, temperature, and frequency of dry season fires. As long as closed canopy forest is available, shifting cultivation is the preferred technique of agriculture.

When savannas are cultivated, peasants must change their technique of food production. They must practise hoe cultivation, and whenever possible they practise hoe shifting cultivation.

Savannas are prepared for hoe shifting cultivation by cutting trees one-half to one metre above the ground. Just before the arrival of the first rains the felled trees and dry grasses are burned to remove plant debris. After the first rains the cleared ground is chopped by light hoeing that cuts grass roots 5 to 8 cm below the surface. Women do disproportionately large amounts of hoeing, weeding, and harvesting.

The first planting on hoe cultivated ground is usually a millet-maize-legume intercrop but in the Kilombero Valley rice is often substituted for millet because of adequate water and its higher yields. The second and third crops will be taller cultivars like maize, sorghum, cassava, sesame, and pigeon peas. Intercrops of tall cultivars require weeding only during the first month or two of growth. After that they shade most competing weeds into attenuation, but yields are low.

The transition to continuous cultivation is always gradual and everywhere the impetus is the same. Population increases force peasants to expend more per capital labour to increase food production so that more people can be fed from the same area of land. When the population of a peasant society rapidly increases, the transition is accelerated but if there is high infant mortality the transition is delayed.

A community usually begins to continuously cultivate some fields after it has experienced too many consecutive seasons of hunger. Famine conditions frequently intervene during the transition because of the peasantry's reluctance to increase labour expenditures sufficient to keep up with population increase. When population pressure forces peasants to produce more food they shorten the fallow period in hoe shifting cultivation and lengthen the number of years in which fields are consecutively cultivated. This usually involves no change in technique. Hoe cultivation is still used but the hoeing is done more carefully and more weeding is done after crops germinate. Peasants also intercrop more legumes with food grains.

As population densities increase, there are several simultaneous changes in subsistence behaviour. The peasantry is forced to reduce the number of livestock because there are smaller areas of common pasture. The area used for hoe shifting cultivation on savannas is gradually reduced and the area of continuously cultivated fields in the village's infield is gradually increased. Within infields some tuber crops are usually grown on cultivation ridges. The intensive ground preparation (for sweet potatoes and cassava) produce reliable yields that mitigate some of the risks of seasonal hunger.

Generally, these changes did not occur until after colonial governments ended warfare and the resulting population increase forced peasants to engage in more intensive cultivation. Today, population increase is forcing the transition to continuous hoe cultivation over vast areas of tropical Africa.

Traditional land-use systems
Central America, review, book, resource management, traditional methods, indigenous knowledge

WILKEN, G.C.

Good farmers: traditional agricultural resource management in Mexico and Central America.

Berkeley University California Press, 1987, 303 pp. USD 47.50

Indigenous knowledge has been rediscovered within the rural development community, and traditional farmers and their functioning systems are being given deserved credit and attention in contemporary project design. What is new to some is an old hat to Wilken, who has spent years studying the ways farmers manage their resources.

This book contains 13 chapters organized around the major resource categories of soil, slope, water, climate and space. The author set out to learn if particular methods work, what can be learned from them, and whether they can be applied elsewhere. The result is a benchmark study of a region of the Third World known for its complex farming systems.

Not only is the book well written, but it is also lavishly illustrated. Good Farmers would make an excellent textbook if it were available in a less expensive paperback edition.

Abstract from DESFIL

521

90 - 1/48

Traditional land-use systems

Latin America, Peru, land-use systems, study, cropping systems, human settlement, ecology, labour, ethnoecology, crops

RHOADES, R.E. and P. BIDEGARAY

The farmers of Yurimaguas - Land use and cropping strategies in the Peruvian jungle.

International Potato Center, P.O.B. 5969, Lima, Peru, 1987, pp. 102

This monograph examines a different and equally important aspect of Yurimaguas tropical agriculture: the traditional farming practices and strategies of rural households.

To complement the rich information available on the biophysical aspects of Yurimaguas agriculture, a team of agricultural anthropologists collaborated in a farmer-oriented study.

The main objective in writing this report was to give outsiders, whether agricultural scientists or other development specialists, a glimpse into the rational and complexity of subsistence and commercial farming in Yurimaguas District. This report deals primarily with the agricultural system of the mestizo settler population and neglects native groups living in the region.

The evolution of Yurimaguas agrarian society mirrors historical processes which have occurred throughout the Amazon Basin of South America over the past 300 years. This humid, tropical jungle region was originally inhabited by indigenous groups that survived by fishing, gathering, hunting, and swidden agriculture when the first European arrived in the sixteenth century.

During the latter half of the 19th and the first half of the 20th century, Yurimaguas like many Amazon communities became economically linked with international markets. Rubber exploitation was followed by short-lived exploitation of products such as lumber and barbasco, which served as major income sources for native or recently settled farmers. To extract these products, an *habilitación* (habilitation) system involving small capitalists who acted as intermediaries was organized. Foreign companies supplied local go-betweens with money and merchandise which, in turn, were provided to workers who went into the jungle to extract raw rubber or the roots of barbasco (*Serjania perulacea*). After some months, they returned with their harvests, repayed their debt and received their profits. The practice of *habilitación* has been widely used throughout Amazonia, primarily in exploitation of lumber, fine skins, rubber, and barbasco. This system often benefited foreign investors and the middlemen more than local farmers who remained in a dependency relation to outside market influences.

When rubber and barbasco were replaced on the international market by less expensive chemical products, labourers were forced to return to their original economic activity, agriculture. Farmers again dedicated their time to subsistence household production

supplemented by maize and bean production for sale in local markets. Occasionally, they worked as labourers on haciendas of the region.

Beginning with the 1970s, the petroleum "boom" began and many farmers seeking greater sources of income elected to work as labourers for oil companies and left their fields in the hands of relatives. Around 1974 petroleum exploitation in the regions ceased and farmers returned again to work the fields. In the 1980s, the major source of capital for farmers has been rice production financed by Peru's Agrarian Bank.

Landless colonists begun a process of agricultural exploitation that many individuals and governments consider destructive. Development efforts are now underway to seek alternatives for these populations in terms of their farming practices. Yurimaguas in Peru has been the focus for over a decade of scientific research on tropical soils and agronomy. This monograph complements the technical research efforts by focussing on the farmers themselves, their practices and beliefs about farming. It describes the agrarian ecology which is not only determined by climate, soils and plants, but by household goals, available technology, labor constraints, markets and policy. Within the physical and social environments of Yurimaguas, farmers combine in a creative manner their resources to achieve both consumption needs and cash requirements. Farmers, are shown to have knowledge and skills valuable for agricultural development efforts.

Traditional land-use systems

Africa, Ghana, traditional methods, poultry keeping, study, free range system, farming resources, land, capital, labour, use of poultry, religious, social benefit, spiritual benefit

VAN VELUW, K.

Traditional poultry keeping in Northern Ghana.

ILEIA, 3, 4, 1987, pp. 12-13

This article is intended to explain the poultry production system in the traditional society in Northern Ghana. It is based on a three months' period of research on the spot and a literature survey to get a comprehensive description. This study deals with the integration of poultry (fowl and guinea-fowl) in subsistence economy and in religious and social activities.

The Mamprusi tribe live in a mainly agricultural subsistence society. The household's consumption needs are central to farm operations. The surplus of subsistence farming and any cash crops are sold on the market.

In a mainly subsistence farming system the three production resources land, capital and labour are central.

Of the three production resources labour seems the main limiting factor in production activities.

Although all households keep livestock, especially poultry, the Mamprusi regard themselves as crop farmers. They have an excellent knowledge of traditional crop production, but quite a rudimentary knowledge of animal husbandry techniques. But even at the present state, animal husbandry is very profitable. Poultry production has almost no inputs. That means that all outputs largely can be considered as profit. The same is true of goat and sheep production. The Mamprusi also keep cattle but these animals are reared by Fulani households in the village.

Every morning the farmer releases his 19 fowls and 6 guinea-fowls from the space under the granary. Some grains are thrown on the ground to feed the birds. Shelter at night and a handful of grain is certainly no more than a supplement. The birds have to scavenge for their diet in and around the compound. This system is called the "free range system". A young boy has to take care of the birds during the day.

Fowls lay throughout the year, guinea-fowls lay only in the rainy season. Fowls produce about 20 eggs a year and guinea-fowls about 50 eggs. This looks very low, but considering the very low inputs, the extreme climatic conditions and the presence of diseases, it is a remarkable production. This production level is enough to maintain the poultry stock size. Even more, there is a surplus. The household uses the surplus for several purposes.

Most of the fowl eggs are used for hatching. Fowl also hatch the guinea-fowl eggs because guinea-fowl are bad brooders. Hatching takes place throughout the year although most of the hens hatch in the rainy season.

Farmers keep fowl about three years. Guinea-fowls are kept 2 years. After that production diminishes too much and farmers cull them.

For a better conception of the role of poultry in the Mamprusi society it is necessary to know exactly the purposes for which households keep poultry.

It is very difficult to determine the most important purpose. Sacrifice is an act whereby the slaughtering of animals, or an offering of food or other substances is made to a spiritual being or a cosmic force. In the Mamprusi society, ancestors influence every day's life. Sacrifice is an easy way to please them but also to ask a favour of them. Fowl cocks are the most popular sacrificial animals. Guinea-fowl cocks are not used. The colour of the birds play an important role. People sacrifice a red cock to the ancestors if they wish rain or a good harvest. A white cock is used when they are grateful. A black cock is sacrificed when they ask protection from evil things like diseases, war or quarrels. Because of these customs, red, white and black cocks have more value. Sometimes the prices are doubled. This has consequences on breeding activities. Farmers never cull a black, white or red cock. At funerals sacrifices take place to recommend the dead person to his ancestors. Also soothsayers and traditional doctors prescribe a sacrifice to cure a sick person or to ask for a safe journey.

Sacrificed animals are not lost for consumption. The blood is for the ancestors but the meat is divided among the male members of the household.

Poultry husbandry is a well-paid activity. It is labour and capital extensive compared with crop farming. Home consumption is another use of poultry.

If poultry production has to be improved, then there is a need of programmes which are adapted to local conditions and traditional values. Planning such programs start with a thorough analysis of the present production system.

This study makes clear that poultry husbandry is much more than a financial income generating activity. Poultry also has a social and a spiritual benefit and plays an important role in subsistence economy.

Abstract from ILEIA, shortened

523

90 - 1/50

Traditional land-use systems

Africa, Nigeria, traditional methods, survey, study, land tenure, socio-economy, inheritance, organization of farming, income of farmers, credit, government aid, on-farm diagnostic research

ESHETT, E.T.

Traditional agriculture in southeastern Nigeria: demographic, land tenure, and other socio-economic factors.

Beitr. trop. Landw. Vet.med., 28, 1, 1990, pp. 5-17

The food crisis currently experienced in Nigeria underscores the great need to understand the production system of the small farmers who produce the bulk of the food consumed. Therefore, considerable attention has been devoted to study different forms of farming systems practised across the country with a view to identifying the constraints involved and finding ways and means of alleviating these constraints, within the small farmers' socio-economic setting.

A reconnaissance survey was first undertaken in June 1984 in the 3 target areas in order to obtain an overview of the type, organization, and functioning of the prevailing farming systems, to appraise the land resources and the physical environments under which the small farmers operate.

The study was carried out to investigate the influence of demography, land tenure, credit and other socio-economic factors on the traditional bush fallow agriculture. In spite of large land resources, there was a strong influence of existing tenurial practices on the farming system. Land tenure exists in various forms as co-operative (communal) property, permanent private property, and land leasing, the latter utilized in contract farming. One third of the farmers were members of cooperatives, others of peer groups, but both types of farming are not very effective. There were considerable differences in the gross income. Government support for the farmers was minimal. 93% of all farms investigated had not received any government credits and only 20% had been able to make use of plant material supplied by the government.

It is concluded from this study that:

- Although arable lands were generally plentiful and population densities low, achievement of higher productivity per farm family was hampered by lack of evolution of modern, improved farming techniques, by rigid and unprogressive organizational and land tenurial practices which discouraged long-term investments by external cultivators, and by absence of credit facilities to farmers and farmers' aversion to cooperative societies.
- Farmers' off-farm engagements helped to diversify and stabilize traditional revenue bases and bring about some measure of self-sufficiency in local manpower which in turn was of economic

significance, especially in remote communities which did not benefit from government developmental activities.

- The strength of the traditional farmers lay in their ability to cope with large farm families (used essentially as traditional labour sources), to adapt their agricultural activities to the dictates of a rather weak and ineffective agricultural extension system, and above all, their ability to wrest an income/farm productivity level that guaranteed a stable domestic economy, with enough food resources to sustain in extended family system, leaving a reasonable surplus to sustain rapidly expanding urban populations.

524

90 - 1/51

Traditional land-use systems
Latin America, Nicaragua, traditional methods, farming systems,
small-scale farms, environment, ecology

CATIE

Caracterización ambiental y de los principales sistemas de cultivo
en fincas pequeñas de Esteli, Nicaragua. (Environment
characterization and principal systems of cultivation on small
farms in Esteli, Nicaragua).

Informe Técnico (Serie Técnica), Centro Agronómico Tropical de
Investigación y Enseñanza, Turrialba, Costa Rica, 34, 1984, 129
pp.

A prototype multidisciplinary team - consisting of three experts
in crop production, crop protection, and agricultural economics,
respectively - studied traditional cultivation practices in
Esteli, Nicaragua, in order to develop appropriate technologies
for increasing small farm productivity. This report describes
results obtained from the team's activities. First, the research
area is described, including location, biophysical attributes, and
socioeconomic characteristics such as agricultural production and
community infrastructure (e.g., credit, technical assistance,
farmers' organization, training). The bulk of the report discusses
characteristics of local farms and cultivation systems (maize,
beans, sorghum); biological constraints on cultivation (weeds,
crop diseases, insect pests); land capital, and labor resources;
cultivation systems arranged according to chronology and size;
constraints on production systems (physical, marketing,
transport); and characteristics of the farmer and the farm family.
The survey methodology is briefly outlined.
Abstract from FSR

525

90 - 1/52

Traditional land-use systems
Latin America, Mexico, Chile, review, traditional methods, Maya
swidden cultivation, agroforestry, holistic approach, farmer, land
tenure, ICRAF

BARAONA, R.

Agroforestry and swidden cultivators in Latin America.

In: Proc. of Int. Workshop of Tenure Issues in Agroforestry, Ed.
J.B. Raintree, ISBN 0-934519-01-03, Nairobi, 1987, pp. 283-291

This position paper should be seen as a complement to land tenure
and the future of agroforestry, as a discipline that should find
ways to become accessible to peasants.

Agroforestry is a relatively new and integrative scientific
discipline.

Agroforestry has very old antecedents and agroforestry
practitioners are considered by many as mere relicts bound for
extinction. Field and forest should survive together and, better
yet, be integrated into productive systems.

In this paper it is suggested that certain situations should be
taken into account in order for scientific agroforestry to reach
peasants effectively. At least in Latin America, conventional
agronomy and allied disciplines have mostly proven unable to
foster the adoption of technical advances in agriculture or
agroforestry among peasants; that is, advances that are really
viable and suitable.

Swidden cultivation, under appropriate conditions, can offer a
number of advantages to the tropical peasants of today, just as it
did in the past to tribal cultivators. Firstly, it does not
require heavy outlays in farming equipment. In Mexico, cash needs
are of some impact and they often limit, where wages are paid, the
acreage of land that can be cleared. When other sources of income
are available, shoulder pumps and herbicides are employed.
Swiddens are considered energy efficient and there is no point in
devoting energy or space to traction animals. Imports or subsidies
of fossil fuels or fertilizers are simply not needed, as long as
the conditions for viability in swidden persist.

In sum, shifting cultivation is in all likelihood, because it is
so autonomous, peasant agriculture par excellence. It allows
cultivators to carry on production using simple tools, applying
what they already know with a minimum of added risks. This is when
things are going well. But this condition is rarely found today.

Gone are the complex interactions and diversity of environmental
material that gave relative stability to the swiddens. Peasants no
longer have the tools, the skills or the knowledge to face or
understand the new nature: generalized plagues, spreading from the
encroaching grasslands to their milpas; changes in soil structure;
weedy secondary growth; persistent grasses with unwieldy stolons,
etc.

In this respect the situation of Maya Catecan swidden cultivators poses some different clues. Their nonconventional scientific system rests on different tenets. The main perceptions of the deltaic farmers of Tabasco deal with plant indicators for site selection and the adjustment to periodic flooding where barely perceptible relief differences take place within large scale landscapes. The Maya are possessors of a particularly rich ethnobotany and some of them can still be considered very knowledgeable high forest managers. But most Maya live in ancient permanent villages with assigned territories covered with mostly degraded secondary growth. Today they are masters of Hub'che (secondary growth) cropping. Their milpas are not particularly rich in diversity-nothing like those of the Lacandon Maya. Their main perception concentrates directly on the soil as an autonomous phenomenon and they have probably one of the richest and least understood ethnopedologic and ethnoedaphic knowledge systems in the world, based on distinguishing soil micro differences even in very small areas. This probably explains why they tend to maintain several separate crop-specific clearings. This could be read as a different revolutionary tendency suggesting different contents in technical support. Yields are universally decreasing but there is no agreement as to the causes. If crisis is generalized and no viable technical support is forthcoming for productive alternatives, ex-swidden peasants have to take whatever options are offered by the very same forces responsible for the crisis: sale of labor force, involvement without participation in unsound and ambitious large-scale projects, or very unprofitable share arrangements with ranchers.

Traditional land-use systems

Africa, Ivory Coast, humid rainforest zone, shifting cultivation, yam, cacao, land shortage, soil fertility, UNESCO, national park

BUDELMAN, A. and P.M. ZANDER

Aménagement du terroir par les paysans immigrés Baoulé dans la région Tái, Sud-Ouest Ivoirien. (Land-use by immigrant Baoulé in the Tái region, South-West Ivory Coast).

Agroforestry Systems, 11, 1990, pp. 101-123

This paper discusses the cropping system of the Baoulé tribe, and investigates the impact of cropping techniques applied on the top soil. This ethnic group has migrated into the Tái area since the early 1960s, and nowadays dominates small-holder agriculture. The Baoulé introduced several agricultural practices that radically differ from the autochthonous land-use pattern in the region; complete removal of the original vegetation from cropped fields, removal of the litter layer before soil preparation, raising of mounds for the cultivation of yam, and, lastly, planting of perennial crops instead of the traditional forest fallow.

In South-West Côte d'Ivoire, in the triangle marked by the rivers Cavally and Sassandra and the Atlantic coast the last substantial rain-forest area of West Africa is found. The area virtually existed in isolation till mid-1960, when the Ivorian government launched a two-pronged initiative that aimed at development of the regional natural resources and conservation of part of the forest as a reserve.

The Tái region nowadays shows all the typical symptoms of degrading natural resources; soil erosion, abandoned tree crop plantations, noxious weed-infested areas, etc. In less than two decades forested land has become scarce, and the gazetted park area is under pressure from farmers in search of land.

The Agriculture University of Wageningen conducted a multi-disciplinary research project "Analysis and design of land-use systems in the Tái region".

Forestry research concerns the management of the 330,000 ha of rain forest of the National Park of Tái and the adjacent buffer-zone. Agricultural research focuses on replacement of shifting cultivation by permanent agricultural land-use in order to relieve pressure from an increasing population on the forest reserve and its buffer-zone.

Fields are kept under cacao, after having been used for food crop cultivation during the first two years. Yam, the most important food crop is grown on mounds. Next to the inherent poverty of the soil, this cropping technique, which disrupts the structure of the top soil is seen as one of the causes for low yields of cacao on Baoulé farms in the area. Yields per ha amount to c. 60% of that of the national average.

Measures to improve adaptation include: Introduction of crop species adapted to adverse soil conditions (e.g. rubber, oilpalm),

to buffer cacao plantations through planting of shade trees, to apply fertilisers, and to make use of biological nitrogen-fixation.

Compared to the rainfed rice-based zero-tillage cropping systems found among the autochthonous tribes, the tillage practice of the Baoulé seems ill-adapted to the rain forest environment.

An economic comparison of the current cacao production system and alternative, more intensively managed systems, including the necessary inputs, basically shows the absence of an economic stimulus for farmers to change their practices.

Measures of improvement are suggested:

- To select and plant crop systems in relation to the characteristics of the toposequence. Emphasis is put on perennial soil cover, crops adapted to low pH values and shallow soils. Oilpalm, rubber and coffee, as well as many fruit tree species are cash crops that merit attention in the search for alternatives for cacao.
- Life expectancy of cacao plantations increases when the crop is buffered by shade trees, either planted or selected in the original vegetation. The most successful cacao plantations in the area are those that were developed, with the advice of the local extension service, in selectively cut rain forest, minimising soil disturbance.
- To apply phosphorus and potassium fertilisers, with an emphasis on increasing and prolonging residual effects. Shade trees may act as temporary store of the nutrients not used by the crop. Their biomass can be cut selectively and used as mulch.
- To make use of biological nitrogen fixation. Many shade tree species can double up in this respect.

The measures refer to the cacao crop, or tree cash crops in general. Food crops should be grown separately, either in a long term fallow system or with auxiliary perennials that have a multi-purpose function: Erosion- and weed control, nitrogen fixation, live stakes for yam support, etc. Such systems are complex from the point of view of management.

Traditional land-use systems

Africa, arid zone, pastoralists, traditional methods, development, study, woodland management, grazing strategies, management of trees, traditional reserves, sacred groves, traditional social controls, FAO

NIAMIR, M.

Traditional woodland management techniques of African pastoralists.

Unasylva 160, 1989, pp. 49-58

This paper is based on a literature survey commissioned by the community forestry unit of the Food and Agriculture Organization of the United Nations (FAO), to collect details on traditional African natural resource management by arid-zone pastoralists, and to evaluate the survival of traditional techniques and their potential for the development process in Africa.

Pastoralists in arid and semi-arid Africa have developed a set of principles and strategies that have enabled them to meet their physical and social needs in a harsh and variable environment. Under conditions of relatively low population density - pastoralists societies are generally characterized by very low fertility rates and high infant mortality - these strategies also resulted in the sustained management of natural key resources, particularly range and woodlands.

Recently, however, rapid population growth and an associated series of external pressures including crop expansion into rangelands, nationalization of land by governments, forced sedentarization, expanding urban and rural demand for fuelwood, and indiscriminate water development, have combined to upset the delicate balance between the herders and their fragile environment.

It is increasingly apparent that, under present conditions, many of the traditional pastoralist techniques no longer enable herders to meet their needs, and are contributing to pasture and woodland degradation. With the adaptability that has always characterized herders, many pastoralists are changing their ways, diversifying into crop cultivation, engaging in commerce and trade, or moving to urban or semi-urban locations. In the process, many of the traditional techniques and systems of management are being partially or totally abandoned but others could still be adapted or modified to make them of value today.

The paper describes several types of traditional woodland management techniques, including mobility and pasture rotation strategies; harvest, regeneration and protection of trees and shrubs, grazing and forest reserves; sacred groves; and traditional social controls. In all cases, the intent is to identify methodologies with potential applications under contemporary conditions.

The "level of technology" in traditional resource management varies considerably among different ethnic groups. Some groups have fairly simple systems, while others have evolved complex organizations and techniques.

Many more techniques will undoubtedly be identified as the interest in describing and using traditional systems for development grows. Most of the work so far has been done by social scientists who, because of their training, tend to concentrate on such issues as social controls, land tenure and political organizations. More involvement of foresters and ecologists is needed to help identify the technical details of woodland management.

In general, traditional techniques cannot be used, revived, or improved without certain prerequisites, some of which may be politically sensitive issues. These include clarification of national land tenure laws; careful planning of crop expansion; official recognition of traditional socio-political organizations; greater incentives to young herders to stay on the range, greater sensitivity by government officials and extension workers to the value of traditional knowledge; and a common, coherent national policy on the decentralization of natural resource management.

Traditional land-use systems
Africa, Kenya, traditional methods, wildlife ranching and
research, project, cattle, sheep, gazelle, wilde beast, range
management, harvesting, wildlife data

HOPCRAFT, D.

Wildlife land use: A realistic alternative.

In: Proc. of a Conference on "Wildlife/Livestock Interfaces on Rangelands"; Ed. S. MacMillan; Publ. by Inter-African Bureau for Animal Resources, P.O.B. 30786, Nairobi, Kenya, 1986, pp. 93-101

The project discussed in this paper was organized as a ranching operation and was designed to assess the ecological, economic and productive consequences of using wildlife in a land-use system. Grasslands, or rangelands, comprising more than half the world's land surface, are facing deterioration and desertification on an unprecedented scale. Over 20 per cent of the African continent is already desert and 45 per cent of the remainder is at risk. The disastrous social, economic and environmental implications are already world news.

Reports from the U.N. indicate that the desertification process is speeding up worldwide. This desertification is a man-made problem. There is no doubt that human activity on the rangelands is contrary to the natural order. Imported livestock and dryland agriculture have replaced a multiculture of indigenous animals that were once part of the ecosystem.

Species diversity is the key to the natural order. With the loss of native animals, the great array of interdependent species including birds, insects and micro- and sub-soil organisms has been affected. The continuing decline in the number of species on rangelands spells disaster for the whole rangeland ecosystem. National parks, set aside to try to preserve this diversity, are relatively small and increasingly isolated conditions in which many species will not survive.

Important is the finding that the utilization and ranching of wildlife is highly profitable. Figures presented here indicate net returns ten times higher when wildlife is included on an average cattle ranch. More than half the cattle herd, in this case, was sold, releasing significant capital. Production shows a 30 per cent advantage over the average cattle ranch, associated with a significant reduction in grazing pressure.

With the accompanying ecological advantages, centering around the adaptation of a multiculture of native animals to their traditional range, the inclusion of wildlife in ranching operations is clearly desirable. Once this happens it will be up to the rancher to move towards the more productive and profitable system. It would appear that wildlife land use offers a real addition, if not an alternative, to present land-use systems.

Traditional land-use systems

Review, Africa, Tanzania, Kenya, Cameroon, agroforestry, case studies, indigenous knowledge, traditional methods, sustainable elements, ecofarming, integrated approach, extension, training

EGGER, K.

Ecofarming: a synthesis of old and new.

ILEIA Newsletter, June 1990, pp. 3-5

The indigenous land-use systems that have evolved from extensive shifting cultivation to forms of sedentary farming which support a high population density (up to 400 people/km²), but also manage to maintain soil fertility, are of particular interest for development of ecofarming in the tropics.

Wherever such indigenous systems are found, signs of disintegration can be seen, particularly where modern farming methods have been enforced or are held in high esteem by formally educated people. The local knowledge is then regarded as backward. But an indigenous farming system is not just a set of techniques, it is an integral part of the people's lives, embedded in their world view. It is an entire "agri-culture". Its maintenance demands much labour, great social discipline and a deep sense of community. When the traditional social institutions disintegrate, so too does the farming system.

The development of tropical land-use systems has followed two main paths: an indigenous path in response to increasing population pressure, from hunting, pastoralism and shifting cultivation to more intensive and sedentary forms of land-use; and a modernization path - a shift from indigenous to foreign technologies and external inputs, into the Green Revolution.

Both these paths have two branches. One branch of the indigenous path entails intensification of land-use without essential changes in farming methods. As a result, once stable forms of land-use become environmentally destructive, as in the case of shifting cultivation with ever shorter fallow periods. With the other branch, the local farmers recognize the dangers and may change their techniques so as to maintain soil fertility.

Within the modernization path, there may be either a direct transfer of foreign technology (e.g. inputs of chemical fertilizers, pesticides, mechanization), eventually leading to environmental degradation, or scientists and farmers are able to adapt the foreign technology to the local social, economic and ecological conditions. If the two branches tending towards ecologically-oriented farming within the indigenous and modern paths are brought together, they could enrich each other. Thus, indigenous knowledge and culture can be combined with judicious use of external inputs into forms of land-use which are more productive and sustainable than either of the two branches alone. The synthesis is called "ecofarming". This is but one of numerous

examples of farming systems that once existed in many parts of Africa.

All these systems have certain elements in common. Many trees are scattered over the fields, species deliberately chosen to promote the growth of field crops. Organic matter in the form of mulch, compost and animal manure is carefully applied to maintain soil fertility. In addition, green manuring is done by bush fallowing or tolerating weed growth in the fields at certain periods during the cropping cycle. Larger livestock are stabled and fed, or, at least part of the year, so that manure can be collected. Grazing is limited to the period after crop harvest. All these systems have an agro-silvopastoral "ecodesign", in which field crops, trees and livestock are closely integrated.

The essential characteristics of these ecofarming systems are:

- maximal but sustainable use of local resources
- minimal use of purchased inputs, only as complementary to local resources
- emphasis on subsistence cropping, combined with complementary production for the market
- ensuring the basic biological functions of soil-water-nutrients-humus
- maintaining a diversity of plant and animal species as a basis for ecological balance and economic stability, with primary emphasis on local species and varieties
- creating an attractive overall landscape which gives satisfaction to the local people.

The furthest developed ecofarming system of this type evolved over several years of project work in Nyabisindu, Rwanda, and is now also being further developed by scientists and farmers in other parts of the country.

II FARMING SYSTEMS RESEARCH AND DEVELOPMENT

530

90 - 2/61

Farming systems research and development
Review, Africa, Asia, Pacific, Latin America, developing
countries, agricultural research, agricultural development,
agricultural knowledge, cereals, resources, constraints,
indigenous knowledge, sustainability, food, export commodities,
cooperation, EEC, ACP, CTA

BUNTING, A.H.

Recherche agricole et développement agricole. (Agricultural
research and agricultural development.)

In: Proc. of an International Forum on Agriculture in the Year
2000 - The Case of ACP-Countries -, Athens, 1988, Greek Government
and CTA, Netherlands, ISBN 92-9081-0440, 1990, pp. 49-61

Shortage of knowledge is a principal limiting factor on
development in agriculture and the rural space. This paper
examines these aspects.

Summarizing this paper it may be said that in spite of
considerable increases of population, particularly in the
developing countries (Part I), the output of cereals per head
(Part II), the absolute output of cereals (Part III) and the
nutritional condition of populations (Part IV) have all increased,
in both developing and developed nations, since the second world
war. The increases have arisen from increases in yield (Part V) on
a more or less constant area (Part VI) since 1948-52 in the
developed nations, and since 1961-5 in the developing nations.

Africa is a partial exception to these generalizations. Though the
average output of cereals per head increased in Africa up to 1961-
5, it has steadily declined since then. The cereals have been
supplemented in part by cassava and other starchy foods, and in
part by imports. The declining trend of output per head, together
with the rapid growth of population, and numerous well-publicised
climatic and political/military disasters, has led some observers
to a generalized pessimism about sub-Saharan Africa, and even
about "the developing world" in general. But the average
nutritional state of Africa has not significantly declined, and
the output and yields of cereals have been increasing.

All this development has depended on the fuller use of knowledge,
part of which comes from formal agricultural research.

Everywhere in the developing world appropriate and adapted
agricultural technology and production systems are to be found.

In more recent times substantial contributions to knowledge have
been made by research, both within the nations and the regions,
and in the International Agricultural Research Centres.

In agriculture, research on existing systems of rural life and
production, the so-called farming systems research, is required.

Research does not initiate development. Its task is to strengthen
the knowledge base for development. Without development, or the
realistic prospect of development, there is no function for
research, no market for its products. In part, the failure of
research to promote development, is the consequence of a failure
of development itself.

It can be concluded from this that though new knowledge, produced
by agricultural research, may be a necessary condition for
agricultural development, it is seldom a sufficient condition.
The differences between necessary and sufficient are discussed by
assembling a checklist of seven groups of factors which influence
development and the rural space.
The development of indigenous research is essential for developing
countries.

It is essential to ensure that the methods to be tested are
sustainable over many years in farmers' fields.
Therefore the central task of research must be to strengthen the
capacity of each nation to take and execute its own decisions and
to deal firmly, on the basis of sovereign independence, with the
donors and the many agencies they support.

A second task is to include the International Agricultural
Research Centres active in the nation, and those of their donors
and sponsors who are also active in the nation, to form a common
plan for the contributions of the Centres to national progress
through research and training.

A common plan of this sort would surely help the donors to use the
Centres more fully in their bilateral programmes in each nation,
and so increase the return on their generous investments in the
"Consultative Group System".

531

90 - 2/62

Farming systems research and development
Review, terms, sustainable development, sustainable livelihood
security, SIDA, IIED

BARBIER, E.B. and J.A. McCracken

Glossary of selected terms in sustainable economic development.

Gatekeeper Series No SA 7; International Institute for Environment
and Development - Sustainable Agriculture Programme -, Endsleigh
Street, London WC1H 0DD, UK, 1988, 19 pp.; price £1.50 each incl.
p. and p.

This glossary of thirty entries covers a variety of terms commonly
used in the literature on sustainable economic development. Each
entry includes a brief description and references for further
information on the subject. Cross references to other terms are
indicated in bold upper case. References are provided to important
sources and background material.

The glossary of selected terms in sustainable economic development
in this paper are:

- Absorptive capacity
- Appropriate technology and intermediate technology
- Austerity policies
- Carrying capacity
- Cash crops, food crops, export crops
- Common property resources
- Cost-benefit analysis
- Debt rescheduling
- Decision criteria
- Desertification
- Developing countries
- Discounting
- Economic rent
- Externalities
- Food security
- Land degradation
- Marginal cost
- Market failures, market distortions and government failure
- Open access resources
- Opportunity cost
- Permanent livability
- Renewable and non-renewable resources
- Special drawing rights
- Steady-state economy
- Structural adjustment programs
- Sustainable development
- Sustainable livelihood security
- Tragedy of the commons
- Urbanisation

The term "sustainable development" is presented here in full
length:

"Two interpretations of sustainable development are now emerging:
a wider concept concerned with sustainable economic, ecological
and social development and a more narrowly defined concept largely
concerned with 'environmentally sustainable development' i.e. with
optimal resource and environmental management over time. The
former interpretation has been endorsed by the World Commission on
Environment and Development, who define the concept as
"development that meets the needs of the present without
compromising the ability of future generations to meet their own
needs". More specifically, a sustainable development approach
"argues that real improvement cannot occur in developing countries
unless the strategies which are being formulated and implemented
are environmentally sustainable over the long-term, are consistent
with social values and institutions, and encourage 'grassroots'
participation in the development process... In general terms, the
primary objective is reducing the absolute poverty of the world's
poor through providing lasting and secure livelihoods that
minimise resource depletion, environmental degradation, cultural
disruption, and social instability".

In contrast, a more narrowly defined concept of
environmentally sustainable economic development is:

"Sustainable economic development involves maximising the net
benefits of economic development, subject to maintaining the
services and quality of natural resources over time".

Where "maintaining the services and quality of the stock of
natural resources over time" implies, as far as is practicable:

- . utilising renewable resources at rates less than or equal
to the natural or managed rate at which they can be continuously
generated;
- . emitting wastes at rates less than or equal to the rates at
which they can be absorbed by the assimilative capacities of the
environment; and
- . optimising the efficiency with which exhaustible resources
are used, subject to substitutability among resources and
technological progress."

Copies of this paper and others are available from the Sustainable
Agriculture Programme, IIED, London (£1.50 each inc. p and p)

532

90 - 2/63

Farming systems research and development
Review, book, Africa, Sub-Sahara, agricultural development,
economics, modernization of agriculture, external institutions,
integration of groups, prospects for development

SETH LA-ANYANE

Economics of agricultural development in tropical Africa.

John Wiley and Sons Ltd., Chichester, UK; ISBN 0-471 900 346,
Reprint 1986, 149 pp. + bibliographical references and index

The first draft of this book was written at the Institute of Agricultural Economics, Oxford, in 1973. It was then conceived as a review of the economic development of agriculture in the western states of Africa. Its scope was broadened in a later draft to cover the economics of agriculture and its related development in tropical Africa.

This book presents an analyses of agricultural economic development in Tropical Africa which highlights the fundamental social and political processes of this development. It examines the factors involved in change and modernization of tropical agriculture, and introduces the involvement of African Intergovernmental Organizations and International, Bilateral, and Multilateral Agencies in the Development of Tropical African Agriculture.

This book concentrates on the contributions by the peasant small-scale farmers to economic development and on the indigenous institutions that need to be recognized and strengthened in order to render more effective their role in agricultural economic development. The important lesson that the book conveys is the need for the African governments to make a more determined effort to build on the existing small-scale farming structure rather than rely on introduced large-scale systems for the development of national agriculture.

The book is about the administrative, technological, social and economic processes and institutions involved in agricultural development in tropical Africa. It is based on the experience of the author spanning three decades in the field and on a vast amount of literature in Europe, North America and Africa.

This book is primarily written for undergraduate and graduate students in economics, agricultural economics, and agricultural administration, and for consultants and businessmen with special interests in tropical Africa.

533

90 - 2/64

Farming systems research and development
Review, book, rural development, poverty, sociology, projects, CTA

CHAMBERS, R.

Développement rural - La pauvreté cachée (Rural development:
putting the last first.)

Editions Karthala 22-24, Boulevard Arago, 75013, Paris, France and
CTA, Postbus 380, 6700 A.J. Wageningen, Netherlands; ISBN 2-
86537259, 1990, 374 pp.

CTA has recently funded the translation into French and the publication (by Editions Karthala) of Robert Chambers' book "Rural Development: putting the last first", which was originally published in English by Longmans.

The book is for people who are concerned with rural poverty and rural development.

It is an attempt to speak to both practitioners and academics, and to both social scientists and physical and biological scientist.

This book is a work of practical sociology, and a criticism of what has gone before in the field of rural development. To read this book is to understand why so many projects and studies have missed the mark.

Within the Third World, much of the evidence is from Africa South of the Sahara and from South Asia.

The book concentrates attention on the 'last', on the hundreds of millions of largely unseen people in rural areas who are poor, weak, isolated, vulnerable and powerless.

Each chapter stands largely on its own, but is linked to others. The summaries which start each chapter give an immediate overview of the book.

This is a challenging book for all people as practitioners, academics, students or researchers, including social, physical and biological scientists, and field and headquarters staff of government departments, voluntary agencies, and aid organizations.

534

90 - 2/65

Farming systems research and development
Review, book, German bilateral cooperation, GTZ, BMZ, women, rural
development, framework, development policy, practical suggestions

SCHNEIDER, R.M. and W. SCHNEIDER

Frauenförderung in der ländlichen Entwicklung. (The promotion of
women in rural development.)

Schriftenreihe der GTZ Nr. 212, Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH, Eschborn, ISBN 3-88085-406-
8, 1989, 152 pp., available at: TZ-Verlagsgesellschaft mbH, Postf.
1164, 6101 Roßdorf, F.R.G.

The promotion of women is one of the aims in German development
cooperation. Rural development has a special importance in the
process of putting these development policies into practice:
facing the key-role women play in this area, no project of rural
development can afford to neglect this aspect. Attention is drawn
to this by the new concept of the BMZ for the promotion of women
in developing countries.

The promotion of women in the context of rural development means
first of all the promotion of women in their roles of producers
and earners. Facing the high work load of rural women in their
house work, very often measures have to be taken to relieve them
in this domain, so that conditions can be achieved for the
necessary increase of productivity in agriculture.

This frame work is the result of a discussion process that lasted
three years.

This book is a complement to the framework "Regional rural
development". Practical suggestions for the promotion of women in
rural development are given. In the first chapter the necessity
and significance of the promotion of women is established. Next
comes the discussion on the importance of women for various fields
of rural development. In the last two chapters the instruments for
the promotion of women are reconsidered as to their suitability.

The last chapters show that the introduced instruments for rural
development can and should be used also for the promotion of
women.

Addressees are first of all counterparts in rural development
projects. At the same time all concerned with planning,
organisation and implementation of projects are to be addressed.

90 - 2/66

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Farming systems research and development
Latin America, Colombia, Ecuador, Brazil, Mexico, CIAT, CIMMYT,
farmer to farmer technology transfer, extension, technology
adaptation and transfer farmer organizations

CIAT

Farmer organizations in technology adaptation and transfer.

CIAT Report 1989, Centro Internacional de Agricultura Tropical
(CIAT), Ap. Aéro 6713, Cali, Colombia, 1989, pp. 11-14

CIAT involves farmer organizations which in several South American
countries are playing important roles in research, technology
transfer, and extension. These intermediary organizations, often
taking the form of a cooperative, have been able to move new
technology developed through the research networks into the field,
bringing immediate benefits to small farmers.

The local farmers' organizations are primarily involved in
agroindustry or marketing, but they can collaborate with research
institutions. Their resources, contacts with farmers, and
administrative capacities allow them to participate in a range of
undertakings, including technology design, research, testing,
evaluation, and adaptation activities. Some activities implement
technologies with long-term payoff, such as planting trees,
erosion control, and regional insect management.

A anthropologist was intimately involved in designing the research
and extension techniques to make promotion more efficient. For
example, a cassava farmer and leader of one of the cooperatives
from the Colombian north coast was hired as a consultant to advise
the new Ecuadorian associations. This farmer-to-farmer technology
transfer approach has proved to be a very effective form of
extension.

In just three years, the number of cassava-drying farmer
associations in Ecuador has grown to more than 20 (nearly 400
members) and output now exceeds 1000 metric tons of flour. Equally
striking, the cost of extension and applied research was cut to
about one-third of what it had been, mostly by eliciting the
cooperation of organized farmers.

The farmers' associations in the Manabi Province have combined to
form a common association: the Unión de Asociaciones de
Productores y Procesadores de Yuca (UAPPY). Through this union
they have been able to streamline production, transportation, and
marketing of the processed cassava. This year, several UAPPY
members have visited CIAT to study the operation of artificial
driers, starch-making technology, sifters, and mills.

FUNDAGRO, a private Ecuadorian foundation, has been assisting
institutions in coordinating their efforts and to integrate
research, extension, training, and farmer organization. The
interinstitutional team includes the national farmer training
institute.

UAPPY has proven to be a successful example of linking technology adaptation, extension, and development to a social and agronomic scheme through a farmer organization. The association accomplished it by establishing relationships with research and extension agencies, both government and nongovernment.

Experience in Colombia and Ecuador has shown that experimental development projects with farmer organizations can work where cassava-drying projects are the focus. They are a model that can be modified and replicated in other parts of the world to make extension efficient and to reduce the cost of applied research.

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Farming systems research and development
Review, book, Africa, Ethiopia highlands, economic analysis,
cooperative farming, mixed farming systems, ATSAF

TESFAYE ASSEFA

An economic analysis of cooperative farming in the highlands of Ethiopia with special emphasis on mixed farming systems.

Wissenschaftsverlag Vauk, Kiel; Dissertation, ISBN 3-8175-0057-2, 1989, 239 pp.

The study concentrates on a resource allocation problem in the context of mixed farming systems with special reference to cooperative farming in the highlands of Ethiopia. In general, the economic organization of cooperative farms does not seem to be well conceived and planned in the light of the agro-ecology and prevailing farming systems leading inevitably to sub-optimal utilization of agricultural resources and low farm returns. The specific problems identified in the study are: the tendency of promoting tractor oriented large scale operations while maintaining the traditional cropping pattern without increasing productivity; a gross violation of the traditional mixed farming systems, by neglecting livestock development, and by the lack of any mixed farming financing approach; the failure to establish optimal production plans, credit demand and debt absorbing capacity (the existing mode of financing is based on piece-meal feasibility studies involving budgeting exercises that do not consider the optimal production plans); lack of elaborated resource inventory and performance evaluation systems; and, the failure to explicitly identify development constraints and to formulate concrete development policies.

The study is limited to an economic analysis at a micro level, addressing issues of optimum enterprise combinations, efficiency, productivity, financing, etc., for producer cooperatives as given economic entities. Only major crops and livestock species with significant integrative functions in terms of complementary, supplementary and competitive relationships are considered. The study region is restricted to that zone with a high potential for crop and livestock production (HPCL) covering mainly three regions - Arsi, Gojam and Shoa - within the central highlands.

A field survey is the basis of the study covering 34 cooperatives as part of the exploratory survey. One exhaustive case study model, where mixed farming is being practised, and three benchmark cooperative models representing farm operations at 2700 m, 2400 m, and 1800 m altitudes are developed. The selection of the case study model and the reference sites and cooperatives for the benchmark models is based on purposive sampling. The methodology involves the complementary use of farm income analysis, linear programming, budgeting and investment analysis.

Abstract from ATSAF-Circular

Farming systems research and development
Canada, study, finance, organic agriculture, sustainable
agriculture, farm credit, net farm income, risk potential, new
equity investment capital, organization of lending, government
assistance, requirements, problems, strategies

MACRAE, R.J. et al.

Financing organic/sustainable agriculture: current problems and
new strategies.

Ecological Agriculture Projects Research Paper No. 5, Dept. of
Renewable Resources, Agricultural Economics, Entomology; MacDonald
College of McGill University, 21111 Lakeshore Rd., Ste-Anne de
Bellevue, QC Canada H9X 1C0

This paper explores the nature of some of the barriers and
opportunities and presents a number of strategies to facilitate
the financing of sustainable agriculture. This is a new and
evolving approach to agriculture and, as a result, its terminology
is not yet precise. There is also tremendous diversity in the
approaches and schools of thought that qualify to be labelled as
sustainable agriculture.

Many descriptions of sustainable agriculture exist, but the
following will be used for the purposes of this paper:

"Sustainable agriculture is both a philosophy and a system of
farming. It has its roots in a set of values that reflects a state
of awareness of ecological and social realities and of one's
ability to take effective action. It involves design and
management procedures that work with natural processes to conserve
all resources, minimize waste and environmental impact, while
maintaining or improving farm profitability."

Of particular importance is working with natural soil processes.
Sustainable agriculture systems are designed to optimize the use
of soil nutrient and water cycles, naturally occurring energy
flows, and organisms for food production. As well, such systems
aim to produce food that is nutritious and uncontaminated with
products that harm human health.

In practice such systems have tended to avoid the use of
synthetically compounded fertilizers, pesticides, growth
regulators, and livestock feed additives. Instead, sustainable
agriculture systems rely on crop rotations, crop residues, animal
manures, legumes, green manures, off-farm organic wastes,
mechanical cultivation, and mineral-bearing rocks to optimize soil
biological activity, and to maintain soil fertility and
productivity. Natural, biological and cultural controls are used
to manage insects, weeds, and diseases.

Within this description fall such farming systems as organic,
biological, ecological, biodynamic, regenerative, alternative,
natural and permanent. Because "organic" is used extensively in
the market place to describe sustainable agriculture

practitioners, it is interchangeably used with sustainable
agriculture.

In Canada, improving the access to agricultural credit has been a
key component of government policy, in order to help improve the
competitiveness and productivity of the agricultural sector, and
to shape its structure.

Producers following sustainable agriculture practices are not
immune from the problems being experienced by the general farm
sector, but the financing of sustainable agriculture presents
additional and special problems, and also presents opportunities
for farmers and lenders. This special group of farmers, due to the
particular barriers they face, has not been as successful in
obtaining credit as many conventional producers. At the same time,
opportunities are presented by the financial position of these
farmers, which may be better than that of many conventional
producers.

This paper identifies the main barriers to financing sustainable
agriculture and has highlighted a diverse range of alternative
credit opportunities and new initiatives that could be promoted by
public and community organizations to assist the development of
sustainable producers.

The financial position of organic farmers was compared to
conventional producers and found to be comparable and possibly
superior, due in part to conventional practices which can
contribute to increasing longer run risks. This suggests that
offering credit to organic farmers offers an opportunity to
lenders that has not as yet been realized, mainly because of
institutional ignorance of their objectives, methodology and
market opportunities. As these traditional credit agencies learn
more about alternative agricultural systems and objectives, their
use by organic producers will grow. Yet, even informed and
rational lenders may continue to be unwilling to provide credit to
traditional farmers who wish to convert to sustainable practices,
due to the risks associated with the transition period. It is in
this area that public institutions may play an important role.

In the long-term, there is potential for significant opposition to
many of the new approaches discussed here. A basic principle of
organic farming is the gradual substitution of knowledge and
skills for capital and purchased inputs, particularly by means of
changes in the design and management of agroecosystems. Many of
the traditional businesses in the food and agriculture sector may
find that the demand for their products and services will decline
as more farmers convert to sustainable approaches.

The farm clientele is clearly changing, and it is time for credit
institutions to adjust their lending criteria, and it is time for
governments to provide incentives to farmers to make the
transition.

Farming systems research and development
Review, USA, farming systems, sustainability, public policy,
socio-political factors, organic farming, agricultural structure,
research needs

YOUNGBERG, G. and F.H. BUTTEL

Public policy and socio-political factors affecting the future of
sustainable farming systems.

In: Proc. of a Symposium on Organic Farming: Current Technology
and its Role in a Sustainable Agriculture; Atlanta, USA, 1981; ASA
Special Publication No. 46; Publ. by American Society of Agronomy
et al., 677 South Segoe Road, Madison, WI 53711, 1984, pp. 167-185

Organic agriculture forms an integrated part of a broader
alternative agriculture movement in the USA and abroad.

The term organic is not an absolute term. It is a relative term
and must, therefore, be defined in a relational or comparative
way.

This summary of policy related research needs in the area of
organic agriculture is neither exhaustive nor presented in any
particular order of importance. All of these research areas are
sufficiently important to warrant further examination. The
financial resources and personal research inclinations and
training of individual scholars will dictate the ultimate scope
and timing of this particular research agenda:

- The Scientific literature of organic farming and the character
and status of educational materials related to organic farming.
Inventory, analyze, and assess existing research reports and
professional publications, extension materials, and other
sources of information with regard to their relevance and
applicability to the informational and educational needs of
contemporary organic farmers. In addition to the practical
farmer benefits to be derived from such an inventory, it could
also serve as a guide to current researchers as they plan future
long-range research projects and programs in this area.
- Public policies and their relationship to organic farming.
Agricultural commodity, marketing, trade, taxation, credit,
conservation, research, regulatory, and incentive policy should
be examined in light of its relationship to, and impact upon,
the development of organic farming systems. State and local
governmental policy should also be included in these studies.
- The ideology and politics of organic agriculture. Studies of the
conventional, general, and commodity farm organizations should
be examined with respect to the ideological and political
overlap and conflict between their policy objectives and those
of organic farmers.
- The sociology of agricultural science. The role of professional
socialization and the status and reward system of professional
organizations in determining the overall agricultural research
agenda.

- The implications of production declines under organic farming
systems. What are the likely consequences of production declines
and a changed product mix which would occur with the widespread
adoption of organic farming?
- Recycling and land application of urban organic wastes.
- The demography of organic agriculture. Major knowledge gaps
remain with regard to the numbers and sizes of organic farms in
the USA, as well as the ideological and socioeconomic character
of organic farmers.
Until reliable and scientifically acceptable information is
obtained with regard to the micro-socioeconomic character of
organic farming, it is virtually impossible to assess the macro-
economic and policy-related effects of the wider scale adoption
of organic farming systems in the USA and abroad.
- Technology transfer. Given the complexity and holistic nature of
organic farming systems, are there unique problems associated
with the information and technology transfer functions, either
from the perspective of the provider or recipient of
information.

Farming systems research and development
Review, definition of sustainable agriculture, agricultural science, food production, funding priorities, reward systems, education, political strategies, institutional strategies.

MACRAE, R.J. et al.

Agricultural science and sustainable agriculture: a review of the existing scientific barriers to sustainable food production and potential solutions.

Biological Agriculture and Horticulture, 6, 1989, pp. 173-219

The purpose of this paper is to examine the main barriers to sustainable food production, to explore their consequences, and to propose strategies to overcome them.

In the first part of the paper the barriers to sustainable agriculture presented by conventional science under the following distinct, but interrelated, headings are: the process of conventional scientific inquiry, the values of scientists, and the conduct of conventional agricultural research are outlined. The second part of the paper deals with new approaches and the place of conventional scientific inquiry in promoting sustainable agriculture.

Agricultural research has been a very effective tool for increasing both agricultural production and the options for food processing and storage. This increase has been accompanied by major changes in the way food and agriculture systems are organized. Research on the sustainability of these systems, however, has until recently received little attention or financial support. Surveys of organic farmers have consistently shown that a lack of relevant information and research has been a major obstacle to implementing sustainable farming practices.

Much of the research and research process that has made conventional agriculture so productive has been a barrier to implementing sustainable agriculture. It is the contention that one relies on too few approaches to agricultural science, that these approaches are not sufficiently comprehensive, and that agricultural scientists have traditionally been associated with too few options in the food system to establish a sufficient knowledge base for sustainable agriculture system.

In practice such systems have tended to avoid the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives, and instead rely upon crop rotations, crop residues, animal manures, cultivation, and mineral-bearing rocks to maintain soil fertility and productivity, and on natural, cultural and biological controls to control insects, weeds and other pests.

The potential of this approach, however, goes far beyond its present expression, which has largely been limited to the substitution of environmentally benign products and practices. More significant advances can be expected as a result of

developments in the science and art of agroecosystem design and management."

Such a description includes farming systems variously referred to as organic, biological, ecological, agroecological, biodynamic, regenerative, alternative, natural, and permanent.

Ecology is concerned with the relationships between organisms (including humans) within ecosystems and with the associated flows of energy and materials.

Agroecologists study these characteristics both ecologically and socioculturally. The sociocultural elements are important because human relationships with agricultural systems are prime determinants of the form any given system takes.

Conventional approaches to agricultural science have not used an agroecological or associated research paradigm. Here the authors show how this poses a serious limitation for supporting sustainable agriculture. It is not to deny, however, that some agricultural scientists using conventional paradigms have contributed to sustainability in agriculture.

The paper concludes that there is growing concern about the direction that the food and agriculture system has taken, the problems it is creating, and the ability of agricultural research to produce solutions to what is perceived by many to be chronic problems. As a result, government, universities, and industry are being forced to re-examine the ways in which they support and perform agricultural research. Because of unanticipated problems stemming from their work, conventional agricultural scientists are likely to find it increasingly difficult to convince the general public that their work is valuable.

540

90 - 2/71

Farming systems research and development
Review, book, developing countries, agricultural extension,
extension concepts, extension methods, situation analysis,
extension management, training of advisers, evaluation of
extension, GTZ, BMZ, CTA

ALBRECHT, H. et al.

Agricultural extension - Volume 1 - Basic Concepts and Methods.
(Landwirtschaftliche Beratung - Bd. I, Konzepte und Methoden.)

Rural Development Series; Publ. of Bundesministerium für
Wirtschaftl. Zusammenarbeit (BMZ) 5300 Bonn; Sonderpublikation der
GTZ, No. 212, 6236 Eschborn 1; CTA, NL-6700 AJ Wageningen; ISBN 3-
88085-364-9, 1989, 268 pp., available from: TZ-Verlagsgesellschaft
mbH, Postfach 1164, D-6101 Rossdorf, F.R.G.

Agricultural extension requires comprehensive knowledge and
skills, detailed analysis and a forward-looking approach to
strategy, methodology and the planning of extension work.

To achieve its aims it employs the methods and results of various
academic disciplines such as sociology, psychology and education,
but it has nevertheless become a specialised subject and
profession in its own right.

This handbook gives specialists the opportunity to supplement
their training by acquiring the fundamentals or the methodology
and theory of agricultural extension. Volume 2 contains practical
examples and background material.

Since the first edition of Agricultural Extension was so well
received, both by project employees as a practical tool and in
faculties of agriculture as a student textbook, this fully revised
second edition is published, which takes into account the progress
of discussion and practical experience made since 1981. This
revised edition has also benefited from experience gained when
using the handbook in the further training of extension
specialists at home and abroad.

The authors analyse current experience of extension and present it
in conjunction with established theories. The overall aim of the
publishers is the creation of concepts and a methodology that
brings greater transparency to the planning, implementing and
evaluation of projects and make decision-making a more rational
process.

The book attempts to explain basic theories and important
relationships in the multitude of extension activities. It then
uses these and current practical experience to propose ways of
structuring the work of projects in everyday practice.

The authors have tried to keep the text as simple as possible.
Further information is provided by the bibliography in Volume I
and the references in the background material in Volume II. (see
Abstract 90 - 2/72).

This book is to be used as a basis for initial and advanced
training for planners and for counterpart personnel in the
projects.

Chapter I-III give the reader an idea of what the book is about,
while the other chapters and accompanying documentation offer
supplementary reading from which the reader can select as
necessary.

All references are marked by an arrow, which should make it easier
for readers to look things up and facilitate rapid reading. The
index serves the same purpose.

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90 - 2/72

Farming systems research and development
Review, book, developing countries, agricultural extension, case studies, extension approaches, problem description, practical guidelines, checklists, recommendation, GTZ, CTA, BMZ

ALBRECHT, H.

Agricultural extension - Volume 2 Examples and Background Material. (Landwirtschaftliche Beratung - Bd. 2 - Beispiele und Hintergrundmaterial).

Rural Development Series; Publ. of BMZ, Bonn, GTZ, Eschborn and CTA, Wageningen; Sonderpubl. der GTZ No. 238; ISBN 3-88085-405-X; 1990, 433 pp., available from: TZ-Verlagsgesellschaft mbH, Postf. 1164, D-6601 Rossdorf, F.R.G.

The objective of this handbook is to help specialists in international cooperation to improve the planning, implementation and evaluation of extension projects. The book consists of two volumes: Vol. 1 deals (see Abstract No. 90-2/71) with basic concepts and this Volume 2 contains the supplementary documentation, that means Vol. 2 contains a collection of background material to illustrate and supplement Vol 1 by means of practical case studies.

In detail this volume II contains the following chapters:

- Case studies of approaches to extension
- Selected project descriptions
- Description of recurring problems
- Cases and examples of method
- Practical guidelines
- Checklists
- Presentation and structure: examples and suggestions

The book (Vol 1,2) is well written, easy to understand and therefore highly recommended for all those working in rural development.

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90 - 2/73

Farming systems and development
Review, book, guideline, project management, project implementation, monitoring and evaluation, project organization, leadership and cooperation, cooperative relationships, GTZ

LANG, H. and H.-D. DRECHSLER

Managing on-site project implementation.

Sonderpublikation der GTZ No. 204; ISBN 3-88085-358-4 1989, 161 pp. available from: TZ-Verlagsgesellschaft mbH, Postf. 1164, D-6101 Rossdorf, F.R.G.

Most Technical Cooperation projects are still oriented to specific sectors and thus staffed with personnel possessing the sector-specific know-how required: i.e. agricultural engineers, physicians, architects, construction engineers, vocational training teachers, etc.

These experts must combine their sector-specific know-how with management tasks, although they have often not had any management training. This guideline primarily addresses this category of staff.

The guideline is to serve as a reference for those experts performing management functions within project implementation work and for partner-country experts to assist them in their day-to-day management tasks. It is meant as an orientation guideline to improve management of project implementation and thus raise project efficiency and guarantee sustained effectiveness.

Chapter 1 gives an introduction to the guideline.

Chapter 2 of the guideline briefly describes the basic framework of the project management concept: target group orientation and securing the sustained effectiveness of project activities are the chief strategic elements; ZOPP objectives-oriented project planning - is the method on which project planning, monitoring and evaluation are based, although it is also relevant for all other management functions.

Chapter 3-7 deal with the five major project management functions:

- . planning project implementation
- . monitoring and evaluation
- . organizational design
- . leadership and cooperation
- . designing cooperative relationships with the project's environment.

A review at the beginning of each chapter summarizes the objectives of each management function, its contents and the instruments for implementing it.

The bibliography indicates selected literature classified according to subject area, for readers wishing to gain more in depth knowledge on the individual aspects.

References to individual chapters in this book, to papers in the loose-leaf Project Management Documentation or other GTZ publications are marked with an arrow.

The procedures and approaches described in this guideline suggest how management functions can be performed when implementing project work.

The authors underline the importance to put enough emphasis on the inherent danger in trying to transfer models in an unreflected manner or in trying to set up parallel structures in the partner country. Each project has its own specific objectives, disposes of individual resources and is embedded in a different environmental framework. If Technical Cooperation measures are to be successful in improving institutional capability, the procedures and instruments in this guideline should be carefully scrutinized before deciding how they can be put into practice in the actual project situation, and they must be modelled to suit the specific circumstances and demands of each project.

Management science is an independent and very wide-ranging subject. This guideline can only impart the basic knowledge necessary to understand the relevant management functions in project implementation. It is not meant to be an instruction book on institution-building. Analyses of institutions and the implementation of institution-building measures remain the domain of experienced experts in that area.

A basic issue for Technical Cooperation projects is how far those management techniques that were primarily developed in Western industrialized nations can indeed be applied in the varied socio-cultural conditions in other countries.

Each element of the management concept must, therefore, be reviewed in regard to the given socio-cultural circumstances and modified where necessary in order to avoid frictions as far as possible in the scope of project implementation.

The Management Guideline is available in German, English and French.

Farming systems research and development
Africa, Nigeria, humid forest zone, Ultisol, survey, yield decline, crop diversity, sustainable agriculture production, soil degradation, land-use transfer, farmer innovation

MOORE, A.W.

Can agricultural production be sustained in southeastern Nigeria?

IITA Research Briefs, 9, (1) 1989, pp. 4-5

It has been said many times over the past fifty years that high population densities in southeastern Nigeria, with resulting high pressures on soil and land resources, will inevitably lead to the collapse of agricultural systems there.

Is it just a myth, and what do the farmers themselves think is happening? Is sustainable agriculture possible under these apparently degraded conditions? Groups of villagers in five areas of varying population density in Imo State have been interviewed. These densities are estimated to range from about 1200 persons per km² in Ahiazu Mbaise in the center of Imo to around 200 persons per km² in Ukwa in the south of the state. It is of interest to note that even 200 persons per km² is a very high density for sub-Saharan Africa.

Imo is in the humid forest zone of southeastern Nigeria and its soils are for the most part strongly leached, acidic, sandy ultisols whose productivity declines rapidly after cultivation. Traditionally, land was cropped for only one season before being left to revert to forest for seven years or so. This living fallow rejuvenated the soil and allowed crop yields to be sustained more or less indefinitely. In recent times, the fallow period has been shortening, with a consequent decline in the productivity of the resource base that supports the agricultural community. At least, that is the scenario that most researchers have come up with.

As it turns out, the farmers themselves also perceive that there has been some decline in the productivity of their resource base over the past 20 years and that their agricultural systems are facing a crisis of sustainability. In general, farmers feel that population pressure on available land has compelled a reduction in fallow periods, which in turn has led to declining yields, reduced crop density, and a decrease in useful production from the fallow itself.

Farmers perceive that both crop yields and crop diversity are declining. This is illustrated by their estimates of the decline in yield of the major crop, cassava, for three of the survey areas.

In addition to the effect of reduced soil fertility, many farmers believe that these yield declines have been caused by an increase in the extent and severity of pest and disease losses over this period.

The decrease in crop diversity is highlighted by the decline or disappearance in many places of cocoyam, which was formerly the

second or third most important crop in the area. There has also been a decline in the production of groundnut, lima bean, velvet bean, coconut, plantain, yams and so on. The reasons for this vary, from new or increasingly virulent diseases (e.g. on cocoyam, plantain) to changing food preferences (e.g. aerial yam). At the same time relatively few new crops have been introduced, rice, pineapple and citrus being among the few notable ones.

There is another adverse effect of shorter fallow periods besides lower crop production resulting from diminished regeneration of soil fertility. Many products are harvested from the fallow itself, e.g. fuelwood, stakes (for yams), wild foods and medicine, and construction materials. With declining length of fallow period there is a smaller area of forest or bush from which products may be harvested and, because the vegetation is younger, there is less species diversity and, on average, individual plants are less mature. Hence one would expect both the quantity and quality of products from the fallow to decrease as the fallow period shortens. That this has happened was confirmed by the farmers, using as indices of pressure on the fallow products their estimates of purchases of stakes and fuelwood, of the use of bamboo as stakes and palm fronds as fuel, and the degree of restriction of access to sources of stakes and fuelwood.

Because pressures on the resources are not uniformly spread, their effects can be attenuated to some extent by transferring the use of land from one place to another. In fact, there has been for a long time extensive movement of farmers between areas in order to obtain the use of less degraded land by renting, gifting or some other means. It has been, and probably will continue to be, an important social means of diffusing the impacts of land-use pressures and ameliorating local degradation.

Although it is easy to be pessimistic about an area as crowded as southeastern Nigeria, any predictions should be tempered with the realization that its agricultural systems have not collapsed, in spite of the apprehensions of many people in the past. However, they have had to change and there certainly have been costs in the form of resource degradation. Further changes will undoubtedly be necessary in the future. An objective of resource management research at IITA is to identify the most appropriate changes for such situations.

Author's summary, shortened

Farming systems research and development study, paper, on-farm client-oriented research, on-farm staff management, case studies, ISNAR, ATSAF

BINGEN, R.J. and S.V. POATS

Staff management issues in on-farm client-oriented research.

OFCOR Comparative Study No. 5, ISNAR, The Hague, Netherlands, 41 P.

The paper focuses primarily on those aspects of on-farm staff management which differ from the management of staff engaged in more conventional agricultural research.

While some features of on-farm research - notably public sector employment regulations pay scales and career ladders - are common throughout a national agricultural research system, the evidence from the case studies shows that on-farm research also has a number of features that raise management issues peculiar to it alone.

Unlike more conventional agricultural research activities, OFCOR requires managers to recruit and assign staff on the basis of their ability and willingness to collaborate intensively with colleagues from other disciplines and to work directly with farmers and technology transfer workers. Moreover, OFCOR requires its scientists to be committed to the development and deployment of technology rather than to the pursuit of more purely disciplinary concerns - a shift in professional orientation which some scientists find difficult to accept and which must, in addition, bring the scientist out of the laboratory and into the field. As a result, on-farm research often places logistic and travel burdens on its scientific staff that are significantly greater than those placed on other scientists.

This paper is intended for two audiences: on-farm research managers, and other leaders of national agricultural systems in developing countries. For on-farm research managers, it offers practical advice on day-to-day staff management issues. For other leaders, it identifies some of the staff-related factors affecting the role of on-farm research in the national system, and some of the characteristics of successful on-farm research managers, so as to delineate priority criteria for selecting these individuals.

The paper is structured as follows. Chapter 1 outlines the main issues arising in the nine case studies. Chapters 2 to 5 consist of a more detailed discussion, grouping the issues under the following major headings or themes: staff patterns and roles; staff recruitment and incentives; staff development; and scientific leadership. Finally, Chapter 6 offers some recommendations for on-farm research managers and other leaders of national agricultural research systems. The data from the case studies, on which the analysis is based, are given in the annex to the paper.

Abstract from ATSAF-Circular

545

90 - 2/76

Farming systems research and development
Africa, Transkei, developing countries, study, technology
transfer, systems approach, agricultural production, development,
policy considerations, research, target groups, farmers, key
factors, agricultural extension

BEMBRIDGE, T.J.

Considerations in technology transfer in less developed areas of
Southern Africa.

Development in Southern Africa, 5, 1988, pp. 212-226

The objective of this paper is to examine the agricultural
development situation in the less developed areas in South Africa,
and then to conclude with a few thoughts on some important factors
to be considered for future successful agricultural extension
programmes aimed at encouraging commercially oriented farmers.

In South Africa there is a situation where food production at the
aggregate level is adequate, and yet the less developed areas
produce only about one third of the food requirements of the de
facto population. Self-sufficiency in food does not give all
members of society an adequate diet.

There is a dual agrarian structure composed of about 62,000
commercial farmers and approximately 1.27 million small-scale
farmers, the majority of whom do not even produce their own
subsistence requirements.

The design of effective agricultural and rural development
policies and strategies requires an understanding of the
interaction between changes in institutions, technology, physical
and human resources, and the agricultural production of a
particular state.

The prices paid for commodities, access to markets, the nature of
available technology, access to inputs, alternative income earning
opportunities and the characteristics and managerial capacity of
the producer, are all factors which influence production decisions
and ultimately agricultural output. Planning effective strategies
and policies to increase agricultural production requires
knowledge of these factors and of the interactions among them.

In order to assess the problems and potential for agricultural
extension, results of a study of a sample of farmers in three
typical semi-intensive farming areas of Transkei are contrasted
with those of twenty-two farmers, who were by consensus of local
extension officers considered to be the most progressive farmers
in the area.

Significantly more of the progressive farmer de facto heads of
household were men who were managing the farming enterprise. This
finding reinforces the need to provide opportunities where the
whole family can be involved in the farming enterprise. The
progressive farmers were better educated and participated more in

local organisations, but they did not differ from the other
farmers in terms of age group, marital status or membership of
local organisations.

The progressive farmers had considerably more land resources,
implements and livestock than did the average farmer. They also
had a greater diversification of enterprises into fruit trees,
vegetable gardens and small stock.

Successful extension involves many factors other than the transfer
of technology and selection of target farmers. There is a
tentative, but essential list of conditions for successful
agricultural extension programmes, based on the assumption that
motivational factors such as salaries, working conditions and
tools to do the job have been adequately fulfilled.

Institutional innovation inevitably involves mobilisation of
considerable political resources. New institutions or changes in
institutional approaches will succeed only if politicians perceive
the benefits and social returns as outweighing the cost of
mobilising the resources necessary for institutional reform which
is aimed at improving the well-being of rural people. The
solutions are usually long term, but the issues must be vigorously
tackled as a whole, if to achieve sustained agricultural
development and to produce a large class of commercially oriented
farmers.

Farming systems research and development
Review, book, tropics, Asia, Africa, Latin America, soil and
vegetation, livestock, water resources, erosion, land degradation,
desertification, sustainable development, pollution and waste,
food production, CTA

DELLERÉ, R.

"Terres et vivres". Concilier protection et production. ("Land and
food". The challenge of sustainable agriculture in the tropics).

CTA-Technical Centre for Agricultural and Rural Cooperation,
Postbus 380, 6700 AJ Wageningen, The Netherlands; ISBN 92-9081-
0327, 1989, 96 pp.

The greatest tasks facing the developing world today are to
increase food production and to protect the environment. The two
are inextricably linked and neither can be achieved without the
other. It does not make sense to meet the needs of people today if
this leaves no tomorrow for their children. In effect, development
must be sustainable.

The main aim in producing this book is to raise the awareness of
those responsible for policies and actions in the rural areas.

The book is designed for maximum impact on the reader: stunning
aerial photographs are linked to a brief but biting commentary on
the developmental mistakes of the past. Seen from the unfamiliar
perspective of the aerial photographer, clustered circles of
thatched huts set in denuded savanna appear vulnerable and
lifeless; eroded and scarified hillsides suggest the bones of a
dead continent; the spreading stain of silt entering the ocean has
the menace of a slow-moving poison cloud; a broad river, with
virgin forest on one bank and charred stumps on the other,
contrasting what is and what is to come.

There is also a positive and constructive message with photographs
and text showing the inventiveness and productive power of Man -
dams, mosaics of rich farmland, water-harvesting, dune
stabilization and elaborately terraced hillsides. These also show
the ability of seemingly simple peasants to work out and implement
sustainable systems of agriculture. But there is also ample
evidence that planning and implementation of projects must involve
local people if misuse and over-exploitation of the environment
are to be avoided.

Nowhere in any of the photographs in "Land and Food" is there a
human face or figure but every picture is graphic evidence of
human activity. The message is clear: it is people who destroy
their environment and suffer for it and it is people who must bear
degradation and desertification; Sustainable development;
Pollution and waste. But no aspect of the environment exists or
can be treated alone and there is cross-reference in pictures and
text.

Abstract from SPORE, altered

Farming systems research and development
Africa, Sierra Leone, review, agricultural research, farmer
experimentation, indigenous culture, ILEIA

RICHARDS, P.

Experimenting farmers & agricultural research.

Proceedings ILEIA Workshop PTD, 1990, 25 pp.; P. Richards, Dept.
of Anthropology, University of London, Gower Street, London-WC1E
6BT, England

Two examples of indigenous experimentation ("hungoo") by Mende
farmers in Sierra Leone are described: a germination test of rice
and small trial plots as a long-established element in indigenous
culture. Earlier publications reveal that agricultural practices
are often thought of as "traditional" and therefore static,
arrived at by accident. Many recent publications however, reveal
that some traditions are quite clearly recent innovations. The
experimenting, innovative, adaptive peasant farmer is now accepted
as the norm, not the exception. Experiments of farmers also tend
to increase in number and complexity after a poor harvest.
Indigenous inventiveness provides an effective point of contact
between scientific research in tropical agriculture and potential
groups of small-farmer clients, and among the International
Agricultural Research Centres it also arouses interest for
technologies that seem appropriate to the needs of typical farm
households in resource-poor, high-risk environments. Still,
conventional methods are often ill-suited to deal with the farming
complexity. The dynamism of innovative peasants is further
elaborated and some of the material on indigenous experimentation
and complementary methods presented to the IDS Conference is
reviewed: A better understanding of farmer experimentation and the
elaboration of complementary research methods based on this
understanding is a small but lively sub-field within tropical
agricultural research. Its proponents believe it has a potentially
significant role to play in the search for alternatives to the
Green Revolution in low-resource high risk environments. Whether
complementary methods have the capacity to foster development of
complex agro-ecological innovations in situ - a highly attractive
proposition - is yet to be determined by practical results. Some
suspect that it may be contradictory to expect to achieve such
ends through a high-profile partnership of scientists and
agricultural interest groups. Vigorous defence of the intellectual
autonomy of the experimenting farmer may in the long run prove to
be the better prospect, and better science.

Author's summary

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90 - 2/79

Farming systems research and development
Review, book, rural finance, guiding principles, rural
development, technical cooperation, target groups, promotion
policy, agricultural credit, rural financial markets, conceptual
model, GTZ, BMZ, DSE

SCHMIDT, R.H.

Rural finance: guiding principles.

BMZ, Bonn and GTZ, Eschborn and DSE, Berlin, ISBN 3-88085-350-9,
1987, 150 pp., available from: TZ-Verlagsgesellschaft mbH, Postf.
1164, D-6101 Roßdorf, F.R.G.

Most Third World countries have suffered repeated setbacks in
their efforts to induce sustained economic development.

The fundamental conceptions with respect to the importance of
rural finance for the development of rural areas in developing
countries, have undergone a radical transformation during the past
ten years. This transformation encompasses not only specific
development policies, but also a discussion of the principles
underlying those policies.

In this situation, these nations must rely on their own resources
and potentials to further their development.

The mobilization of local resources and their efficient use has
become the central problem. Self-sustaining economic and social
development requires a renewed emphasis on and reinforcement of
labour-intensive traditional economic sectors. This applies
especially to agriculture and small enterprises, the integrative
elements of regional rural development.

The small-scale farmers including their self-help groups and the
municipalities, must be provided with the basic prerequisites for
economic independence and flexibility. A rural financial
infrastructure must be created that is suited to their needs and
to the local situation.

This book is organized on the basis of their practical objectives.
Three chapters deal with the political and methodological starting
points (Chapter 2), the conceptual model of an efficient rural
financial system (Chapter 3), and the programmes and instruments
of GTZ for the promotion of rural finance (Chapter 4).

This book on Guiding Principles places more emphasis on
fundamental and general questions and relationships than on the
various details, which differ according to the specific situation.
The experiences of German organizations working in the field of
economic and social development were systematically analysed in
order to formulate a conceptual orientation for the support of
rural finance. The book is aimed at programme designers in
government ministries and financial institutions who are
instrumental in the formulation of policies for the development of
rural areas. At the same time, it is intended to assist project
planners and those in other positions who are responsible for the
implementation of projects promoting rural development.

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90 - 2/80

Farming systems research and development
Latin America, Dominican Republic, case study, project, training
center, organic agriculture, appropriate technology, IIED

ORNES, H.

Community training centres for organic agriculture and appropriate
technology, Dominican Republic.

In: The Greening of Aid-Sustainable Livelihoods in Practice, Eds.
L. Conroy and M. Litvinoff; Earthscan Publ. Ltd. in association
with Int. Inst. for Environment and Development, London; ISBN 1-
85383-016-X, 1988, pp. 216-220

Organic Agriculture and Appropriate Technology Centres for the
Community (CAOTACOs) are farm-schools that were conceived in 1979
by the Fundación para el Desarrollo Comunitario (FUDECO) with the
objective of stimulating and supporting the self-management
development of the rural population in the Dominican Republic.
FUDECO, a private, non-profit, voluntary organization, administers
the project.

The strategy for creating the CAOTACOs sought to create in the
rural population a consciousness that it was possible to obtain
better use of the local available resources through technologies
adapted to the economic and social characteristics of each
community. This philosophy, along with practical work, brought a
mutual enrichment between rural communities and FUDECO. This has
led to the CAOTACOs assuming multiple functions, transforming them
into what they are today: training centres; demonstration,
experimental and appropriate technology diffusion centres,
channels for resources; instruments for participant planning;
integrated models for productive agricultural and industrial
activities.

The CAOTACO project includes many components of integrated rural
development programmes, e.g. agriculture, livestock raising,
supply of inputs, credit, processing of agricultural and livestock
products, appropriate technology, environmental protection,
infrastructure, housing and health. Although the physical centre
is important for a CAOTACO, principles are more important than
infrastructure. Principles include use of locally available
technologies and constant reinforcement of training.

Management of the organization is based on self-management.
Direction is formally in the hands of the board of directors, the
majority of whose members are representatives of the farmers'
associations and the remainder members of FUDECO. The CAOTACO's
board of directors determines priorities and plans activities
based on the previous training process, which itself aims to
convert beneficiaries into trainers.

The concept of integration not only covers activities physically
located in the CAOTACO but also includes activities for the

farmers so that they can produce crops that constitute part of the raw material required in the processing industries. The training centre is used to train some of its beneficiaries, as a result of which they experience a change of attitude regarding how best to use the area's local resources.

Some of the major successes and achievements of the CAOTACO system include:

- Democratic participation of the people.
- Adaptation of technology appropriate to small-sized parcels of land.
- Adaptation to the local small-farmer diet - the "association" of crops that form a balanced diet and, when growing, mutual help in reducing threats of insects and disease.
- Utilization of wastes and manures.
- Diversification of traditional monocultural production.
- Use of the Lorena stove, produced from locally available material, to help conserve firewood.
- Soil conservation - use of traditional teams of oxen is easier on the soil than tractors and much more economical; "live and dead barrier" fencing helps keep animals from overgrazing.
- Continued promotion of the concept of small-farmer self-determination, although the model used in the Dominican Republic may not be practical in countries where there is less of a hierarchical system or where there are no existing associations to form its basis.
- Recruitment and training of personnel who agree with the methodology and have the technical ability to implement it.
- Utilization of existing organizations, through agreements, and emphasis on small farm size, campesino participation and trust, and a revolving fund that can lead to financial self-organization.
- Strategic geographic location in an accessible area, with distribution of the buildings and other features on the campus to make it a compact, self-contained experience that is relevant to the surrounding environment.
- Availability and appropriate timing of sufficient funding.
- Frequent visitors to the centre from around the world, who get to know the facilities and create added support.
- The capacity to correct mistakes, so that they do not damage the community.
- Promotion of joint planning and partnership with the beneficiaries, prior to making significant investment decisions.
- Utilization of architecture appropriate to the region.
- Good communications with local communities through radio, press, etc., to improve their level of knowledge and technical abilities.
- A preference for hiring staff from the local area if they are equally qualified as (or better than) other applicants.

Farming systems research and development
Latin America, Peru, CIP, developing countries, agricultural sustainability, socioeconomy, physical determinants, national program commitment

GREGORY, P.

Sustainability and CIP's research.

CIP Circular 17, 2, 1989, pp. 8-11; International Potato Center, P.O.B. 5969, Lima, Peru; ISSN 0256-8632

In this paper, the author defines agricultural sustainability, addresses some global issues in agriculture, and describes CIP's role in contribution to sustainable systems.

For this reason, the author believes sustainability should be treated as a dynamic concept, allowing for the changing needs of a steadily increasing global population.

Sustainability is determined by the complex interactions of the biological, physical, and socioeconomic factors constituting the basis of all production systems.

The author discusses then the physical determinants such as soils, water, energy etc. and socioeconomic as well as legal determinants, but refers to biological determinants when he talks about CIP's activities.

CIP is contributing to sustainable agriculture in many ways. CIP's main activities are concerned with genetic resources, which play a vital role in developing sustainable agricultural systems. There is an increasing ability to protect and utilize the valuable potato and sweet potato germplasm collections. In vitro conservation of low pathogen-load germplasm is now routine. Germplasm identification and evaluation for agricultural usefulness are advancing rapidly and crossability barriers have been virtually swept away.

The work on potato population development enhances sustainability of performance by maintaining wide genetic diversity while increasing the frequency of genes controlling adaptation, yield, resistances to biological stresses, and tolerances to abiotic stresses. Whenever possible, CIP gives strong emphasis to stable mechanisms of resistance or tolerance. A classic example is the development of stable horizontal resistance to late blight. A newer example is the increased attention to exploitation of glandular trichomes, which help to provide potatoes with long-term resistance to several types of insect pests and even to some fungus and virus diseases.

The whole TPS approach at CIP is an excellent example of the potential contribution to sustainability. Because a much smaller amount of TPS than of tuber seed is needed to plant a field in potatoes, much less storage space is required, thus avoiding the necessity for building, maintaining, and operating special storage facilities. TPS is easier and cheaper to transport than tuber seed. Another advantage to using TPS for planting is that the

tubers which otherwise would have been used as seed can be consumed or sold.

All of the above has very strong implications for energy-related aspects of sustainability. CIP's work in integrated pest management has shown how dependence on pesticides can be reduced by the integrated use of additional control factors such as locally available repellent weeds, pheromones and genetically resistant potatoes.

In the socioeconomic area, there is a strong interest in sustainability issues. CIP has undertaken an ambitious worldwide agroecological mapping, zoning and environmental characterization project. Production trends, agroclimatic conditions, topography, constraints, and socioeconomic factors have been documented for more than 140 countries.

In future it should maintain a strong focus on the genetic resource-oriented work.

There should be a more systematic treatment of broader issues involving the work of many centers. These issues include controlling soil degradation, maintaining high-input systems, improving low-input systems and, of course, developing genetic resources.

There is a need for more inter-center collaboration if sustainable agricultural production is to be achieved.

Farming systems research and development
Review, handbook, Africa, Zimbabwe community workers, training, transforming society, self-reliant communities, participatory education, group dialogue, leadership and participation, CTA

HOPE, A. and S. TIMMEL

Training for transformation. A handbook for community workers, Book 2.

MAMBO Press, Gweru, P.O.B. 779, Zimbabwe; ISBN 0-86922-255-4 for Book 2, 1986, 129 pp.

Building trust and dialogue in society cannot be done by pronouncements. Dialogue begins at the local level, in small units and thus in groups.

Sharing information should not be confused with participation. Mass meetings where information about new legislation, government policies, etc. is passed on, is not the same as participation of people. It is a more personal form of mass communication than radio or television, but not participation.

Participation means dialogue. Dialogue is based on people sharing their own perceptions of a problem, offering their opinions and ideas, and having the opportunity to make decisions or recommendations.

All the theories, codes, and exercises in this book have been used effectively with groups in Africa over the past twelve years.

This book has been reproduced in three parts mainly because it will be easier to use like this in the field than one large and bulky book. Each part belongs with the other two parts.

Part one is basically the theory of Paulo Freire on developing critical awareness and how to put this theory into practice.

Part two is focussed on the skills necessary for participatory education. To break the 'culture of silence', people need to gain a sense of self-confidence and know that what they think is important. Therefore methods to involve the group actively are critical in group leadership, as are ways of clarifying and implementing the goals of the group.

Part three deals with the social analysis necessary to develop critical awareness and long-term planning and with the steps needed for building solidarity in people's movements.

This book tries to combine both reflection and action in a clear and simple way.

Training for transformation provides a basic and comprehensive text for adult education workers, social workers, community development workers, church workers, and trade union educators. All concerned with the process of transforming society.

This book is written mainly for practitioners. It is a book on how to put basic theory into practice.

It is designed to assist workers in the field who are encouraging the development of self-reliant creative communities.

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90 - 2/83

Farming systems research and development
Review, book, developing countries, agricultural economics,
market, price

COLMAN, D. and T. YOUNG

Principles of agricultural economics. Markets and prices in less
developed countries.

Cambridge University Press, 1989, 323 pp., Hardback £ 12.95, USD
24.95

A first-rate text, which should be in good demand in the market
for which, as its sub-title indicates, it was clearly written. It
is the third in a new series developed by Wye College as part of
the innovative postgraduate programme in Agricultural Development
for external students (mostly in developing countries) of the
University of London, run somewhat along the lines of the Open
University. The criteria for the series state that texts should
'review and synthesise existing knowledge and highlight current
issues, combining academic rigour and topicality with a concern
for practical application'. The two authors, David Colman and
Trevor Young, amply met those requirements. Their large and
interesting list of references, for example, confirms that they
mean business.

The first half of the book deals with underlying principles of
production, demand, and supply. In the second part, supply and
demand are brought together into a chapter on equilibrium and
exchange, followed by chapters on trade and the theory of economic
welfare. The final chapter shows how all this material can be
effectively used in policy analysis - surely a subject which needs
as much help as it can get!

The text is well presented, and, sensibly, available in paperback.
Abstract by J.A. Mollet

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Farming systems research and development
Review, book, farmer innovation, agricultural research,
sustainability, technology transfer, integrated approach, policy,
development, extension, ecology, agronomy, social anthropology

CHAMBERS, R. et al.

Farmer first: farmer innovation and agricultural research.

Intermediate Technology Publications Ltd., 103-105 Southampton
Row, London WC1B 4HH, UK, ISBN 1-85339-008-9, 1989, 240 pp., price
hardback UKL 12.95; paperback UKL 2.25

It is now recognized that the person who produces food, and who
can command food, and where production takes place, are often more
important than how much is produced.

It is understood too that the relative importance of rainfed
agriculture has risen compared with irrigated agriculture, and
that resource-poor farm families and resource-poor conditions have
been less well served by agricultural research than have those
which are resource-rich.

Widespread deforestation and environmental degradation have given
sustainability a high profile. Population projections suggest that
in many countries rural areas will have to support much larger
populations with many more people living in fragile environments.
The priority has become not just sustainable agriculture, but
sustainable livelihoods based on agriculture - now and in the
coming decades.

This is the theme of "Farmer First: farmer innovation and
agricultural research". This book, published by Intermediate
Technology in June 1989, postulates that much of the problem lies
in the processes of generating and transferring technology, and
much of the solution lies with the farmers. By putting the farmer
first, analysis, choice, and experimentation are done principally
by the farmers themselves, and outsiders act only as catalysts and
consultants.

"Farmer First" edited by Robert Chambers, Arnold Pacey and Lori
Ann Thrupp, presents a new approach for agricultural research,
taking into account these points. Starting from examples of
farmers' own innovations, contributions from the agricultural and
social sciences, ecology, economics and geography plead the case
for a farmer first' mode to complement conventional procedures for
research and transfer of technology.

"Farmer First" is written for all those concerned with policy,
practice and management for agricultural research, extension and
development. It is for agricultural economists and engineers,
agronomists, ecologists, entomologists, extensionists, foresters,
geographers, sociologists, social anthropologists, soil scientists
and others. Further, it is for those who work in international and
national agricultural research systems, in extension, agricultural
universities and faculties, and in NGO's.

Abstract from SPORE

Farming systems research and development
Asia, Bangladesh, review, action research, education, survey
research, projects, technology transfer, farmer, cooperatives,
village development plan, community development, BMZ, GTZ

SÜLZER, R. and G. PAYR

Action research and education: "Comilla approach" in Bangladesh.

In: Agricultural Extension, Vol. 2, ISBN 3-88085-405 X, Ed. H. Albrecht et al., Publ. by BMZ, Bonn and GTZ, Eschborn; 1990, pp. 37-41

The Comilla District in Bangladesh covers an area of 260 km² and has approximately 200 000 inhabitants.

The basic concept of action research is applying the results of observation (observational research) and systematic surveys (survey research) in practical projects.

The main objective is to familiarise administration specialists with rural development. This approach is an unusual way: first, after initial socio-economic surveys, pilot projects are started and tested. It includes new production methods, local self-administration and also infrastructure programmes.

Initial reactions to this programme and experience gained in India gave rise to two major projects.

A new extension approach was finally established with the help of a training centre and the village cooperatives, each of which selected a model farmer (in the non-agricultural sector a "local leader") who came to the center for one day every week. Thus he was given regular training, and when he returned to his village he took with him simple instruction sheets and drawings.

These model farmers had to commit themselves contractually to pass on their knowledge, to test new methods and to establish contact with the specialist advisers of the National Extension Service at village gatherings.

The pursuit of individual aims in isolation was prevented by the fusion of general extension services, representatives of village cooperatives, the government and the Local Government Council of the training centre.

The principles underlying the Comilla approach to rural development make it quite different from the Indian Community Development Programme:

- The village cooperatives were at the heart of the development programme. They were not formed as a condition for receiving credit and means of production but were active working groups of farmers and non-farmers who exchanged ideas and information.
- The programme did not set out to address the whole population of a village. Only farmers with several acres of land were considered for the cooperatives, since they required

contributions and investment of savings on the part of the farmers.

- The cooperatives were to be democratically managed and to accumulate so much capital over time that they could run their own central processing facilities.
- The concept was based on village development plans that indicated where enterprises could not be run by a village or cooperative alone, thus eventually plans were extended to cover a number of villages, giving rise finally to a Thana development plan. This plan evolved therefore from the ideas and discussions that had started at the lowest level.
- The continuous training programme was an integral element. In the Comilla approach there was no professional adviser to implement a programme on behalf of the government. Training and extension were carried out by the members of the cooperative itself and not by outsiders. Outside help was made available as often as possible, but it was help that was requested and not imposed.

The aim of the overall programme using the Comilla approach was to mobilise local resources (material and non-material). No development objective was prescribed (number of cooperatives, increase in production), but people were shown the route to follow. In simpler terms, one can say that the route itself was the objective.

Women from the strictly Moslem Bengali villages have been included in the programme. For a small remuneration, women volunteers act as a link between the training institute and the wives of neighbors. They are involved in a wide variety of activities, but agricultural work outside the home is out of the question.

Cooperation between the sexes was and still is impossible because of strict segregation of men and women. A women's group was tolerated, but only where a male cooperative already existed. This meant that the women were not only restricted in terms of location but were also dependent on the men. Without consulting the women, the male groups took decisions affecting the cooperative as a whole.

The success of women's groups depended much more than men's groups on the female advisers and the teaching staff at the training centre.

Newly founded or disintegrating groups fluctuated greatly because of inadequate extension work and poor supervision. A further obstacle was the fact that women in the villages had no experience of group work, and communication with them was therefore extremely difficult.

The IRDP Programme for women (Integrated Rural Development Programme) that has been implemented since 1976 in some parts of Bangladesh has built on the experience gained in the Comilla project. In this case it has proved possible to create women's groups that are independent of the men's groups, and efforts are being made to encourage not only a higher level of self-reliance but also involvement in economic activities.

The initial indications are that there is a surprisingly high level of participation in the programme, although really effective work is hampered by a shortage of credit for women. Experience

certainly shows that women are more reliable than men when it comes to repayment of loans, but nevertheless women are not regarded as creditworthy under the usual loan conditions, since they have no security.

It was mainly for political reasons that the endeavour to propagate the Comilla approach on a national scale was short-lived.

With the help of foreign donors, the Comilla model was instituted on a national level in 1978 under the title "Intensive Multi-sectoral Area Development Projects of IRDP". What was intended as a development programme over 30 years - spreading gradually from village to village and Thana to Thana - is now in the hands of the state.

The name has been retained, but the functions have changed. As in the case of Community Development in India the results of creating hierarchies and national planning has been that capacity for self-help has been weakened rather than encouraged.

Farming systems research and development
Review, book, proceedings, training course, sustainable agriculture, ecofarming, on-farm experimentation, projects, case studies, DSE, SEAMEO

SEAMEO/DSE

Proceedings - international training course on sustainable agriculture (ecofarming) and on-farm experimentation.

SEAMEO Regional Center for Graduate Study and Research in Agriculture (SEARCA), Los Baños, Laguna, Philippines in Cooperation with German Foundation for International Development (DSE), F.R.G., 1989, 315 pp.; available: The Director SEARCA, College, Laguna 4031, The Philippines

The International Training Course on Sustainable Agriculture (Ecofarming) and On-Farm Experimentation was held at SEARCA in Los Baños, Laguna, the Philippines from 7 November to 2 December 1988. Sponsors were the German Foundation for International Development (DSE), SEARCA, and the Farming Systems and Soils Resources Institute (FSSRI) of the University of the Philippines at Los Baños (UPLB).

The aim of the seminar was to gather information, through background lectures, field trips, intensive discussions, and experience exchange among participants, staff members, and resource persons, that can be used for implementation of research extension programs within the field of sustainable agriculture.

The uncritical and unadapted application of so-called modern production technologies by insufficiently informed and trained farmers or unscrupulous farm managers and land exploiters often resulted in crop failures, indebtedness, contaminated soils and water reserves, more pests, toxically doubtful farm products, erosion deserts, and long-term sterile areas.

There is a need for scientists, extensionists, and responsible politicians to discover, design, and promote sustainable production systems containing all elements adapted to the characteristic needs and possibilities of their regions and home countries.

For this seminar the term "sustainable agriculture" was described:

- Improvement or at least preservation of natural resources such as soil fertility; water resources, forests, or tree cultures, necessary for favorable macro- and microclimatic conditions.
- Intensification of agricultural production through integration of crop production, horticulture, agroforestry components, and animal husbandry into a manifold ecological stable farming system.
- Use of all wastes, recycling of all nutrients and biomass produced within the system.

- Reduction and, wherever possible, elimination of pesticides and mineral fertilizers by using biological control measures, a variety of crops, resistant varieties, organic fertilizers.
- Use of appropriate technology designed for the special needs and working conditions of the farmers.
- Avoidance of production risks and strengthening of self-sufficiency of farms and rural communities.
- Adjustment of the production system to social, cultural, economic, and political conditions and peculiarities of each location.

Twenty-two participants representing nine countries from Southeast Asia and Africa participated in the course, which consisted of country reports, background lectures, field trips, and workshops/discussions.

In their country reports, the participants shared their experiences as researchers, extensionists, teachers, and planners involved in agricultural development.

The background lectures gave the participants wide-ranging views on issues related to sustained agricultural production and on-farm experimentation techniques as operational tools for implementing development projects.

In their visits to some research stations, demonstration farms, actual farms, and other places of interest in the Philippines, the participants saw various examples of ecofarming system and learned about the efforts of some institutions to bring about development along this objective.

Toward the end of the training program, the participants had a two-stage discussion/workshop that enabled them to put together concepts in designing and planning development projects under given situations. It also served as an exercise in team work, group dynamics, and interaction among various disciplines.

On the whole, the training program attempted to raise the level of consciousness of the participants on the broad issue of sustainable agriculture.

The seminar did not offer ready prescriptions but has given some ideas on how to reach the goal.

Based on the participants' evaluation, the course objectives were satisfactorily met. It was the consensus of the participants that similar activities need to be done more often in the future.

Farming systems research and development
Africa, Sudan, rapid rural appraisal, economics, tree management, incentives, sustainable agriculture, USAID, IIED

PRETTY, J.N. and I. SCOONES

Rapid rural appraisal for economics: exploring incentives for tree management in Sudan.

Int. Inst. for Environment and Development (IIED)-Sustainable Agric. Programme, London, UK, in association with the Institute of Environmental Studies, Univ. of Khartoum, Sudan, 1989

This paper is a report of a field based workshop conducted in Sudan from 20 February - 3 March, 1989, by the International Institute for Environment and Development, London, and Institute of Environmental Studies, University of Khartoum, Sudan.

This was to be the first attempt to use an RRA specifically to obtain information and develop hypotheses about the economic incentives involved in the production of gum Arabic from the tree *Acacia senegal*.

This study focuses on two villages in the proximity of Khartoum, Sudan and illustrates these different determinants of local incentives.

In this study to determine the incentives perceived by rural people to the cultivation, maintenance and use of trees, processes acting at various levels are considered. These incentives take several forms - institutional, economic, cultural, and act at different levels, from national to regional, to village, to cohesive groups within a village, and to individuals.

At regional level the influences on tree management relate to changing patterns of wood product supply and demand and the interaction of urban and rural markets.

For the village farming system uncertainty over economic, tenurial and environmental are key influences on tree management incentives; land use, tenure patterns and institutional control over communal forest land are also found to be significant.

The preferences for their trees by different groups in a village influence assessments of the costs and benefits of alternative tree management options. Similarly, different socio-economic groups have varying, and sometimes competing, interests in the local resource base and are affected to different degrees by changes in the wider wood economy.

Thus, this investigation of economic incentives at different levels enables the development of integrated insights for a more effective understanding of incentives for tree management in rural Sudan.