

Agroecology

Asia, Nepal, highlands, review, study, deforestation, women, agricultural production, nutrition, households, time allocation, policy implications, IFPRI

KUMAR, S.K. and D. HOTCHKISS

Consequences of deforestation for women's time allocation, agricultural production, and nutrition in hill areas of Nepal.

International Food Policy Research Institute, Research Report 69, Washington, D.C., ISBN 0-89629-071-9, 1988, 69 p. + bibliography

The hill areas of Nepal are a prime example of an area in which low-productivity agriculture is surrounded by rapid environmental degradation as the result of deforestation, and the interaction of the two is promoting further deterioration in both. The following characteristics prevail in the area: low agricultural productivity; high out-migration; a high reliance on labour input in production, especially given the limited use of agricultural technology; and pressure to expand cultivated land at the cost of forest land as population grows.

According to the study's hypothesis, deforestation reduces agricultural output from existing cultivated land by increasing time spent in collecting essential forest products, which shifts time away from agriculture. As a result, household income from agriculture is reduced. Unless alternative sources of income increase, food consumption and eventually the nutritional status of the population will be adversely affected. Because livestock production is also an important part of household enterprise in these areas, the destruction of forests also influences this sector. A reduction in the availability of fodder used for stall feeding increases the pressure for grazing, which increases soil erosion on lands that are currently not under cultivation. Also, children who are involved in collection and livestock grazing activities may experience adverse effects on health and education, which would ultimately influence the region's prospects for raising the productivity of labour.

The study is based on results from a year-long survey of 120 households in three hill districts of the Western Development Region in Nepal. Results indicate that when deforestation - represented by the time required to collect a standard load of firewood - increased by 1.0 percent, there was a reduction in fuelwood consumption of 0.3 percent and an increase in the total time required for its collection of 0.6 percent.

Analysis of the production functions for cropping activities indicates that women spend the most time on the dry-season crops - wheat, maize, and mustard. But the time spent for collection of fuelwood is also greater during the dry season because that is when people collect extra amounts of wood and store it for later use. As may be expected, the marginal product of upland crops-

maize and ragi - is about half that for the lowland crops-paddy, wheat, and early paddy.

Caloric availability and the ratio of kilocalories from rice compared with other cereals are positively influenced by the component of household income that comes from agriculture and time spent on food preparation and cooking. At the same time, food preparation time is positively associated with the amount of fuelwood used and negatively with the amount of total time spent in fuel collection. This suggests that in addition to the effects of deforestation on agricultural production and incomes, secondary or associated effects could be related to fuel consumption and time spent on food preparation. The main determinants of preschool child nutrition are degree of deforestation, household income, household size, and work loads of women and older children. In addition, the data indicate that the Tibeto-Burman ethnic groups have better child nutrition than the Newar-Brahmin groups, when the influences of other household characteristics are controlled.

The results suggest that it is not enough to rely on out-migration or reforestation efforts alone to improve the economy and ecology of the region. Strategies for raising agricultural productivity need to be considered. In the long run, agricultural products that offer high value to weight, such as horticultural products, may be a feasible proposition for the region. This requires investments in research and extension, as well as an efficient marketing system suited to the primarily smallholder agriculture. At present, production is largely subsistence-oriented and not very productive; therefore, the degree of rural market development is limited. In the short run, therefore, it appears necessary to increase productivity of the traditional crops through the use of improved technologies that already exist and can be promoted, thus shifting a way from subsistence production and promoting the growth of rural market infrastructure.

This could provide the base for a gradual shift into more specialized horticultural and livestock products. In order to achieve this, efforts will be needed, first, to promote improved input use, and, second, to alleviate human labour bottlenecks for both small and larger farms. Labour-saving technologies for nonfarm activities, such as food processing and water supply, should also be included. Agroforestry programs that reduce collection time for essential forest products would also complement such an agricultural intensification effort in the hills of Nepal.

Authors' summary, shortened

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Agroecology study, holistic view, sustainable development, Pacific, agricultural systems, colonial time, postcolonial change, social environment, policy, CTA, IBSRAM, ODA, USAID, ORSTORM

BROOKFIELD, H.

The human context of sustainable smallholder development in the Pacific.

In: Proc. of a IBSRAM Workshop on Soil Management and Smallholder Development in the Pacific Islands; Bangkok, Thailand; ISBN 974-7613-20-4, 1989, pp. 189-204

The object of this paper is to set out certain of the social and economic dimensions of smallholder agricultural development in the Pacific. It examines what has happened in the past, during and since the colonial period, as well as what is happening at the present time. Attention is given to the strong features of a Pacific farming as well as to the weak aspects, and for this reason some emphasis is first given to the more labour-intensive forms of agriculture in the region.

To progress toward sustained-yield systems incorporating both traditional and modern knowledge remains a viable goal if it is appreciated that the economic and social contexts of farming have completely changed, and are continuing to change at a rapid rate.

The role of the study of indigenous systems is to show what land can be managed, and by what basic techniques it can be managed well. One major task of research is, then, to develop modern techniques which can do the same job better, and more cheaply in terms of labour. Another and still more important task for research is the selection and development of higher-yielding and more adaptable and disease- and drought-resistant varieties of the principal food crops of the Pacific.

In view of the tendency of agriculture to contract wherever off-farm opportunity is present, and to expand only in areas where the greatest poverty is combined with the greatest numbers, it is realistic to envisage physical contraction of farming onto the sites of higher capability.

A broad-span approach, across all types of land, farming systems and social groups, is far less likely to succeed than is a policy of concentration on the better land, better suited to technological improvement for a range of crops, and on the better farmers. Such an approach may be politically unacceptable, as it has been in the past, but the alternative is worse.

The individual farmers need to be supported by research, assisted in creating capital for the sustained management of the land, and backed up by new economic policies which will give a higher place than hitherto to ensuring farmers reliable on-farm incomes.

Four main points are argued in this paper. First, indigenous Pacific agricultural systems are greatly varied and were more

varied in the past; this variation exhibits a considerable measure of adaptation to conditions of soil, slope, and hydrology. Second, change in the colonial and postcolonial periods has involved major changes in crops, and further major changes in patterns of labour allocation; the availability of labour inputs has become a serious constraint. Third, while indigenous Pacific farming is conducted within and as part of a set of total social systems, these social systems have themselves undergone major change in the colonial and postcolonial periods. Fourth, at least some of the changes that have taken place may in part be consequences of a consistent bias against agriculture, and especially smallholder food-crop agriculture, international development policies. It is necessary to view Pacific agriculture dynamically as part of a set of larger changes in both the human and natural environment of rural production. The paper develops each of these propositions in turn, in the context of an holistic view of rural change.

Agroecology

Latin America, Mexico, Peru, Honduras, Dominican Republic, USA, study agroecosystems, biodiversity, agricultural systems, NGO's

ALTIERI, M.A.

How best can we use biodiversity in agroecosystems?

Outlook on Agriculture, 20, 1991, pp. 15-23

The world's agricultural landscapes are planted with only some 12 species of grain crops, 23 vegetable crop species and about 35 fruit and nut crop species. That is no more than 70 plant species spread over the approximately 1440 million ha of currently cultivated land in the world.

Agriculture affects biodiversity by replacing nature's diversity with a smaller number of cultivated plants and domesticated animals. Agricultural systems are often artificial ecosystems of genetic uniformity or monoculture. Due to their artificial nature, these systems require constant human intervention, extensive external inputs and use of non-renewable resources.

Intensively managed monocultures are shockingly genetically uniform, depending on a handful of varieties. For example, in the USA, 60 to 70% of the total bean acreage is planted to two or three varieties, 72% of the potato acreage to four varieties and 53% of the cotton acreage to three varieties.

Modern agricultural systems have become productive but only by being highly dependent on external inputs. A growing number of people fear for the long-term sustainability of such highly input-dependent and ecologically simplified food production systems. Questions are being raised about the growing dependence of modern farming on non-renewable resources, the loss of land through soil erosion, and the heavy reliance on chemical fertilizers and pesticides.

Biodiversity can be used to help the great mass of resource-poor farmers, mostly confined to marginal soils, hillsides and rainfed areas, to achieve year-round food self-sufficiency, reduce their reliance on scarce and expensive agricultural chemical inputs, and develop production systems that rebuild the productive capacities of their smallholdings.

Studies in California over the last twenty years have shown biodiversity to be a key factor in insect pest management. Strategies utilizing alternate hosts and cover cropping have significantly enhanced natural enemy populations. Biodiverse multiple cropping, intercropping, agroforestry and shifting cultivation systems are still practised in traditional farms in Latin America. Non-governmental organizations (NGO's) in Latin America are studying these systems and incorporating this biodiverse approach in their work with rural agricultural communities. Efforts in Mexico, Peru, Honduras and the Dominican Republic are described.

The few examples of grassroots rural development programmes described above suggest that the maintenance and/or enhancement of biodiversity in traditional agroecosystems represents a strategy that ensures diverse diets and income sources, stable production, minimum risk, intensive production with limited resources and maximum returns under low levels of technology.

Since traditional farmers generally have a profound knowledge of biodiversity, their knowledge and environmental perceptions must be integrated into schemes of agricultural innovation that attempt to link resource conservation and rural development.

The process must be linked to rural development efforts that give equal importance to local resource conservation and food self-sufficiency and/or participation in local markets.

Preservation of traditional agroecosystems cannot be achieved in isolation from the maintenance of the ethnoscience and socio-cultural organization of the local people. Cultural diversity is as crucial as biological diversity.

Agroecology

Review, book, study, alternative agriculture, traditional methods, ecological interactions, external inputs, low-input approach

US - National Research Council

Alternative agriculture.

National Academy Press; Committee on the Role of Alternative Farming Methods in Modern Production Agriculture, Board of Agriculture, Nat. Res. Council; USA, ISBN 0-309-03985-1, 1990, price £16.95

Alternative Agriculture is a very thorough and sound examination of lower-input systems which involved five years' work by the US National Research Council's Committee on Alternative Farming Methods. It consists of two parts, the first of which looks at issues such as the role of agriculture in the economy, problems in US agriculture, research and science (including issues such as crop rotations, plant nutrients and crop protection), and an economic evaluation of alternative agricultural systems. The second part consists of detailed case studies of 11 lower-input farms in different parts of the US.

The study found that well-managed alternative farms nearly always used smaller amounts of synthetic chemical pesticides, fertilizers and antibiotics than comparable conventional farms, thus reducing the potential for adverse environmental health effects without necessarily decreasing - and in some cases actually increasing - per acre crop yields and the productivity of livestock management systems.

This was achieved primarily through the substitution of information, labour and management for traditional fertilizer and other inputs. 'Alternative' farmers were typically less reliant on government support programmes. Ironically, government policies often discouraged the wider adoption of alternative practices.

The role of management and information as a replacement for traditional technologies is emphasized in the economic analysis which concentrates on general farm survey results. The report found that, within a given region for a specific crop, average production costs per unit of output on the most efficient farms were typically 25% less, and often more than 50% less, than average costs on less efficient farms. Machinery, fertilizer, pesticides and interest charges (excluding land) accounted disproportionately for differences in per unit production costs.

The report contains some very important insights which should act as a stimulus to all involved in agriculture to re-evaluate the accepted wisdom that high-input, high-output systems are the most profitable, even without taking 'external' social and environmental costs and benefits into account.

Abstract by N. Lampkin, shortened

Agroecology

Review, tropics, subtropics, developing countries, ecofarming approaches, low external input, management, farmers, farming systems, integrated systems, cropping systems, terminology, agroforestry

GLAUNER, H.J. and H. KEIL

The approaches, goals and methods of ecofarming in tropical and subtropical regions of developing countries.

Plant Research and Development, 28, 1988, pp. 47-62

Starting from the general ecological criteria of variety and consistency of systems, the attempt is made in this paper to achieve high and lasting productivity for the individual location by ecological production methods making use of different basic ecological principles.

As population densities rise, the fallow period in zones of semi-permanent agricultural systems is increasingly shortened so that nowadays in many places the level of "permanent cultivation with very low yields" has been reached. Examples can be given of similar over-utilization of resources in other permanent types of land-use systems. On top of all this, marginal land is being taken under cultivation at an increasing rate, with the result that it ultimately tends to be destroyed. This trend is accompanied by stagnating agricultural production and has resulted in the population being inadequately supplied with food.

As a result of the problems already referred to efforts were also made to introduce site-adapted methods of production which ultimately led to the adoption of ecologically oriented forms of farming (ecofarming, site-orientated farming). These are expected to bring about a process of balanced development that is appropriate to the specific site, at least in rural regions or agricultural systems.

This approach involves combining agronomic and ecological goals in such a way that ecosystems are preserved while being productively exploited.

Stable and productive ecological systems are usually for the most part closed cycles. Therefore, agricultural enterprises (farms) and agricultural regions should also to some extent be closed systems, although within each system the aim should be to attain diversity and complexity.

The systems and principles of ecofarming at tropical/subtropical sites can be demonstrated both by examining the land-use systems which have already been instituted or are still being evolved, as well as by describing the production principles which are applied. The essential goals of ecological farming systems described further above can be attained in particular by applying the agroforestry system of land use or by applying the principles of multiple cropping, while specific fertilizing measures are merely of secondary importance.

The authors conclude that because of its versatility and adaptability, agroforestry may in certain cases be a suitable means of helping to solve the problems of land use, food supplies and energy needs within the framework of a rural development programme. However, systematic research into the relationships and interactions within agrosilvicultural systems and the development of generally applicable practical methods are all as yet still in the very early stages.

The large number of often unsolved problems, especially in the socioeconomic sector make it difficult for the highly positive approaches of agroforestry to be applied across the board. As a rule it is more difficult to observe the general social conditions of agroforestry than it is to select and shape its scientific components.

Agroecology

Review, book, Africa, Burkina Faso, Zimbabwe, Benin, Rwanda, Tanzania, Latin America, Colombia, ecofarming, case studies, field research, agroforestry, soil fertility, smallholder, green manuring, shrub fallow system, erosion control, multiple cropping, fruit trees, water conservation, soil conservation, EEC, GTZ, BMZ

KOTSCHI, J.

Ecofarming practices for tropical smallholdings.

Tropical Agroecology 5; Verlag J. Margraf, Mühlstr. 9, P.O.B. 1905, D-6992 Weikersheim, F.R.G., ISBN 3-8236-1184-4, 1990, 183 p.

The articles in this book dealing with ecofarming practices under tropical conditions present the preliminary results of field research.

This book concentrates on ecofarming under rainfed conditions.

The key problem in rainfed cropping systems, whether in Africa, Latin America or Asia, is decreasing soil fertility.

In accordance with this idea, research interest has been focused on the question of soil fertility maintenance by integrating perennials into existing cropping systems in the tropics. In this book initial results are presented of research into newly developed ecofarming practices, mainly involving agroforestry. The results are derived from small-scale experimental programmes which form part of rural development projects. The close connection with agricultural extension and the experimentation on farmers' fields and in cooperation with farmers make this type of research highly applicable to local farming systems.

The articles presented in this book are written by different authors in 8 chapters:

- I. Introduction
(Johannes Kotschi)
- II. Agroforestry for soil fertility maintenance in the semi-arid areas of Zimbabwe
(Johannes Kotschi)
- III. Conservation of soil fertility by peasant farmers in Atlantic Province, Benin
(Anne Floquet)
- IV. Green manuring with fast-growing shrub fallow in the tropical highland of Rwanda
(Kurt Raquet)
- V. Investigating possibilities of combining fodder production with erosion control and agroforestry in the West Usambara Mountains of Tanzania
(Reinhard Pfeiffer)
- VI. Multiple cropping with deciduous fruit trees in the cold tropical highland of Colombia
(Karl M. Müller-Sämann)
- VII. Low-cost soil and water conservation measures for

smallholders in the Sudano-Sahelian zone of Burkina Faso
(Helmut Eger)

- VIII. Trials by scientists and farmers: Opportunities for cooperation in ecofarming research
(Ann Waters-Bayer)

The findings presented in Chapters II-VII are introduced by a description of the research location, followed by a brief analysis of the major problems. Based on this, the main aims of the research and the methods applied are outlined. The discussion of results is limited to the main findings, which already indicate the perspectives for future research. Deeper analyses of the data are still underway and final results are to be presented in more detailed publications.

A. Waters-Bayer (Chapter VIII) discusses methods of farmer-scientist collaboration in ecofarming research and the extent to which the experimental programmes combined scientists' and farmers' knowledge to generate improved techniques for the existing farming systems.

This book is well worth the attention of those interested in sustainable agricultural production systems in the tropics. The book will be of use to undergraduates involved in plant production and others looking to extend their general awareness of this exciting area.

Agroecology

Africa, Nigeria, study, land-use, tropical rain forest, ecology, soil, hydrology, micro-climate, biotic environment, deforestation, agricultural practices, clearing method

IITA

Ecology of a tropical rain forest and the effects of changes in land-use.

In: Ann. Report and Research Highlights, IITA, Ibadan, Nigeria, 1986, pp. 37-39

A long-term project, started in 1984, is designed to better understand the magnitude and trends in alterations of soil, hydrology, micro-climate, and biotic environments by deforestation and different land-use systems and agricultural practices. The existing vegetation, a high forest southeast of Benin City, Nigeria with a tree density of from 1,300 to 2,100 per hectare, was cleared using a front-mounted shear blade on a track-type tractor.

The different land-uses were compared. The control (undisturbed forest) and traditional farming (manual clearing and growing mixed crops of yams, tomatoes, etc.) are compared with six other land-uses for their bio-physical environments and production. Each of the eight treatments is imposed on a one-hectare plot and replicated three times. All of the 24 plots are equipped with an H-flume and water level recorder to monitor runoff rate and sediment loss. One replicate of all eight treatments has a monolith lysimeter installed to monitor evapotranspiration, seepage, and leaching losses of plant nutrients. In addition to hydrologic properties, other factors studied include soil bulk density, infiltration rate, runoff and soil erosion, micro-climate, inter-flow and base-flow, soilfauna, nematode infestation, vegetation succession, and agronomic aspects of crop production.

Soil bulk density increased by deforestation, although the relative increase was more with mechanical than manual methods. Effect of deforestation on the increase in soil bulk density was observed down to a depth of 45 cm with machine clearing and 35 cm depth in manual clearing with forested control. But machine and manual methods of deforestation increased soil bulk density by 19.9 and 17.6% for 5 cm depth, 29.5 and 17.9% for 15 cm depth, and 13.3 and 7.0% for 25cm depth. At a 35 cm depth, only the bulk density of the mechanically cleared plot was increased (by about 4.5%) as compared with forested control.

As a result of the increase in soil bulk density, the equilibrium infiltration rate decreased on all cleared plots. The equilibrium infiltration rate was 79.5 cm/hr for the forested control, 73.0 cm/hr for traditional farming, and 22.0 cm/hr for mechanically cleared plots.

Evapotranspiration on cleared land with different land-uses was more than that on forested control by a factor of 8 to 10. The low evapotranspiration in forested control is due to the fact that no trees were grown in the forested lysimeter, hence the low transpiration. This situation will change with the establishment and growth of young seedlings already taking root. Among different land-use treatments, the maximum evapotranspiration rate was higher in improved forestry and rice than in other treatments. Water runoff and soil erosion varied among different land-use treatments. As expected, the least runoff and erosion were observed in forested control. Both runoff and erosion were low under traditional farming and cassava but relatively high under perennial crops (e.g. oil palm, improved forestry, coconuts, and plantain) because of slow growth rate and low canopy cover. Growth of rice, maize, plantain, pastures, and tree crops was influenced by deforestation-induced changes in soil properties. Upland rice growth and yields were superior in wind rows where dried woods were burned after clearing. Variations in rice grain and straw yields among four varieties are demonstrated. The maize crop showed extremely poor growth and failed to produce any significant grain yield because of poor soil fertility, no fertilizer application, and high soil acidity.

Agroecology
Review, book, permaculture, agro-ecosystems, farming systems, house design, village life, external inputs, socio-economic factors, politics, finance, diversity, concepts, sustainable agriculture

MOLLISON, B.

Permaculture: a designers' manual.

Tagari Publications, P.O.B. 1, Tyalgum, NSW 2484, Australia, ISBN 0-908228-01-5, 1988, 588 pp.

Permaculture - a word coined by the author for 'permanent agriculture' - is 'the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems'. In this large book, illustrated with excellent line drawings and colour photographs, Mollison has compiled all his ideas on how to design such systems.

Many authors these days write about sustainable agriculture or development, but Mollison takes a broader viewpoint, emphasizing ethics, responsibility for the earth and its people, and working with nature to reach a stable social order. Thus, his book deals with more than agricultural systems: he considers house design, village life, external socio-economic factors, and even politics and finance.

Permaculture has much in common with agroforestry. From the beginning, we are told that trees are an important aspect of permaculture and that the energy needs of a system should be provided by the system itself. Design concepts such as diversity, cooperation between species, microclimatic effects, ecological succession, water conservation, perennial crops, contour lines, and terracing are also of concern to agroforesters.

Trees are given the highest importance in the humid tropics, with descriptions of homegardens, windbreaks, hedgerows, tree polyculture, and 'avenue cropping' (i.e. hedgerow intercropping). Shade trees, farm forestry, windbreaks, and browse are discussed in the context of the drylands and temperate regions.

This book is beautifully produced and contains an amazing amount of information. It is fascinating to read and can be recommended to anyone who wants to put the concepts of sustainable agriculture - including agroforestry - into practice. There is a strong ecological ('green') emphasis, which may not suit everyone concerned with agroforestry. Part of the purchase price will be used by the Permaculture Institute to support tree planting programmes - another reason to buy the book. Contact: Tagari Publications, P.O.Box 1, Tyalgum, NSW 2484, Australia.

Abstract by E. Torquebiau, ICRAF

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91 - 5/95

Agroecology.

Review, manual, organic farming, appropriate technology, crop protection, equipment, seed-bed preparation, intercultivation, sowing, planting, fertilizer distribution, harvesting, pest-harvest technology, processing, water pumps, ITDG

MC ROBIE, G.

Tools for organic farming. A manual of appropriate equipment and treatments.

Publ. by Intermediate Technology Publications, 103-105 Southampton Row, London WC1B 4HH, UK, ISBN 1-85339-009-7, 1990, 60 pp.+ appendices

Not only in the Third World but now increasingly in industrialized countries methods of large-scale-capital-intensive farming are being questioned. Many people in industrialized countries are concerned that their food and water supply are poisoned by the nitrates and pesticides used in chemical-based farming.

Many developing countries are adopting many of the worst aspects of rich-country agriculture. It can hardly be over-emphasized that conventional agriculture in the North is essentially non-sustainable.

The two contrasting approaches to agriculture and food production, the chemical and biological, essentially exemplify what is meant by inappropriate and appropriate technology.

The agriculture that has developed in the North since the 1950s is one that has increasingly poured fossil fuel, mostly oil, onto the land, and has mined food energy from the land. The upshot is an unsustainable system of agriculture in energy terms. On both sides of the Atlantic, about three calories of energy are used for every one calorie of food obtained.

This system is unsustainable environmentally; there is growing evidence of the degradation of soil and of soil erosion. In Britain the removal of hedges and the compaction of soil by heavy machinery contribute to soil degradation and in the USA recent studies suggest that soil loss per acre is 25 to 50 per cent greater than it was in the 1930s when the Soil Conservation Service was set up.

Although Third World countries did not start using fertilizers and pesticides on any scale until around 1970, in the next decade their use of fertilizers grew twice as fast as in the North; the FAO forecast future growth to the year 2000 at about 8 per cent a year.

The reversal of these trends would, in fact, constitute the basis of a rational agricultural policy, and while organic farming would not overcome all of the problems set out, it would unquestionably solve many of them.

This manual is offered as a small contribution towards part of the research that is needed into a technology for organic farming. Like its forebear, Tools for Progress, it does not pretend to be

exhaustive. It is intended to serve the needs of the small- to medium-scale organic farmer in Britain, Europe and the developing countries. The items in it have the merit of having been selected by practical farmers.

The book contains 4 chapters:

- Introduction
- 1. Crop protection
- 2. Seed-bed preparation and intercultivation
- 3. Sowing, planting, and fertilizer distribution
- 4. Harvesting and post-harvest crop processing
- Appendix 1. Water-lifting pumps and other equipment
- Appendix 2. Manufacturers' index

This book builds upon selections from Tools for Agriculture, which lists small-scale and relatively inexpensive equipment for farming in developing countries. Tools for Organic Farming warns against chemical pesticides which upset the ecosystem and describes how to use natural crop protection methods instead. The book describes suitable low-cost tools for small-scale organic farmers from hoes to lightweight threshers and lists suppliers and manufacturers.

The Intermediate Technology Development Group is an independent charity organization, gathers and disseminates information, and helps to introduce technologies suitable for rural communities in developing countries.

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91 - 5/96

Agroecology

Review, book, case studies, organic farming, livestock, cropping systems, marketing, processing, productivity, economic performance, organic food, food quality, environmental impacts

LAMPKIN, N.

Organic farming.

Farming Press Books, Ipswich, UK., ISBN 0-85236-191-2, 1990, 700 p., price £19.95

Although prior to the development and use of inorganic fertilizers and pesticides all agriculture was essentially organic in nature, the growth of the organic farming movement is a relatively recent phenomenon. In fact modern organic farming systems have developed in parallel with intensive, conventional agriculture over the past 40 to 50 years, largely as a reaction to the increasing use of chemical inputs in farming.

Initially organic farming developed slowly, mainly as the result of the activities of practising farmers. More recently, however, there have been increasing inputs of scientific research. During the 1980s in particular, with the inherent weaknesses of intensive, conventional farming becoming more apparent, there has been a rapid growth in research and development in organic systems. Most of the information generated by this activity has been published through a wide range of outlets - books, journals and conference proceedings- but the development and the wider understanding of organic systems has been somewhat restricted by the relative inaccessibility of much of this information; there has been no English language source of sufficient breadth and depth which could be considered to encompass the whole subject area. However, with the publication of Nic Lampkin's book this gap has been well filled.

Organic Farming is a detailed, 700-page textbook which fully covers all aspects of the subject. It is divided into two main sections, 'The Principles of Organic Farming' and 'Organic Farming in Practice'. The first section deals with the theoretical basis of the subject in seven chapters, each of which is fully referenced with a wide range of further reading. Thus the reader is guided towards more detailed information which cannot be included in the text.

The second, practical, section describes livestock and cropping systems by using specific examples from working organic farms. Further chapters deal in detail with marketing and processing, productivity and economic performance and converting to an organic system. A final chapter considers wider issues such as the quality of organic foods and the system's environmental impacts. Six appendices also provide information on organic standards, sources for wider reading, addresses of important organizations and other useful material.

Because of the scope of its coverage and the range of detailed information that it provides, this book will become the major reference point for all those who are seeking to inform themselves about organic farming. It is well written and readable and, at a price of £20, excellent value. It should be on the bookshelves of all teachers and students of agriculture and horticulture; it should also be read by all those concerned about the future of the food production industry because it points the way in which the industry will have to go in the 21st century.
Abstract by R.D. Hodges.

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91 - 5/97

Agroecology
Review, book, developing countries, proceedings, sustainable
development, environmental accounting, natural resources, social
net national product, income calculation, pollution measuring,
national accounts, environmental losses, development policy,
nonmarket accounting, future prospects, World Bank, UNEP

AHMAD, Y.J.

Environmental accounting for sustainable development.

Publ. of the Int. Bank for Reconstruction and Development (The
World Bank), 1818 H Street, N.W. Washington, D.C. 20433, USA, ISBN
0-8213-1224-3, 1989, 92 p. + appendices

This volume contains selected papers from a series of workshops
jointly sponsored by the World Bank and the United Nations
Environment Programme (UNEP).

The point was to develop methodical guidelines for developing
countries on environmental accounting and its use in development
policy and planning.

The main objective of the meeting was to ascertain whether
environmental accounting could be developed and based on the
present state of the art.

In general, the papers indicate current thinking on the issue of
environmental and resource accounting.

A tool that can help ensure that future calculations of national
income more accurately represent true, sustainable income. The
current system of national income accounting has some limitations.
Current calculations ignore the degradation of the natural
resource base and view the sales of nonrenewable resources
entirely as income.

The book contains the following chapters:

- 1. Environmental and Resource Accounting: An Overview
Salah El Serafy and Ernst Lutz
- 2. Toward a Measure of Sustainable Social Net National Product
Herman E. Daly
- 3. The Proper Calculation of Income from Depletable Natural
Resources
Salah El Serafy
- 4. Introducing Natural Capital into the SNA
Anne Harrison
- 5. Measuring Pollution within the Framework of the National
Accounts
Derek W. Blades
- 6. Correcting National Income for Environmental Losses: Toward
a Practical Solution
Roefie Hueting
- 7. Environmental Accounting in Development Policy: The French
Experience
Jacques Theys

- 8. Linkages between Environmental and National Income Accounts
Richard B. Norgaard
- 9. Environmental and Nonmarket Accounting in Developing
Countries
Henry M. Peskin
- 10. A Proposed Environmental Accounts Framework
Henry M. Peskin
- 11. Environmental Accounting and the System of National Accounts
Peter Bartelmus
- 12. Recent Developments and Future Work
Ernst Lutz and Salah EL Serafy

The chapters in this volume reflect different aspects and
approaches to environmental accounting. They are concerned mostly
with financial and economic considerations and the prospects of
modifying the U.N. System of National Accounts (SNA) to reflect
issues of environmental and natural resource concern.

Agroecology

Latin America, Caribbean, Honduras, study, natural resources, environmental planning, land-use planning, definitions, hypothesis, institutions, DESFIL, USAID

HANRAHAN, M. et al.

Strategic environmental and natural resources planning.

Publ. of Development Strategies for Fragile Lands (DESFIL), 7250 Woodmont Avenue, Suite 200, Bethesda, Maryland 20814, USA, 1990, 35 p.

This report is a synthesis of three long-term DESFIL projects in environmental and natural resources planning.

Development Strategies for Fragile Lands (DESFIL) is a centrally funded project of the Bureaus for Science and Technology and Latin America and the Caribbean, United States Agency for International Development. Strategic environmental and natural resources planning is perhaps the most fundamental purpose of the DESFIL Project.

The authors define a strategic plan as "a written statement which sets out a course of action and an allocation of resources to implement a policy," and suggest a general outline of a strategic plan.

This paper is organized into three sections. First present definitions are presented. Second, three case studies are used to illustrate the planning process. Third, a first case study, from St. Kitts and Nevis, deals with a land use planning and environmental management program, whose goal is to ensure that land development for tourism and high quality residential development occur in a timely and environmentally sound manner. On a larger scale, the second case study deals with the national environmental program in Honduras. The final case study examines, at the regional level, the planning process behind the regional strategy of the U.S. Agency for International Development (A.I.D.) and the resulting RENARM (Regional Natural Resource Management) Program. In the final chapter of this paper, conclusions regarding the importance of the process involved in strategic planning and suggestions as to the way such processes might be encouraged and carried out are presented.

Aside from content and pedagogy, strategic plans fulfill program requirements and are useful program guides for governments or donor agency personnel, either public, private, domestic, or international. When seeking funds or programs or policy support, strategic plans can serve to show long-term commitment and ensure development of sound program actions.

No matter how well prepared a strategic plan may be, it can only bring about program actions and influence policy if it is put to use. This means that everyone involved in preparing a long-range strategy must take action to ensure that the plan does not sit on

a shelf, but rather stimulates program activities and formulates future policies.

Strategic plans have great potential, especially in sustainable environmental and natural resource management. Such plans can shape public debate, set priorities, coordinate the actions of diverse agencies and funding institutions, set common agendas, and provide for coordinated and concerted action. However, this potential must be translated into action for the plan to be useful.

In all three case studies presented here, the participatory planning process has had continuing impact on program design and effectiveness as well as policy formulation. However, this process is lengthier and more costly than the procedures typically followed in strategic planning.

The synthesis of the DESFIL experience in strategy preparation is that these outcomes of planning are determined by the way the plan is prepared. The contents of the plan, or what it may say, are, by contrast, less important than the process by which the plan is prepared.

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91 - 5/99

Agroecology
Review, book, environmental management, sustainable development,
ecology, economics, social systems

COLBY, M.

Environmental management in development: the evolution of paradigms.

World Bank Discussion Papers, No. 80, World Bank, Washington D.C.,
1990, 39 p., USD 5.95

This brief paper is excerpted from the author's 370-page doctoral dissertation, *Ecology, Economics, and Social Systems: The Evolution of the Relationship Between Environmental Management and Development* (the Wharton School, University of Pennsylvania, 1990). Presumably, substantiation of many arguments made in this paper may be found in the longer work.

After a brief introduction to set the stage, Colby presents the characteristics of five models of "management of the relationship between humans and nature." He refers to these models as paradigms. The greatest contrast is found between the paradigms labeled "Frontier Economics" and "Deep Ecology." The other three - "Environmental Protection," "Resource Management," and "Eco-Development" - are said to represent variations that combine attributes of the contrastive pair. A good portion of the paper is devoted to a characterization of these five models and the ecological and economic consequences of development based on each. In each instance, the conceptualization as well as the critical evaluation is that of Western economics. Non-Western world views are not represented, but some features of these views can be found in the deep ecology paradigm.

Colby asserts that each paradigm is based on different assumptions about "human nature and activity, about nature itself, and the interactions between nature and humans (p. 5)." Thus, he appears to view these paradigms as incommensurate. If so, it is difficult to understand why he depicts the relationship among them as taxonomic. Yet Colby also argues that the "paradigms are not completely distinct or unrelated (p. 5)," so perhaps they are commensurate paradigms. Then evolution of one from the other, alluded to in the subtitle, becomes possible, as do taxonomic relationships.

Colby concludes by outlining conditions that may lead, in his view, to the dominance of the ecodevelopment paradigm, or something very similar. This paper is provocative, as a discussion paper should be. Personally, I disagree with the author's use of the term paradigm and find it applicable only to the frontier economics and deep ecology models, and then only in a loose sense. All five models are still with us, and the case for their representation in an evolutionary taxonomy is unconvincing.
Abstract by Philip Young.

906

91 - 5/100

Agroecology
Review, book, environmental challenge, greenhouse effect, ozone layer depletion, energy policy, acid rain, tropical forests, biodiversity, development assistance, population, health, global environmental policy act, institutions, strategies, prospects

World Resources Institute

The crucial decade: the 1990s and the global environmental challenge.

World Resources Institute (WRI), Washington D.C., USA, ISBN 0-915825-37-6, 1989, 17 p.+ annexes

The World Resources Institute has brought together in this publication brief descriptions of critical world environmental problems and a checklist of measures to deal with them. Rather than fully describe all measures needed to address America's environmental challenges, this report focuses on priority initiatives needed to deal with the two principal threats to the global environment - large-scale atmospheric deterioration and biological impoverishment. Additional discussions and analysis of most of the initiatives suggested here can be found in the readings noted at the end of this report.

The buildup of carbon dioxide and other gases in the atmosphere threatens far-reaching climate changes.

Air pollutants are escaping our urban-industrial areas and invading the country-side, seriously damaging aquatic life, forests, and crops.

The deterioration of the global environment has a scale that encompasses the great life-supporting systems of the planet's biosphere. It includes the alteration of the earth's climate and biogeochemical cycles, the accumulation of wastes, the exhaustion of soils, loss of forests, and the decline of ecological communities.

In the developing world, pressures on natural resources intensify daily. The deserts expand while the forests, with their immense wealth of life forms, retreat. Hundreds of millions of people live in absolute poverty, destroying the resources on which their future depends because no alternative is open to them.

The 1990s will be the crucial decade for action on these pressing concerns. If major national and international efforts are not pursued in this period, irreparable damage will be done to the world's environment, and the problems will prove increasingly intractable, expensive, and dominated by crises.

Sustainable development is the widely accepted answer that meets today's needs without compromising the ability of future generations to meet theirs.

It means helping developing countries invest in reforestation, agroforestry, water conservation, and energy efficiency. It also means reducing debt and other pressures that force Third World countries to cash in their natural resources to earn foreign

exchange. Family planning, primary health services, and better sanitation all deserve a high priority since they reduce child mortality and slow birth rates.

In developing these recommendations, the WRI has followed these precepts:

- rely on the market mechanism whenever possible, in part by ensuring environmentally accurate prices;
- speed the application of existing and new solution-oriented technologies that promote environmentally sustainable development;
- attack pollution at the source by shifting from "pollution control" to waste and pollution minimization; and
- focus U.S. efforts in developing countries where they are most needed: on generating environmentally sustainable livelihoods for the poor, on enhancing the long-term productivity of the resource sectors, and on slowing population growth.

Agroecology

Study, developing countries, development assistance, environment, international strategies, projects, implementation, monitoring technical guidelines, training, IIED

WENNING, M.

Development assistance and the environment.

Publ. of the Int. Institute for Environment and Development (IIED), 3 Endsleigh Street, London, WC1H 0DD, UK, 1989, 20 p.

This paper focusses on the implementation of environmental procedures by aid agencies and suggests one model for including the necessary steps throughout the project cycle.

There has been in the past a growing effort to incorporate environmental considerations into development assistance programmes and projects.

It is now widely recognised that past policies which directed development aid primarily toward purely economic objectives have failed to prevent or to reduce the sometime catastrophic effects of aid on the human and natural environments of developing countries.

Within the last 10 years most multilateral and bilateral aid agencies have committed themselves to include systematically environmental considerations into all their development activities. It is recognised that one way of achieving this goal is to use environmental impact assessments (EIAs) integrated into the project cycle and supported by appropriate guidelines and training and education of staff.

Many aid agencies have not yet translated these commitments and intentions into practice. Even though they have developed a wide range of technical guidelines, most agencies have failed to establish procedural and institutional changes, a necessity for making environmental assessments an integral part of the project cycle and for building up an "institutional consciousness" on environmental matters.

To what extent have these commitments been fulfilled? Recent studies conclude that even though most donors have made progress, it is still too slow. Three major points have been raised:

- In general donors find it easier to provide funds and technical assistance than to institute effective procedures,
- the discussion has so far been concentrating largely on technical issues, their planning and the improvement of their methodological aspects,
- political and institutional aspects of integrating procedures in all stages (from preparation to evaluation) of projects, programmes and policy development, have been dealt with insufficiently.

Within many aid agencies, the most useful environmental know-how often lies with individuals. Results are therefore dependent on these individuals' environmental awareness and ability to take and

implement the necessary steps. But to achieve an environmental reflex throughout the aid process, it is only possible if information is gathered more systematically and planning instruments are improved and adequately integrated into the project cycle.

It is not possible to institutionalise a procedure of environmental assessment without guidelines and handbooks which help agency staff. The author presents an overview of categories and content of guidelines.

Finally the author states that there is already the knowledge, experience and guidance on what could be effective procedures and what the main elements should be. But, there is much that requires further improvement, adjustment and even revision. Yet this cannot be a reason for any further delays in revising existing procedures. Development assistance agencies must now take seriously their own commitments regarding environmental impact assessments and institutionalise genuine changes in their approaches to development activities.

This gatekeeper is based on a more detailed paper prepared by the author for a seminar to promote environmental assessment procedures within the European Commission.

Agroecology

Study, environment, pesticides, water, industry, agriculture, human health, monitoring studies, risk assessment

ROBERTS, T.R.

Pesticides in water - human health, agricultural and environmental aspects.

In: Chemistry, Agriculture and the Environment; Ed. M.L. Richardson; the Royal Society of Chemistry, UK., 1990, 429-444

Concern about the quality of water, either for drinking or for amenity use, has developed into a major issue in recent years. Causes of concern have included the accidental contamination of water by, for example, aluminium sulphate, and the presence of low levels of certain natural chemicals which are either introduced deliberately (e.g. fluoride) or unintentionally (e.g. nitrate or lead). When considering the broader issue of water pollution from agricultural activities, nitrate is one of three areas of concern, the others being farm slurries and pesticides. Assessing the extent to which pesticides can reach water bodies and whether there is a subsequent risk to the consumer or to the environment is a complex task for several reasons. First and foremost, it is important to recognize that there are some 400 different chemicals registered for use, particularly as herbicides, insecticides, or fungicides, although far fewer are used in significant amounts. Although many of these chemicals fall into classes such as the organochlorine, organophosphate, and pyrethroid insecticides, and the triazine, urea, and phenoxyacetic acid herbicides, the chemical and physical properties and the toxicology of individual chemicals can differ widely. Therefore, each pesticide needs to be considered on a case-by-case basis. During the development of a new pesticide, extensive studies of the environmental behaviour (both fate and effects) and toxicology are carried out on both the pesticide and its metabolites over a number of years. Results from such studies, together with a knowledge of the use pattern of the chemical, enable prediction of the likely fate and behaviour of each chemical in the soil and water environment under a range of conditions.

Very few pesticides are applied directly to water, exceptions being certain insecticides for parasite control and a few herbicides for aquatic weed control. Even in the latter case, chemical control of aquatic weeds is carefully scrutinized and the use of aquatic herbicides is kept to a minimum.

For pesticides used in agriculture, it is possible for a small part of the application to reach water sources in several ways, the most likely being directly from spray drift or indirectly as the result of run-off from the soil surface or movement through soil into underground water systems. With current knowledge and techniques used in pesticide applications, spray drift can be kept

to a minimum. Spray drift is most likely to occur during aerial applications.

Pesticide run-off from soil into ditches, rivers, or lakes is clearly a more localized problem which will occur only when a pesticide is used in situations where there is a combination of sloping land, appropriate rainfall, or flooding conditions adjacent to a water course.

Possibly of greater concern is the use of pesticides (largely herbicides) by local councils, railroads, etc. where they are used extensively and often without adequate control.

Whereas spray drift and run-off can lead primarily to pesticide movement into surface waters, leaching through the soil profile can result in some pesticides reaching groundwater in low concentrations.

The physical properties of the pesticide will govern the extent to which it is adsorbed to soil and hence prevented from moving away from the site of application. The chemical properties will largely govern the stability of the compound in soil, although the extent to which a chemical is susceptible to breakdown either chemically or by micro-organisms is also influenced by its physical nature. The use pattern of the pesticide can also influence the extent to which it reaches water. In particular, frequency and method of application, dose rate, and formulation can all influence behaviour to some degree. Climatic factors are also important, especially total rainfall and frequency of storm or flooding events.

The pesticides in water issue is an important one where scientific logic tends to conflict with political/regulatory issues. Hopefully both aspects will come closer together with both toxicological and exposure assessments being taken into consideration in order to evaluate properly the hazard posed by traces of pesticides in water.

Agroecology
Review, book, proceedings, developed countries, environment,
agriculture, ecology, pesticides, field testing

PAOLETTI, M.G. et al.

Agricultural economy and environment.

Elsevier, The Netherlands, ISBN 0-444-88610-9, 1989, 636 p., £90.05

Agricultural Ecology and Environment is the proceedings of an International Symposium held in April 1988 in Padova and was published in full in the Elsevier Journal Agricultural Ecosystems and Environment.

I am immediately suspicious when I open a large expensive volume (636 pages) and find that it is simply a field testing of pesticides. The 60 participants were from Europe and North America, although the recommendations section was aimed primarily at the European sector. The major emphasis in the book is directed towards vertebrates although much of the material discussed is also relevant to invertebrates.

The 24 papers cover the main topics of interest: (i) the need for field tests, (ii) the objectives of field tests, (iii) prediction of hazards, (iv) design of field trials, (v) test methods, (vi) interpretation of results, and (vii) post-registration studies. It was particularly interesting to contrast the different philosophies in the USA and Europe to field testing and to compare the systems already in operation. Unfortunately, there is considerable overlap between papers. More careful control of choice of speakers and the topics to be covered would have solved this problem. In spite of the extent of overlapping there is very little cross-referencing between papers. The difficult question of interpretation of results is discussed in several papers but, not surprisingly, no clear-cut decisions are reached. It is clear that results still need to be reviewed case-by-case by a group of experts.

The final section summarizes the main conclusions of the papers and the subsequent extensive discussions and finishes with 40 recommendations. These recommendations are the most important aspect of the book and should form the basis for the development of flexible testing procedures. For this reason alone the book will prove invaluable to those interested in assessing the environmental effects of pesticides.

Abstract by N. Carter.

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Agroecology
Study, world, agriculture, environmental pollution, atmospheric
emissions, methane, ammonia, biomass burning, gas impact, IIED

PRETTY, J.N. and G.R. CONWAY

Agriculture as a global polluter.

International Inst. for Environment and Development, London, UK.,
1989, 16 p.

In recent years it has also become apparent that agriculture is a major source of atmospheric pollution, with consequences that are both long-term and global.

Pesticides, fertilizers and farm wastes can create severe pollution of water and land, on a local and sometimes even regional scale.

Crop plants and livestock interact, continuously with the atmosphere, i.e. plants take in carbon dioxide as part of photosynthesis and produce oxygen, while both animals and plants take in oxygen and respire carbon dioxide. These activities do not result in pollution of the atmosphere, or even in significant contamination. What is potentially harmful is the production of gases and particulates, arising both from the crops and animals themselves together with their immediate environments, and from the practices of crop and animal husbandry.

The most important of the gases are methane, ammonia and nitrous oxide, to which may be added the smoke, particulates and other gases resulting from the burning of vegetation. All of these gases are produced in some quantity by natural processes, but agriculture has increased the rates of emission, slowly at first but now with dramatic effect as a result of the greater expansion and intensification of agricultural production. For instance, expansion of land area in the tropics under rice paddies has led to a greater production of methane; the intensification of livestock husbandry has greatly increased the emissions of ammonia; growth in fertilizer applications has produced much larger emissions of nitrous oxide; while straw burning and the clearance of forests and grasslands has resulted in a rise in production of carbon and nitrogen oxides, as well as much more smoke and particulates.

The principal atmospheric emissions from agriculture, their causes and immediate contribution to impacts are described in this paper. In summary, agriculture is a major contributor to the total global production of methane, nitrous oxide, ammonia and the products of biomass burning.

The burning of vegetation and crop wastes often has serious, though local, undesirable effects. Fires may get out of control, affecting nearby settlements or destroying valuable watersheds or other natural habitats. Smoke and particulates may also create a considerable local nuisance, and in industrialized countries frequently cause serious traffic accidents through smoke billowing

across roads. More serious, though, are the potential global consequences arising from the emission of these gases, notably their contribution to increased environmental acidification, to a reduction in the ozone layer and to changes in the global climate. The impact of these gases are described in detail.

The authors conclude that, what is required, is practices that will reduce the emissions of methane, ammonia and nitrous oxide. There appears to be little that can be done about methane; but ammonia and nitrous oxide emissions could be reduced by the choice of appropriate fertilizers and mode of application, and ammonia by changes in storage and application to land of livestock wastes. So far, though, little attention has been given to agricultural practices and technologies that are designed to inhibit the production of gaseous pollutants.