

Social, Economic, and Institutional Aspects of Agro-forestry

Edited by J.K.Jackson



THE UNITED NATIONS UNIVERSITY

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FOREWORD

The Workshop on Agro-Forestry, jointly sponsored by the United Nations University and the Albert-Ludwigs-Universität, Freiburg, was held at the Geographische Institut II of the University, Freiburg-im-Breisgau, Federal Republic of Germany, from 31 May to 5 June 1982.

It was the fourth of a series of workshops on agro-forestry sponsored by the UN University, previous ones having been held at Turrialba (Costa Rica), Chiang Mai (Thailand) and Ibadan (Nigeria). The theme of the fourth workshop was The Social, Economic, Institutional, and Legal Aspects of Agro-forestry, and the Constraints these Imposed on Development.

The workshop was directed by Professor Walther Manshard, former Vice-Rector for the Programme of Management of Natural Resources of the UN University, and now Director of the Geographische Institut; Professor Hansjuerg Steinlin, former Director of the Forest Resources Division, Food and Agriculture Organization (FAO), and now Professor für Weltforstwirtschaft und Landespflege at Freiburg University; and Dr. Gerardo Budowski, UNU Programme

Co-ordinator for Agro-Forestry Systems, Tropical Agricultural Centre for Research and Training (CATIE), Turrialba (Costa Rica). The workshop was attended by thirty-one participants from fourteen countries.

A number of field workers with practical experience in agro-forestry had been invited to submit papers based on their views and experience to four moderators (Mr. J.E.M. Arnold, Dr. Kamla Chowdry, Professor S.K. Adeyoku and Dr. Peter Huxley). Each moderator then prepared a position paper based on analysis of the papers submitted and his or her own experience. Presentation of each position paper was followed by discussions, which in each case lasted for the best part of a day, and a summary of which is included in these proceedings. Other papers were not read individually at the workshop but were circulated at the different meetings.

Participants in the workshop would like to thank the organizers, not only for the very efficient arrangements for the workshop itself, but also for the very enjoyable social and cultural activities which accompanied it.

CONTENTS

FOREWORD	v
Agro-forestry at the United Nations University and Its Evolving Role: Introductory Remarks Gerardo Budowski	1
POSITION PAPERS	
Economic Constraints and Incentives in Agro-forestry J.E.M. Arnold	3
Agro-forestry, the Rural Poor, and Institutional Structures Kamla Chowdhry	11
Some Tenurial and Legal Aspects of Agro-forestry S. Kolade Adeyoju	20
Education for Agro-forestry Peter A. Huxley	26
OTHER PAPERS	
The Dynamics of the Shifting Cultivation, Rural Poor, Cattle Complex on Marginal Lands in the Humid Tropics John Bishop	36
Considerations of Social, Economic, Institutional, and Legal Aspects of Agro-forestry in Venezuela Eduardo E. Escalante	43
Observations on Indigenous and Modern Agro-forestry Activities in West Africa Marilyn W. Hoskins	46
Some Policy Implications of Agro-forestry: A Ghana Viewpoint J.G.K. Owusu	51
Agro-forestry Aspects of the Establishment of the Green Belt around Ouagadougou, Upper Volta Peter E. Weinstabel	56
Agro-forestry in Shifting Cultivation Control Programmes in India E.S. Thangam	61
The Forestry Situation in Thailand Amnuay Corvanich	69
Constraints on the Introduction of an Agro-forestry Element into Traditional Forms of Shifting Cultivation J.K. Jackson	72
Forestry and the Rural Community Soekiman Atmosoedarjo	75
Agro-forestry Activities in a Multiple-Use Forest Management Project in the Philippines W.L. Heymann	81

The Agro-forestry Development Plan and Practices of PICOP	
Arcadio G. Matela	83
Agriculture, Fuelwood, and Conservation Farming in the Atzera Range, Lae, Papua New Guinea	
Beka F. Siki	86
Problems of Agro-forestry in Land-Use Planning	
T.C. Sheng	89
PARTICIPANTS AND CONTRIBUTORS	95

AGRO-FORESTRY AT THE UNITED NATIONS UNIVERSITY AND ITS EVOLVING ROLE: INTRODUCTORY REMARKS

Gerardo Budowsky

The agro-forestry project at the UN University began in 1977. Its aim was to build up a network for the promotion of research and training in selected aspects of agro-forestry, by supporting centres of excellence, and facilitating the exchange of scholars between developing countries ("South-South"). It was requested that the project should relate to other UN University activities, notably the projects on highland-lowland interactive systems and rural energy systems, and to certain aspects of the "World Hunger" and "Human and Social Development" projects of the UN University.

CATIE, at Turrialba, Costa Rica, became an associated institution of the UN University on the basis of its ongoing programme of agro-forestry research and graduate training, supported by the Direction de la Coopération et du Développement et de l'Aide Humanitaire (DDA), Switzerland, and later also by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) of the Federal Republic of Germany and the Agency for International Development (AID) of the United States. The programme sponsored at the UN University Headquarters at Tokyo and the International Co-ordinator at CATIE, has engaged in the following activities since 1977:

1. Retrieving and Quantifying Existing Knowledge

A series of systematic workshops on the state of knowledge of agro-forestry was organized at CATIE, Costa Rica (1979, proceedings published in Spanish and English), Chiang Mai, Thailand (also in 1979; Chiang Mai University became the second UN University associated institution), and at the International Institute for Tropical Agriculture (IITA) in Ibadan, Nigeria, in 1981 (proceedings in press). All these meetings followed a somewhat similar pattern; co-sponsorship was obtained from the local institutions, as well as in various degrees from different international or regional organizations such as the International Centre for Research in Agro-Forestry (ICRAF), FAO, and the International Development Research Centre (IDRC), Canada, among many others.

Specialists from the countries of the region provided papers which were discussed, enabling conclusions to be drawn. The emphasis was mainly on the humid tropics, as this ecological region has been neglected hitherto.

2. Broadening the Conceptual Framework and Promoting Field Research

It was felt that agro-forestry in many parts of the world had become an act of faith, meaning different things to different people. So the programme contributed to the establishment of the boundaries defining what agro-forestry is, and what it is not; where it can be applied, and where not. But of particular importance was the quantification of both existing traditional practices and newly designed systems. This led to a series of publications dealing with an area (La Suiza, close to Turrialba) where traditional agro-forestry systems linked to coffee and pasture were widely practised.

3. Building up Centres of Excellence as Part of an Effective Network

Besides CATIE and Chiang Mai University, steps have been taken to strengthen other existing centres in West Africa and South-East Asia, according to their special capabilities and potential for radiating knowledge over a wider area.

4. Promoting Interchange of UN University Scholars

At present the flow has been towards CATIE, to which a total of thirteen scholars (six from Thailand, two from Indonesia, two from Tanzania, one from Venezuela, one from Peru and one from Nigeria) have been sent. In the future it is planned that the flow will also move in other directions.

5. Establishing Links with Other Relevant Organizations

Most outstanding have been various co-operative ventures with ICRAF, FAO, the International Union of Forestry Research Organizations (IUFRO), United Nations Environment Programme (UNEP), AID, DDA (Switzerland), GTZ and Deutsche Stiftung für Internationale Entwicklung (DSE), Federal Republic of Germany, and IDRC (Canada). ICRAF, with its various technical meetings, has played a particularly valuable role, as has the FAO in its activities and publications on social forestry (the important role of forests for local communities).

Socio-economic Constraints in Agro-forestry

While some of the socio-economic aspects of agro-forestry were mentioned at the three workshops organized by the UN University, the information retrieved and the research carried out tended to concentrate largely on the biological aspects. The same is true of the ICRAF meetings. Yet there is much to learn in the socio-economic field from existing agro-forestry systems, such as, for example, the use of shade trees for cocoa, coffee, and in pastures in Latin America; the use of live fence-posts; Indonesian experience on home gardens; and African experience in *taungya*. Even the scanty research which has been undertaken on socio-economic aspects has placed most emphasis on strict cost-benefit relationships, and has neglected social and legal aspects, and the importance of improving social welfare. Obviously, the study of the socio-economic factors in agro-forestry is still in its infancy. It may well be a more complicated aspect for study than other factors, but this is no excuse for not facing the necessity for such studies. More important than anything else, perhaps, is that the local people's

perception of economic and social factors needs to be carefully studied and understood and, it is hoped, quantified and incorporated into action plans.

That is why the Freiburg Workshop was organized. The usefulness of the exercise will certainly be far more than academic. It is not that we can pretend to solve most problems. But agro-forestry, as seen – or rather “rediscovered” – by scientists, is here to stay. It has become an essential part of foreign-aid programmes, both multilateral and bilateral, and at present an increasing number of publications are being produced. Let us hope that the deliberations at the workshop will provide useful guidelines for the orientation of such co-operation, as well as promoting research, education, and training in the socio-economic field. Most of all, it is important that the subject of socio-economic restraints should be approached on the basis of sympathy towards rural farmers, and the way they perceive and practise agro-forestry, so that wherever possible methods can be improved, and the age-tested knowledge of the farmers can be adapted for use in other parts of the world.

ECONOMIC CONSTRAINTS AND INCENTIVES IN AGRO-FORESTRY

J.E.M. Arnold

Introduction

The term agro-forestry has been used recently to cover many dissimilar systems and activities. It is used in this paper to describe any situation in which trees form part of the agricultural production system. The focus throughout is on the developing world, with emphasis on the small farm.

Discussion of the economics of agro-forestry defined in these terms must centre on its costs and benefits to the farmer – what costs he faces which discourage or prevent him from incorporating tree systems, and what returns and other benefits could he obtain from them. Costs and benefits to a poor farmer, living partly or wholly within a subsistence system, take forms other than cash outlays and incomings. Prominent among his implicit calculations is usually consideration of risk; the need, when living at the very margin of existence, to avoid any change which might leave him even worse off than he is now. Discussion must therefore reflect these and other realities which shape the farmer's economic decisions, and must not be confined simply to monetary assessments of profitability.

Intruding on the farmer's decisions there are often the interests of government in encouraging agro-forestry in order to stabilize land use, to diminish environmental and resource damage, and to develop forest resources at low cost. These benefits spread much more widely than just to the farmers concerned, but are usually achieved only by imposing additional costs upon them. The paper therefore also considers the implications of the differences in economic objectives and impacts as seen by the farmer and by the general community.

A further issue that needs to be addressed concerns the differential impact of programmes to introduce agro-forestry activities upon different segments and members of a community. Some are likely to benefit more than others; some possibly are excluded altogether from the benefits or are even disadvantaged by the changes. The equity and distributional aspects of agro-forestry projects are therefore also reviewed.

In the next section of the paper economic benefits are listed, with economic constraints and costs in the following section. The final section reviews various measures that can be taken to make agro-forestry systems viable and attractive, by reducing economic constraints and capturing economic potentials.

Many of the constraints discussed in the paper reflect basic changes and disruptions in rural societies and economies in the developing world. A full treatment of the economic parameters of present-day agro-forestry systems would need to take into account a wide panorama of changes and change agents affecting the viability and function of rural social institutions and farmers' attitudes. Frequently, basic institutions such as the community are breaking down – without any mechanism for replacing the services they provided. Growing pressures on the land have widely reached the point at which the perception of farmers of their needs – and their abilities to meet them – have drastically changed.

In order to reduce the subject to manageable proportions the present paper focuses rather narrowly on the immediate impacts of these broader changes on the viability and acceptability of agro-forestry systems. However, what is being described is often but a symptom of much more fundamental pressures, and needs to be kept in mind in discussing the subject.

Economic Benefits and Incentives

The widespread occurrence of trees in traditional agricultural systems throughout the tropics provides evidence of the benefits that farmers obtain from their presence. These benefits can be divided into a number of broad categories.¹

The most widespread benefit from agro-forestry systems is their function of maintaining or restoring the productivity of the land. This underlies all systems of non-continuous cultivation which incorporate a period of tree

This presentation is based on a paper entitled "Economic Factors in Agro-forestry Practices" which will appear in the journal *Agroforestry Systems*.

1. See Budowski (in press) for a more detailed categorization of advantages and disadvantages of agro-forestry systems.

fallow in the farming system; and as Jackson¹ has pointed out, a widespread flaw in programmes designed to modify or replace shifting cultivation is the failure to recognize the fallow as an integral part of the agricultural system. The soil-enriching impact of trees is also commonly one of the principal economic incentives to participation in *taungya* and *taungya*-type rotational systems within the forest; they provide the farmer with access to fertile land (King 1968).

Trees also perform this soil-enriching function in certain permanent cultivation systems; for example, being intercropped as alley crops to raise nutrients to the surface layers of the soil through litter or green mulch, a function often combined with addition of nitrogen through use of leguminous tree species. In other words, they provide a low-cost alternative to fertilizers and soil conditioners. Trees are also employed to protect the soil, by providing shade, shelter from wind, protection from destructive rain impact on the soil, reduction in soil loss through row plantings to check runoff, etc.

A second widespread beneficial impact of trees is in increasing the total output of the land by adding a tree crop to one or more lower layers of crops. The intercropped species selected have root and above-ground structures which make complementary use both of different layers of the soil and of the space exposed to sunlight above the soil surface. A wide variety of such vertically structured multiple-crop combinations are found in the tropics.

Associated with this benefit is the advantage obtained by diversifying the range of outputs from the farm, by including a number of products of tree species in order to reduce the risk to subsistence or income due to the failure of individual crops, and to provide usable or saleable produce over a wider seasonal time-span than would be possible with only one or a few crops. In one of the more commonly occurring agro-forestry systems, the home garden, tree crops provide products which complement the high-calorie foodstuffs grown elsewhere in the farm system (Wiersum 1981).

A third category of benefit is that of raising incomes by exploiting tree crops which provide higher returns from the land than alternative crops. Recent studies have shown, for example, that eucalyptus grown on irrigated land in Gujarat, India, to produce poles and firewood for sale (Gupta 1979), and *Albizia falcataria* grown on agricultural land in Mindanao, Philippines, for sale as pulpwood (Hyman et al., n.d.) produced higher returns to the farmers than the agricultural cash crops they displaced.

By better use of available resources, trees can also be an additional source of income. Less labour-intensive systems of tree-growing can be used to allow farm families to utilize more of the available land; tree-growing is less tied to seasonal patterns than most crop production and, where land is not a constraint, more use of labour resources is possible than with agricultural crops.² This, for example, was an important factor in bringing about the increase in the net incomes of the pulpwood tree-farmer programme in the Philippines described by Matela.

Tree products can equally contribute to reduction in costs. Materials needed to meet essential local needs, such as fuel, forage and building materials, may be provided at lower cost by growing trees rather than using alternative sources of supply.

Trees can also provide a capital reserve for use in emergency, or to meet exceptional cash outlays. Trees are widely grown for this purpose by farmers; as they do not have to be harvested at a particular time, and usually accrue in value over time, they have unique value in this respect.

Usually the tree component of an agricultural system contributes more than one of the above economic benefits. For example, the leguminous *Acacia senegal* planted in the fallow areas in Sudan, not only enriches the fallow, it also produces a marketable product – gum arabic – which is an important source of income to the farmers, as well as fuelwood, fodder, fibre for rope-making, and other outputs of local value.

Economic Costs and Constraints

The economic pressures militating against agro-forestry systems are of two overlapping kinds. There are the pressures which are causing the breakdown of existing systems, and the destruction and removal of the trees they contain (as is happening, for example, to the village tree resources of the plain areas of Bangladesh and the gum gardens of the Sudan), and there are pressures which discourage the introduction of trees in situations where there are no trees in the agricultural system at present.

The most widespread constraint to both retaining and adding trees is probably that of growing competition for land under pressures of expanding populations on a limited land base. Though trees constitute a productive

1. Citation of authors not listed in the references refers to other papers prepared for the workshop.

2. However, as is discussed later in the paper, a constraint on some agro-forestry systems is their labour requirements – either because they are more complex and require more labour than alternative crops, or because labour is in fact heavily committed even in the agricultural off-season when many forestry activities are programmed.

element in so many traditional agricultural systems in the tropics, and are essential for sustained production from the land, as land becomes scarcer the overriding need to produce food and income in the short term naturally takes precedence over these longer-term values. A central challenge in introducing agro-forestry systems is to be able to do so in a manner which meets these immediate needs as well as the longer-term aims of stability and sustained productivity.

This conclusion about the impact of growing pressure on the land base needs to be qualified. Some of the more widespread agro-forestry systems – the home or tree gardens of Asia and the compound farms of Africa – where themselves responses to earlier, slower increases in pressure on the land. As the forests receded farmers took to planting tree species of economic value on the farm, usually around the house, working out over time the most efficient and sound mixture and structure of different species (e.g. Okigbo 1977). In this way trees have been maintained in large numbers even in such densely populated areas as the plains of Bangladesh and Java.

Such systems have often proved very resilient; in Java their area has even increased as population has grown in recent times, apparently because their productivity is higher than the areas devoted solely to crops. However, eventually even these systems break down. As overall farm size decreases with the fragmentation accompanying population growth, the proportion devoted to home gardens rises at the expense of the area of staple food crops. But when farm size falls below a certain point, farmers increasingly forego the tree products in favour of staple food-crop production (Wiersum 1981).

This underlines a basic constraint in most agro-forestry systems in terms of their contribution to alleviating the situation of the very poor: that it is often difficult to adopt them on very small farms, and that they contribute nothing directly to the landless unless schemes can be devised to give these people access to land.

Population growth also endangers existing agro-forestry systems through the resultant growing pressure on the tree resource, raising the value of the latter to the point at which economic pressures to cut and use it exceed its value as a continuing part of the agricultural system. Recent work in Bangladesh has shown that the village-tree resource – though it is comprised mainly of fruit trees planted in the village areas – is being cut at a rate far in excess of its replacement, principally to provide fuel. With the other locally available organic fuels from agricultural wastes already fully used, the tree resource provides the only reserve from which to accommodate the rising fuel needs of growing populations. At the same

time this population growth requires more housing in the village area, so reducing the area available for the tree resource (Douglas n.d.).

A powerful component in the increase in economic pressures to cut and use existing tree resources is the growth in urban and industrial demands for wood – in particular for fuelwood and charcoal. Again, however, it is necessary to recognize that rising values for tree products also provide a major economic incentive to investment in husbanding and growing trees. Brokensha and Riley (1978), for example, have described the process in an area in Kenya of transformation of wood from an abundant, free item to a commodity of value, to be brought under control, protected and perpetuated.

Shifts in the values and costs of other uses of the land can also have impacts on trees and agro-forestry practices. Corvanich has described an example of market pressures which have encouraged farmers to introduce crops which directly or indirectly lead to the removal of trees. “Modernization” of tropical agriculture, and the economies of scale, support services and marketing opportunities it attracts, favour monocultures which replace the traditional multiple cropping systems of tropical agriculture in which trees often featured. Similarly, trees are also usually incompatible with mechanization, creating impediments to the use of machinery, and are therefore removed. New varieties of tea and coffee to be grown in the open also result in the removal of the shade tree intercrop.

The discussion so far has been mainly in terms of economic pressures which discourage the retention of trees in existing systems. There are also economic costs for farmers in introducing trees. One of the most important of these is the relatively long production period of most tree species. Poor farmers can seldom divert resources from producing to meet immediate needs for food and income to a tree crop which will start producing returns at best a few years into the future. Hence the widespread preference in agro-forestry for fruit trees and other tree species which yield outputs of value other than wood, and do so early in their production cycle.

The length of the production period imposes another economic constraint; it increases the level of risk for those, such as tenant farmers or farmers practising shifting cultivation on state land, who do not have security of tenure of the land they cultivate. Few will invest in a long-term crop such as trees if they fear that they will not be present to harvest the returns in the future. Thangam and Corvanich have pointed out that this is a fundamental constraint to agro-forestry; to rectify may well need changes in basic legislation affecting control of the land.

Sheng has drawn attention to a number of other features of trees which could make them costly to the farmer – for example, competition with neighbouring crops for water, nutrients and light; and emission of substances toxic to other plants. It is important to recognize both what the costs of trees are to farmers, and also that these costs may weigh much more heavily in his economic calculations than in those of a forester or entrepreneur. Protection of trees against livestock or termites, for example, may impose a cost greater than the farmer can meet. Formulation of viable agro-forestry packages depends very heavily on being able to identify tree species which do not place such “costs” on farmers – a characteristic likely to outweigh such conventional forestry choice criteria as yield and form in the farmer’s calculations (Poulsen 1981).

Although, as has been pointed out earlier, agro-forestry activities may sometimes enable economic use to be made of surplus labour, in other instances shortage of labour may prove to be a serious constraint. Some agro-forestry operations are likely to compete with peak-season labour demands. In off-season periods labour often migrates to work opportunities elsewhere. Some of the operations, such as the logging of smallholder-grown pulpwood in the Philippines, may require labour inputs in excess of what can be provided by the farm family, so that they have to hire additional help.

There can also be more fundamental economic pressures preventing or discouraging farmers from introducing trees into their agricultural practices. Farmers in the developing world are widely faced with pressures to change their agricultural system, changes which usually cannot be accomplished solely with traditional knowledge, skills and resources. During the transitional period to the new system the farmer is likely to find it difficult to abandon such traditional practices as burning and overgrazing which are inimical to tree-growing (Openshaw and Moris 1979). Similarly, the tradition of investing wealth in livestock in grazing systems in Africa has persisted because alternative investment outlets have not been developed in these systems – to the point where livestock numbers build up to levels which result in destruction of the tree vegetation (von Maydell 1979). As was pointed out in the Introduction, some of the constraints to agro-forestry thus stem from the much wider changes and disruptions that are occurring in the rural societies and economies of the developing world.

Matching Agro-forestry Activities to Economic Opportunities and Constraints

Some of the more important measures often needed in order to remove or reduce economic constraints to adoption of agro-forestry practices (and to realize the

economic opportunities) involve institutional and legislation change. Initiatives in these areas are usually needed to resolve issues concerned with community level organization and management, government support to the participants and their training in new skills, and the critical issues of security of tenure and distribution of benefits. As institutions and legislation are the subjects of two other sessions of the workshop they are not discussed further in the present paper.

Analysing the Situation

The task of defining viable, acceptable, agro-forestry projects rests very heavily on success in identifying the relevant factors in the local situation. Some agro-forestry programmes, such as those described by Thangam, are very complex, being designed to provide alternatives to shifting cultivation which entail changes to the whole way of life of the people concerned. As he explains, a whole range of investigatory measures will be needed in such cases, in order to understand what might be successfully achieved.

Even where the agro-forestry project is no more than the insertion (or modification) of a single element in a system, it may have numerous interrelationships within the system which need to be properly understood in order to be able to identify how to intervene to improve the situation. For example, fuelwood supply and use in a rural village is likely to be influenced by other economic values of local trees, availability of alternative organic fuels (dung, crop residues), and other economic uses of these materials, access to land and uses of that land, village power systems, pressures on farm and household labour budgets, and differential sets of priorities and values within the village – to name but some of the relevant factors (Reddy, in press). Without a sound understanding of all these relationships, it is unlikely that it will be possible to define the interventions which will have the desired effect.

Identifying Costs and Benefits

Equally important is the correct identification of the costs and benefits to the different protagonists. Calculation of benefits and costs from points of view of the village and of the forest service will generally lead to different assessments of the same project (Romm 1980). The objective of a forest service in a *taungya* project, for example, is usually establishment of plantations at low cost. The objective of the participating farmers is to improve their food and income situation. Common features of *taungya* practices imposed by forest departments in pursuit of their objectives impose costs and constraints on the farmers which are increasingly unacceptable to them. A survey of *taungya* farmers in southern Nigeria in 1975–1976 for example, showed that

the physical labour involved, the restrictions on cropping practices which curtailed the cash income potential, the insecurity, and the lack of social and physical infrastructure and services, all acted as negative factors, most of which could be partly or wholly rectified by changes in the way *taungya* is applied (Ball 1977). Failures in the past to adapt the system to farmer objectives as well as forest service objectives have led one recent writer on the subject in India to describe it as "frankly exploitative in concept and operation" (Seth 1981). It is the exploitative nature of past applications which are largely responsible for the widespread breakdown of traditional *taungya* programmes in recent years, due to their rejection by participants and potential participants.

Similar divergencies of interest and perspective arise frequently in projects designed to replace shifting — cultivation by settled agricultural practices where the latter require substantial investments in soil conservation structures (such as terraces), the benefits from which are as much environmental protection for populations elsewhere as increased income to the farmers. Where such disparities in purpose and impact arise, mechanisms must be devised for transferring resources so as to produce a favourable benefit-cost relationship for the villager as well as for the government. Examples of such transfer mechanisms are the subsidization of input and capital costs reported by Heymann, and found on a much larger scale in such successful programmes as village forestry in the Republic of Korea (Gregersen 1982), or the incentives given, amenities and services provided, and marketing facilities arranged in the *taungya*-type projects described by Thangam.

Support mechanisms need to avoid creating a dependency upon outside inputs on the part of the recipients which would undermine their ability to become self-sufficient in operating agro-forestry systems. This concern has led to extensive debate over whether or not to pay for local labour inputs into agro-forestry projects. It is often argued that only voluntary provision of labour is compatible with the degree of commitment to the project necessary for its success. On the other hand, the community may be so poor and heavily burdened already, that it would simply not be able to cope with the additional tasks associated with the project unless it was accompanied by additional income from wages for the work done. Similar arguments have arisen over whether or not planting stock should be provided free of cost. Clearly there is no single answer to such questions. They have to be decided on a case-by-case basis.

There are two other aspects of the differences in the value different people involved place on the socio-economic impacts. One is the conflict (discussed by Hoskins) between indigenous and modern; the failure to

recognize that for many rural people it is the variety of non-wood products from the indigenous forests which are of value — products which are not yielded by plantations or woodlots, the outputs from which often do not have value to the people dependent on indigenous forest. Projects which shift the use of forest land towards wood production may severely disrupt not only the subsistence base of forest people, but also the source of livelihood of often enormous numbers of other people, very often the landless and the poorest in communities, who gather and sell products from the forest (Arnold 1981).

The other point concerns the need to assess costs and benefits as they are actually perceived by the farmer. As has been noted earlier, in terms of the farmer's objectives, resources and constraints, the costs and benefits of trees are likely to be widely different from, say, the costs and benefits of the same tree to a forester.

Distributional and Equity Issues

The problem of divergent impacts of costs and benefits also arises very widely within the community. An agro-forestry project is unlikely to have a similar impact on all groups or individuals within a village. Hoskins has shown how important needs and perspectives within the community can be — and often are — overlooked or incorrectly interpreted in the identification process, leading to projects which neglect, or even adversely affect the landless, herders or women, for example.

However, the problem goes far beyond that of correctly identifying all those concerned, and of defining their needs and possibilities. Even if this is achieved, the much more difficult task remains of devising project interventions which can meet the needs of all. As Bishop points out, those with larger farms and greater resources are more likely to be able to benefit from an agro-forestry innovation than small farmers. Similarly, in grazing systems, those with larger herds are more likely to be able to benefit from an expansion of tree areas to provide arboreal forage than the poorer members of the community who possess fewer animals (Horowitz and Badi 1981).

The task becomes even more difficult and intractable if the objective is to use the agro-forestry activity as a tool to achieve a positive distributional effect in favour of the poorer parts of the community. Noronha (1982) has drawn attention to the many divergencies and conflicts of interest within communities under the heterogeneous conditions found in India and many other parts of the world. Cost and benefit impacts of tree projects are likely to be different for different income groups, for different users of the land, for different components within the village power structure, and even — within the family —

between men and women. For communal tree solutions to be feasible, there needs to be a tradition of communal action, the presence of communal land, and labour available at the right time. To succeed, agro-forestry projects need to be based on groups with shared economic objectives and situation, and a measure of socio-cultural homogeneity, which may often mean smaller groups than a village or the community (Noronha 1982). Recent work in Tanzania suggests similar conclusions (Skutsch *et al.* 1982).

The problems associated with the inequalities underlying these distributional aspects and equities have deep institutional and political roots, and to remove or ameliorate them could require far-reaching changes. Indeed, it has been recently argued that unless there is an egalitarian distribution of land, village-level forestry projects cannot reach those in most need of them – the poor and the landless (Agarwal 1980).

Economic Dimensions in Project Design

There remain a number of more narrowly operational measures which can contribute to economic viability and acceptability. Tree systems will seldom be interesting to farmers and other rural people unless they produce tangible short-term economic benefits. This can be achieved by using, or including, species which produce such benefits as fruits, fodder, etc., which mature early in their life cycle, as is described by Heymann and Thangam, or by using very fast-growing wood or fibre species, or by incorporating complementary income-generating activities such as mushrooms, *kudzu* fibre, etc., in village forest projects in Korea (Gregersen 1982), or honey, *tasar* silk, etc., produced in forest areas in Java (Soekiman and Banyard 1978).

Even with short gestation periods for tree products, the time horizons or capital costs may be such that farmers or communities need financial support until the trees are generating income. Credit for agro-forestry needs to be available on terms which are compatible with the timing and nature of the cash flows in and out of the project. For example, a recent evaluation of a smallholder tree-farming project in the Philippines by the agency providing credit to the farmers showed that the grace period and repayment terms had been consistent with the tree production period, but that the loan size and timing had not always matched the heavy expenditure the farmer incurred in harvesting the trees, and the credit procedures had discouraged the agricultural component by requiring the farmer to take out separate loans for trees and crops (Hyman *et al.*, n.d.).

Access to credit usually requires the farmer to be able to provide security for the loan. In the absence of legal ownership or tenurial rights, such security may be

difficult to achieve, increasing the risk from tree crops. Certain economic measures can help reduce the risk element. Heymann has drawn attention to the importance of ensuring the marketability of the products before introducing new species of fruit trees to rural people. In the agro-forestry project, to produce pulpwood as a smallholder crop as described by Matela, firmer assurances of market and price, embodied in formal agreements with the purchaser, were needed to make tree-growing acceptable to the farmers. Heymann also underlines the importance of quality in relation to price and market acceptance, and yield, and the role of training and extension in transmitting necessary new skills and experience.

Agro-forestry systems can often be more complex than existing crops and farming practices. As Cornavich points out, ability to acquire the necessary skills will be influenced by the literacy of the people involved. This factor underlines yet further criteria which, together with training and extension, impinge upon consideration of the institutional aspects of agro-forestry which are discussed in another part of the workshop programme. Generally speaking, new activities will be absorbed and adopted more easily if they are familiar, are related to traditional technology and materials, and if individual changes are kept small and simple. This seems to apply as much to agro-forestry as to diffusion of new technology in general (National Academy of Sciences 1982).

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Discussion

There was a need to assess costs and benefits, in particular how these were perceived by the small farmer who might have quite a different scale of values from the conventional economist, or from the specialist in agriculture or forestry. A number of examples were given. Quite often trees were not valued primarily for the wood they produced, but rather for some other property; for example, in Peru, for demarcating field boundaries; in Nigeria, for providing leaves for wrapping foodstuffs. A farmer might retain valuable trees for use by his sons, to build houses when they married, rather than cutting them for sale at the theoretically optimum time. The farming methods and other practices of small farmers in the tropics were mainly directed towards minimizing risk, rather than maximizing profits.

Farmers would be willing to engage in agro-forestry if they were sure that the benefits they received outweighed the costs (which might include such things as the sacrifice of leisure) they incurred. But the benefits must be such things as the farmer himself valued. It was often difficult for extension workers to know what farmers' priorities, as perceived by the farmers, were. Much more information was needed on this, and on the processes of decision-making by small farmers. To obtain this information extension workers needed a new approach, with fewer preconceived ideas. They must be prepared just

as much to learn from farmers as to try to teach them. The agro-forestry extension worker not only needed to be trained in new techniques but in new attitudes towards farmers.

The costs and benefits from agro-forestry might not accrue to the same sectors of society. For instance, if one of the benefits was reduction of soil erosion – and hence of silting in streams – the beneficiaries would be people living in the valleys, rather than the farmers on the hillsides. Thus the valley dwellers, or the state representing society as a whole, should be prepared to pay part of the cost, or to give other incentives to the hill farmers.

Such incentives could be in the form of cash, reduction in taxation (which would only benefit wealthy farmers) or granting security of land tenure. Other incentives could be in the field of general social development, such as the provision of roads, water supplies and schools. There was, however, the problem of directly linking these social activities, in the mind of the individual farmer, with the agro-forestry activities he was being encouraged to undertake.

Many agro-forestry activities would, of course, be of direct benefit to the farmer practising them. It was necessary, however, to ensure that these benefits went to those who really needed them, and not only to large

landowners. Indeed it might happen that large farmers became better off, while smaller farmers and the landless suffered. Precautions should be taken against this.

In introducing new ideas considerable thought should be given to the effect they would have on existing social structures. However, some change in social structure might be essential if certain schemes were to be implemented successfully.

There was some discussion on whether agro-forestry should be developed from the top down – from

government to farmer – or from the bottom up – from farmer to government. In practice both approaches were needed. Governments must prepare plans for land use on a national scale (or even in co-operation with other governments, on a supra-national scale), and must make provision for finance and staff. Farmers, on the other hand, must be involved in planning agro-forestry schemes at the local level. They should be able to say what they want and expect from the schemes, and should be encouraged to put forward their ideas on running them. Without this the success of the schemes was much less probable.

AGRO-FORESTRY, THE RURAL POOR, AND INSTITUTIONAL STRUCTURES

Kamla Chowdhry

Introduction

The Freiburg Workshop on Problems of Agro-Forestry was intended to focus attention on the social, economic, institutional and legal aspects of agro-forestry programmes. Foresters and other professionals involved in studying and implementing various kinds of agro-forestry projects were invited to write papers sharing their experiences, in order to highlight the social, institutional and legal factors that need to be understood for successful implementation of agro-forestry programmes.

Review and Comments on Papers

Nine papers from different countries were sent to me for review. In reading the papers I was struck by the "two culture" phenomena. The foresters and other related professionals mainly discussed the technical aspects of agro-forestry problems – aspects relating to land, soil conditions, water harvesting, production methods, ecological degradation, watershed planning and integrated area plans. The aspects of better understanding of people, and of the strategies to be used to obtain participation and collaboration of the so-called beneficiaries tended to be overlooked. The importance of people-oriented approaches was realized by almost all, but the problem was dealt with by normative statements such as "farmer participation is one of the most crucial problems of developing agro-forestry", "unless people are convinced of the advantages, the proposed method would not be possible", or "cultural environment must be taken into account." These "ought" statements did not help the reader to find ways and means to find out how, under what conditions, with what kind of people, and under what social and cultural factors participation would be feasible.

Indications from several papers were that "top-down" approaches were being used, that governments and donor agencies were assisting in transforming societies, and that implementing officials were the principal agents of change. In the paper by the sociologist, the "bottom-up" approach to the problem and modes of attacking it was emphasized. She clearly brought out the importance of first understanding the needs and the experience-based knowledge of local people before new projects are formulated for their benefit. Examples were given where

good projects backfired because unrealistic assumptions were made of the needs of local people.

In most papers it was assumed that experts and technocrats have a body of specialized knowledge which defines their comprehension of situations, problems and solutions. What was not brought out was that experts and their knowledge often have built-in biases and assumptions, which need to be re-examined in relation to the new situation and people concerned. Who defines the problem (the professional expert or the so-called beneficiaries), is significant because the definition of the problem in itself confers control over the situation. The professional reformer defines the problem in ways that maximize his own power and control over the situation. Similarly the beneficiaries are likely to define the problem in ways meaningful to them and which give them the control of resources.

Out of nine papers reviewed only one paper was by a woman. It was interesting that only in this paper was the problem of agro-forestry discussed from the perspective of women. In agro-forestry projects, especially those having components dealing with fuel, fodder, animal management, etc., women are the main workers. And yet it was rare to find that projects were formulated taking into account the needs and activities of women. With "male" and so-called "developmental" perspectives, projects often end up by making drudgery and the quality of life worse for women.

A recent example is from a remote Himalayan village, Dungra-Paitaoli, where women defied their menfolk in deciding on the choice of land use and protection of trees. The men wanted to sell a nearby forest to the Uttar Pradesh government so that it could be converted into a potato farm. But the women defeated this move. They already spent several hours collecting firewood and would have to spend more time walking, at least another five kilometres every day, to fetch fuel and fodder. The men wanted a potato farm for its cash income which they could convert into drink, but also for other "benefits of progress" – a motorable road, a bus connection, perhaps a school – which they hoped the potato farm would bring.

Influential villagers including the village head did not like the women's protest. They turned the question of land