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RETHINKING APPROACHES TO TREE MANAGEMENT BY FARMERS

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This paper examines farm households' tree management strategies and proposes a framework for policy interventions. Farmers plant or retain some trees on their land nearly everywhere. Historically this component of on-farm resources has attracted little interest but practical policy measures can be identified, and differ substantially from those relevant to forestry.

Policy conclusions

- As access to forest resources decreases, trees managed by farmers are often of increasing importance in meeting household objectives.
- Welfare and conservation approaches to defining interventions need to be replaced by approaches that examine tree management in terms of farmer livelihood strategies.
- Interventions to reduce market constraints to tree growing appear to be more important than incentives to plant trees on farms.

Introduction

The upsurge in interest in farmers' tree management since the mid-1970s stemmed from perceptions that such resources could in fact have a number of important impacts. One was in offsetting deforestation, and the environmental damage that excessive removal of tree cover can cause. A second was in meeting people's fuel and other basic self-sufficiency needs at minimal cost. A third was the potential of trees in stabilising and improving small farm systems.

However, by comparison with what is known about the crop and livestock components of agriculture, very little is known about existing tree management practices, about farmers' perceptions of the value of trees and of different tree outputs in meeting their needs and production objectives, and about the constraints farmers face that limit their potential to develop tree resources within their farming system.

Programmes to stimulate tree management at this level have been severely hindered by this lack of knowledge, and have had only limited impact.

This paper presents the results of recent research initiated to address some of these gaps in knowledge. The analysis moves away from the needs-based and conservation approaches that dominated much of the earlier work, and instead examines tree management in terms of farmer livelihood strategies and of the dynamics of rural change. It draws in particular on a number of detailed studies in eastern Africa and south Asia.

Tree management and household strategies

Though patterns and intensities of tree planting vary widely, in general the density of planted trees increases as agriculture intensifies, and access to forests and woodland decreases. Trees are likely to be inserted into farm landscapes for the following reasons:

- to maintain supplies of tree products as off-farm tree production declines;
- to meet growing demand for tree products;
- to help maintain agricultural productivity; and
- to contribute to risk reduction and management.

Within this broad overall framework, farmers' patterns of tree management vary (Box 1) and their decisions are likely to be influenced by a number of factors, including: decline in access to off-farm tree resources, agroecological characteristics and land use practices, land and tree tenure and control, agrarian transformation and growth in market transactions, factor availability and allocation, and management of risk. The interaction between these factors in a number of the situations studied is summarised in Box 2.

Box 1. Patterns of planted trees on farms

- *Trees maintained on non-arable or fallow land.* Low intensity management of naturally regenerated trees on uncultivated land is likely to occur in more extensive farming and grazing systems.
- *Trees grown around the house.* Where protection against livestock and burning is difficult, growing fruit and other valued trees is concentrated within a fenced area around the house.
- *Trees growing along boundaries and in other interstitial sites.* Found where trees need to be separated from crops in areas of intensive land use, or where trees are the dominant means of boundary demarcation, or where lines of trees serve a protective purpose (e.g. windbreaks and contour planting).
- *Intercropping on arable land.* Generally takes the form of trees scattered, or in clumps or rows (alley cropping), as part of sometimes complex agricultural crop production. Occurs where trees provide benefits to agricultural crops through shade, shelter or soil improvement, or intercropping is mutually beneficial to both trees and crops because of shared water, soil, nutrient, and light resources. In multi-storied, multiple species compound farms and 'home gardens', tree/crop mixtures can represent important components of the overall

farm system.

- *Monocropping on arable land (farm woodlots)*. This is usually associated with the growing of trees to produce cash crops, such as poles, pulpwood or bark, or for fruits such as cashew nuts, and is likely to be found in the more advanced, market-oriented agricultural areas.

Source: Arnold and Dewees 1997, 1995

Box 2. Patterns of farmer tree management in selected study areas*

Murang'a District, Kenya In the transitional coffee/tea zone of Murang'a District between 20 and 30 per cent of smallholder farming land has been planted with woodlots of *Acacia mearnsii*, grown for its bark (yielding tanning extracts), charcoal, fuelwood and building poles. The results of a detailed study of around 120 households suggest that woodlots are more likely to be established as households age, are more risk-averse, and have less labour, and that woodlot clearance takes place when labour is more available to cultivate the holding. Woodlot-growing parcels tend to be on more steeply sloping sites, and therefore harder to work and more prone to erosion if cleared.

Uttar Pradesh, India When the government farm forestry programme started in the late 1970s, many farmers in the more commercialised parts of Uttar Pradesh adopted eucalyptus as a farm crop, in an area where farm trees had not been grown before, but then gave up its planting when the first production and marketing cycle was completed. A study of six villages showed that eucalypt planting was taken up more by wealthier farmers who had more land, had more assets, faced shortages of labour and problems of supervision, and had diversified sources of incomes. Eucalypt growing was discontinued due to higher than anticipated costs, lower crop yields in the vicinity of the planted trees, low output prices, and uncertainties over yields and markets.

Siaya and South Nyanza Districts, Kenya On-farm tree planting and management have become progressively more intensive with the transition to permanent cropping, the disappearance of communal tree resources, and the rise of local cash markets for fuelwood, poles, seedlings and fruit. During 1985–89 a farmer-responsive extension service substantially increased the 'menu' of tree-related options available to households, and farmers employed a large and growing number of different tree species and management practices. Farmers have increased the numbers and land area in trees under conditions of increasing land scarcity to obtain critical consumption goods which would otherwise have to be purchased, to diversify their sources of cash income, and to protect food security in the face of declining crop yields.

Western Rajasthan, India In this arid region, people have historically based their livelihood systems on production of grain in association with nitrogen-fixing trees, on livestock management, and on retaining a substantial part of the lands as common property to ensure a reserve of biomass products for use in low rainfall years. Changes in these biomass-centred strategies in the face of land reform, heightened population pressures on the land, and progressive commercialisation of agriculture in

response to growing access to markets, have been studied over two decades. Depletion of the area of common lands and overexploitation of the resource that remained has forced greater reliance on private tree management, but the adoption of tractor cultivation has hindered growth in the latter. It has proven possible to intercrop one locally important tree species under mechanisation but the system as a whole is being seriously threatened by the large net reduction in tree resources.

Middle Hills, Nepal Comparison of aerial photo cover from 1964 and 1988 in central Nepal showed a more than fourfold increase in tree density, despite increasing population pressures on the land. Farmers pursue a strategy of natural regeneration and planting first on stream beds and banks and other uncultivated land, then on the walls of rainfed terraces and then on the walls of irrigated terraces. Changes in labour availability, increased access to markets, and changes in fodder needs as livestock management practices evolve towards stall-feeding, may be factors influencing this increase in private tree management.

** Summarised from case studies reported in Arnold and Dewees 1997, 1995.*

Most farm-level tree management is primarily to meet household needs for fruit, fuel, fodder, building materials, etc. However, farmers increasingly exploit opportunities to generate additional income through sales. However, farmers' production of wood products for urban and industrial markets is often limited by competition from low-cost supplies from natural forests, price controls, and government restrictions on private harvesting and sale of wood. A combination of these factors helps explain the limited occurrence of private production of fuelwood and poles for urban and industrial markets.

Tree cover is often maintained, or is expanding, because labour rather than land is increasingly becoming the limiting factor on farm (Box 3), but this trend could be reversed if better functioning factor markets enable farmers to get better access to capital, labour and land. Farmer decisions to grow trees are also influenced by the role trees can play in risk management. Trees help to even out seasonal peaks and troughs in flows of produce or income and demands on farm labour. The preference in many farm systems for multi-product tree species, and use of a variety of trees rather than tree monocrops, reflects the greater flexibility and reduced exposure to risk that this offers. Trees can also provide a reserve for use or sale to meet emergencies or unexpected outlays. They also help to protect crops against damage from wind and water erosion, and contribute to maintaining soil nutrients. The presence of apparently low-yielding trees is often explained by their value in containing exposure to risk.

Box 3. Trees and land and labour allocation

- Trees require less labour than most other crops, and so are attractive where labour is expensive, scarce or difficult to manage.
- Trees may be planted by households with access to sufficient income from non-farm sources, which consequently have less need to cultivate their land intensively.

- Trees may be planted and maintained as an alternative to renting out or sale of land that is surplus to the household's immediate needs in order to retain resources which can be passed on to the next generation.

Source: Derived from Dewees and Saxena 1995 (in Arnold and Dewees 1997, 1995)

Developing a framework for policy

Too many of the policy or project interventions to date have sought to encourage tree growing where trees are not an appropriate component of the farm household economy, or have attempted to induce growing of inappropriate trees. Others have pursued solutions that would require unrealistic change in the institutional or social framework, or have failed to focus on the critical areas where change could be brought about.

In any given situation, the potentials of tree-based interventions need to be compared with those of alternative ways of achieving the same goals. Equally, the policy analyst needs to know whether there are market or government failures that constrain or distort the present situation, and, if so, whether and how they might be remedied or alleviated through intervention.

The 'forest conservation' and 'welfare' approaches to farm trees in the 1970s and 1980s have proved to be of only limited value in defining an appropriate policy framework. With their restricted focus on particular needs and products, they tended to obscure the dynamics of farmers' economic responses to changes in demand and supply and to scarcity and abundance. Many failed tree-growing projects were a response to a perceived energy supply problem, rather than to real local needs for trees and tree products. Little was then known about how farmers respond spontaneously to declining supplies of fuelwood, and so the case for tree growing was not balanced against alternative courses of action.

Similarly, the perception that planting trees on farm could help to maintain or restore the environmental benefits of forest cover overlooked the very different patterns of tree cover that are established on farms. Trees in farming systems are more usefully seen not as part of the forest resource, but in the context of farm household livelihood needs and strategies.

More holistic analysis suggests that the earlier focus on intervening primarily to stimulate an increase in supply of tree products is insufficient: more attention should be paid to matching production with demand. In particular, higher priority should be given to changing policies and practices that presently constrain farmers' access to markets, and that depress market prices for their tree products. Action is thus likely to be needed in three policy areas:

- subsidies and related fiscal measures;
- regulatory and tenurial mechanisms; and
- public investment in research and other support services.

Subsidies and fiscal measures

Subsidised planting stock

Project interventions have centred on stimulating more tree planting through provision of subsidised planting stock, and/or cash payments to offset establishment and maintenance costs. However, as an enterprise requiring only low inputs of capital, it is not clear that cost constrains many farmers from growing trees. Indirect evidence of growth in market transactions in seedlings reinforces this view. There is also evidence that to subsidise planting stock can have negative impacts on the emergence of sustainable seedling production.

Recent evaluations of projects in India suggest that there is also a danger that interventions in the form of cash subsidies are encouraging tree crops in situations where they are unlikely to be viable or appropriate. Farmers appeared to be planting in response to the short-term returns from the cash payments provided rather than the longer term returns from investment in trees, leading to distortions in land use, threatening household food security or generating inequity through displacement of sharecroppers and grazing. There is also widespread evidence that both seedling distribution and cash subsidies tend to be targeted towards larger farmers – not least because this enables the forest service to reach its targets quickly and with the minimum number of transactions.

This is not to suggest that government help in providing seedlings is not needed. This can play an important pump priming role in getting increased tree planting established. It can also have a continuing role in providing species that are not locally available, or that are difficult to raise. However, the case for making the planting stock available at less than cost is questionable. Where costs of establishment or husbandry are constraints, more attention could be paid to use of credit, and measures to reduce costs, in order to avoid distortions arising from subsidies. Practices such as staggered planting, and interplanting with crops that produce intermediate yields, can limit the net costs of tree growing.

Subsidies for competing land uses

Shifts in farmer decisions in favour of or against tree crops are also influenced by agricultural policy measures that influence input and output prices for alternative agricultural crops and land uses. Subsidised fertiliser inputs and supported prices for agricultural crops, for example, are likely to bias choices against tree growing. Where it is not practical to remove these distortions, it could be argued that a countervailing fiscal intervention may be needed in order to restore the true competitive position of the latter. However, this is not necessarily best applied by subsidising the establishment phase; it may be more appropriately achieved by improving the demand and market prospects of the tree products.

In any event, the analyst considering the role of trees in a farming system needs to be aware of the impact of agricultural policy measures on the viability of tree growing. These can include policies that influence the adoption of new agricultural technologies such as use of tractors, and policies that affect shifts in livestock management and hence demand for grazing and fodder, as well as price policies.

Price controls, subsidies and fuelwood markets

Prices of fuelwood in urban markets are frequently kept low, for the same reasons of political gain that lead governments to keep urban food prices artificially low. This

may be achieved by price controls on fuelwood and/or charcoal, or by subsidising alternative fuels. Governments may therefore be focusing on subsidised planting as a way of stimulating supplies of fuelwoods because of political difficulties in the way of allowing prices to rise.

In many countries the government also intervenes in the market as a producer from state forests. Some products are made available at deliberately subsidised prices, because of their importance to the poor. Others are effectively sold at below-cost prices because the process of setting and collecting royalties fails to capture an appropriate share of the economic rent. The result is to confront the private producer with competition from subsidised sources, which often also gain from economies of scale in transport and marketing.

One of the more fundamental policy issues that many governments need to address, therefore, is conflict within their overall strategy to provide forest products. A logical long-term solution could be to phase out state production in those markets where farm-level production has a comparative advantage. In the short term the position of the latter can probably be improved by removing or relaxing regulatory constraints that reinforce the structural and scale advantages that the state, through its forestry administration, possesses as a producer of many forest products.

Regulatory and tenurial measures

Regulations controlling private production and sale

Often motivated by the need to prevent illegal felling, many states control commercial sales of private tree products, requiring producers or traders to obtain permits to harvest, transport and sell roundwood. The resulting cumbersome and costly bureaucratic procedures tend to make producers dependent on intermediaries, who have the skills and resources to navigate the procedures. The complexity, cost and poor market information (and therefore uncertainty) can prove to be a major distortion of market forces, and a disincentive to small producers in growing trees for sale.

If they cannot be abolished, controls of this kind can often be reduced and simplified without jeopardising the government's concern to protect against illegal felling. Where most trees planted for wood production are exotics, harvesting and transport controls and regulations can be modified to exclude these since they are not present in the natural forests that forest services seek to protect.

Security of tenure

It is widely argued that security of tenure is one of the most important conditions that farmers require before investing in a long-maturity crop like trees but this need not imply private ownership. For instance, in many customary systems in Africa, persons who plant trees are assured of continued rights to the produce even after they have relinquished control of the land on which the trees are located.

Where the tenure situation does pose a constraint to tree growing, it is likely to be more realistic to seek solutions that can be effected within the existing legal and tenurial framework, than to try to alter it. Moreover, past changes have often engendered a strong distrust of government intervention in this area. Moves to alter control of land by creating individual titles to common pool resources can

disenfranchise large segments of the local population. The prospect of change can thus itself introduce uncertainty, and so may inhibit investments in long-term activities such as tree growing.

In many countries the state is empowered to appropriate forest or woodland areas. While often intended to bring threatened forests under sound public management, this approach may discourage private tree planting because it introduces uncertainties about rights of ownership and usufruct. Clarification of the application of such linkages between the presence or absence of trees and control of the land could often provide the assurance that farmers need.

Public investment in research and support services

Research

The perception that the problems that were to be tackled through farm forestry needed urgent action, on a massive scale, often resulted in pressures on forest services to achieve overambitious targets for seedling distribution and uptake by farmers – pressures that all too often resulted in priority being accorded to quantity rather than quality (or appropriateness). Many tree-planting support programmes have consequently been characterised by poor technical prescriptions and practices.

Though nominally designed to service a ‘needs’ approach, technical options made available to farmers have seldom been systematically selected to match those needs. Many projects, for instance, have favoured a small number of forestry species better suited for production of timber than of the produce farmers seek to obtain from trees.

There is therefore need for a greater content of applied research that responds to the needs, opportunities and constraints actually faced by farmers. This should focus *inter alia* on helping to identify changing demands that farmers could exploit. Many tree species that have physical and husbandry characteristics well suited to their employment as components of agroforestry systems, will make economic sense to farmers only if there are outlets for those of the tree’s outputs that have to be processed.

Broader approaches to extension

The study in western Kenya (Box 2) showed that, where they had access to a wide range of tree-based options, farmers employed a wide range of species, in a variety of different roles and niches, as they intensified land use. This suggests a much broader-based approach to extension than has usually been adopted, with farmers being able to choose from a menu of options, reflecting the widely varying requirements between, and even within, households for specific tree products and services. Extension should also be able to provide access to market information and to help in marketing.

This also suggests a more flexible approach to structuring support services than has been evident in some of the larger target-driven programmes designed to support farm-level tree growing. A greater use of pilot activities in the initial phase, and a more measured build up, should enhance the likelihood that support services are able to respond to local conditions.

Strengthening the planning data base

The historical data on changes in production and use that normally provide the starting point for policy analysis have seldom been assembled over a long enough period for tree resources within agricultural systems. Because of the shortage of detailed 'case' studies of tree management it is seldom possible to examine the likely patterns of change through comparative studies across different situations. Nor are existing secondary data usually spatially organised in a manner that would facilitate such exploration of patterns of behaviour and change.

There are a number of ways in which existing information can be used in order to improve the information base. Archival research can often yield important pointers to past change in the presence of trees within land and resource use, and the reasons for change. Aerial photographic coverage and satellite imagery from different periods can provide more direct and detailed evidence of the nature and extent of past changes in tree cover (and provide a basis for designing follow-up field studies). Secondary data may be reorganised in ways that permit comparison of patterns of tree occurrence and management across different agroecological regions, land use systems, and conditions of wealth and market access. Careful monitoring and evaluation of projects, and of experiments, is another valuable source of information of use in analysis. There are also other techniques, such as landscape modelling, that might be used.

The improvement of data at the policy and planning level needs to be matched by information that improves understanding of the role of trees and tree products in the household economy at the local level. Traditional household and regional surveys have an important role to play in this connection, as do forms of appraisal that involve local people more directly in the planning and decision process.

Conclusions

Tree management practices by farmers reflect the many different ways in which trees contribute to multiple-objective livelihood strategies. Farmers need access to a menu of tree species that are matched to their different needs and opportunities. Policy analysis needs to compare tree solutions with alternatives, and to recognise the adaptations to scarcity already practised by farmers. Interventions to reduce market and demand constraints to tree growing appear to be more important than incentives to plant trees. There is a danger that, by hindering farmer access to tree product markets, governments may inadvertently be interfering with the shift from a subsistence to a market economy.

References

Arnold, J.E.M. and Dewees, P.A. (eds) (1997) *Farms, Trees and Farmers: Responses to Agricultural Intensification*. Earthscan Publications, London. (Also published as *Tree Management in Farmer Strategies: Responses to Agricultural Intensification*. Oxford University Press, Oxford, 1995.)

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