SELECTED READINGS AND MATERIALS

from

WORKSHOP MANUAL FOR LAND USE PLANNING METHODOLOGIES IN SOCIAL FORESTRY

prepared by

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In collaboration with

USIAD-GOP Forestry Planning and Development Project
and Winrock International

November 1991

LAND USE PLANNING METHODOLOGIES

IN SOCIAL FORESTRY

Pakistan Foresters Workshop
Pakistan Forest Institute
Peshawar, Pakistan

November 10-21, 1991

INSTRUCTORS:

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The materials in this document were abstracted from the training manual for a two week technical short course presented by the College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, Idaho, U.S.A. at the Pakistan Forestry Institute, Peshawar, November 10-21, 1991. The Workshop was sponsoredby the USAID-GOP Forestry Planning and Development Project withtechnical assistance provided by Winrock International.

The overall workshop objectives are:

1. To provide forest officers with the training needed to define, analyze and evaluate land use planning processes as they apply to social/farm forestry projects in Pakistan;

2. To train forest officers in developing appropriate goals and measurable objectives for social/farm forestry activities;

3. To demonstrate the importance of involving local people in planning forestry activities and to learn desirable extension techniques;

4. To present the theory and methodologies to determine the social impacts of alternative social/farm forestry activities;

5. To develop and evaluate alternative social/farm forestry strategies; and

6. To enable the participants to train others in their districts to work together to achieve the social/farm forestry objectives.

PROPOSED DAILY SCHEDULE

Sunday, November 10, 1991

A. Opening Ceremony
Introductory Remarks
Introduction of Participants

B. Workshop Organization and Schedule
Pre-Course Survey/Biodata
Training Objectives - getting goal agreement
Distribute Training Materials

C. General Planning Theory, Concepts and Principles (Force)

D&D as a specific planning framework for farm forestry (Forester)

Hand-outs: Planning definitions; NFMA process; G-H Planning Schematic; D&D overview.

Reading assignment:

"Beyond Community Woodlots: Programmes with Participation", Michael M. Cernea. ODI Social Forestry Network Paper 11e. Winter 1990.

"The Importance of Land and Tree Tenure in Agroforestry." 1987. Louise Fortmann. Perspectives in Agroforestry. Technical Report No. 1. Washington State University, Pullman, Washington. October 6, 1987.

Monday, November 11, 1991

A. Land and Tree Tenure - Implications for Forestry Projects (Force)

Discussion will focus on Cernea and Fortmann reading

B. Developing Goals and Objectives (Force)

C. Introduction to Agroforestry (Forester)

Definitions, basic concepts, characteristics of agroforestry systems

Assigned Reading: Buck, L.E. 1989. Agroforestry extension training sourcebook. Module 2 Lesson 3.

Tuesday, November 12, 1991

A. Introduction to Social Impact Assessment (SIA) (Force)

Theory; Conceptual Framework of Human Ecology System
Hand-out of Model

B. SIA Measurement Techniques (Force)

Including RRA, and focusing on participant observation in preparation for the afternoon's exercise

C. Field trip – Participant Observation Exercise in local area

Homework: Summarize observational data

Wednesday, November 13, 1991

A. Analysis of Participant Observation Data

Report on what was learned during the exercise (in pairs or 3's); based on observations, begin to trace the impact of a tree planting program, using the human ecology model.

B. Agroforestry Classification Systems (Forester)

Focusing on classifications by configurations

Hand-out: Nair, P.K.R. 1985. Classification of agroforestry systems

C. Pakistani Agroforestry Systems (Forester)

Participants will be asked to discuss in small groups the agroforestry systems they are familiar with in Pakistan and to report to the class.

Assigned Reading: Gender analysis case study from Kenya

Thursday, November 14, 1991

A. Continue Pakistani Agroforestry Systems (Forester)

B. Gender Analysis Case Study Discussion

View "Gender Analysis: Strenthening Winrock Projects", a 12.5-minute video produced by Winrock Intl.

C. Gender Considerations in Pakistan

Ms. Mamoona Wali, Pakistani Forester, will assist.

Assigned Reading: Evans, Patrick T. 1988. "Agroforestry in Paraguay". Women in Natural Resources 9(2):29-34. (Article presents adoption-diffusion principles and their application to extension forestry work in Paraguay.)

Friday, November 15, 1991

No class

Saturday, November 16, 1991

A. Adoption-Diffusion of Innovations (Force)

Theory; Principles; Designing farm forestry innovations.

B. Developing Social Surveys

Participants will develop a survey to be done in the field two days later which is focused around who (gender) uses (and has tenure to) what forest products. Goal will also be to identify what products/species that extension foresters might introduce to farmers would be most likely to be adopted by male and female farmers.

C. Discussion of Analysis of Survey Data (Force)

Sunday, November 17, 1991

A. Communication Strategies

Exercises on communication skills will be conducted

B. Role-playing interviews, including videotaping the role-play

C. Finalize survey after the pre-testing during role play

Monday, November 18, 1991

Conduct survey in field

Participants will work in pairs in nearby villages; each pair will interview about 10 farmers

Homework: Summarize/analyze survey data

Tuesday, November 19, 1991

A. Report results of village survey

Make recommendations for species to introduce or products needed by villagers and propose farm forestry alternatives to meet villagers' needs

B. Financial analysis of agroforestry alternatives for farmers (Force)

Wednesday, November 20, 1991

A. Multi-attribute decision-making models (Force)

B. Open Session - will be scheduled later depending on participants' needs and unfinished topics.

Thursday, November 21, 1991

A. Summarize concepts learned during the workshop.

What is working? What isn't? How can this training help improve forestry activities in Pakistan?

B. Developing a personal action plan for the next month and next year; closure exercise for content presented during workshop.

C. Closing ceremony

Course Evaluation
Presentation of Certificates

PLANNING PROCESS

PLANNING PROCESS

Rationale

Planning in the simplest sense is nothing more than taking systematic steps to accomplish purposeful actions in a defined situation. The process of planning takes place in a political setting and must address economic, social and environmental realities. Focusing on planning as a process shifts attention from techniques or single steps often associated with planning (such as population projection, mapping, modeling, etc.) to the social change element of planning. In most societies viewing planning as a social change process requires that planners work as partners with the local people whose lives will be most affected by the plans.

Objectives

Participants will be able to:

1. Define planning and land use planning using terminology commonly used by planning professionals.

2. Compare and contrast synoptic, incremental, and transactive approaches to planning.

3. Become familiar with the theory and application of ICRAF's Diagnosis and Design.

4. Recognize the importance of land and tree tenure considerations in land use planning and social forestry projects.

5. Write measurable objectives for farm forestry activities.

6. Identify the role of different people -- farmers, extensionists, managers, etc. -- in participatory land use diagnosis.

7. Critically evaluate social forestry activities in Pakistan with regard to planning and people's participation.

8. Understand and apply the concepts underlying multiattribute decision-making models to land use planning situations.

DEFINITIONS FOR PLANNERS

Synoptic Planning

Synoptic planning as a theory has dominated planning practices in the Western world and in development planning assistance programs. It is also referred to as **comprehensive** or **rational**. Synoptic planning has four main elements: goal-setting, identification of alternatives, evaluation of the means against the ends, and implementing the decisions. It encompasses conceptually and analytically as many factors as possible. It focuses on technical relationships. There is a major emphasis on producing "plans."

Incremental Planning

Incremental planning as a theory is based on the idea that no major changes will be accepted by society. Plans are constructed by a mixture of "intuition, experience, rules of thumb." It is often called the "science of muddling through." It also recognizes the decision-makers' propensity to "satisfice" choices rather than seek "optimal" solutions.

Transactive Planning

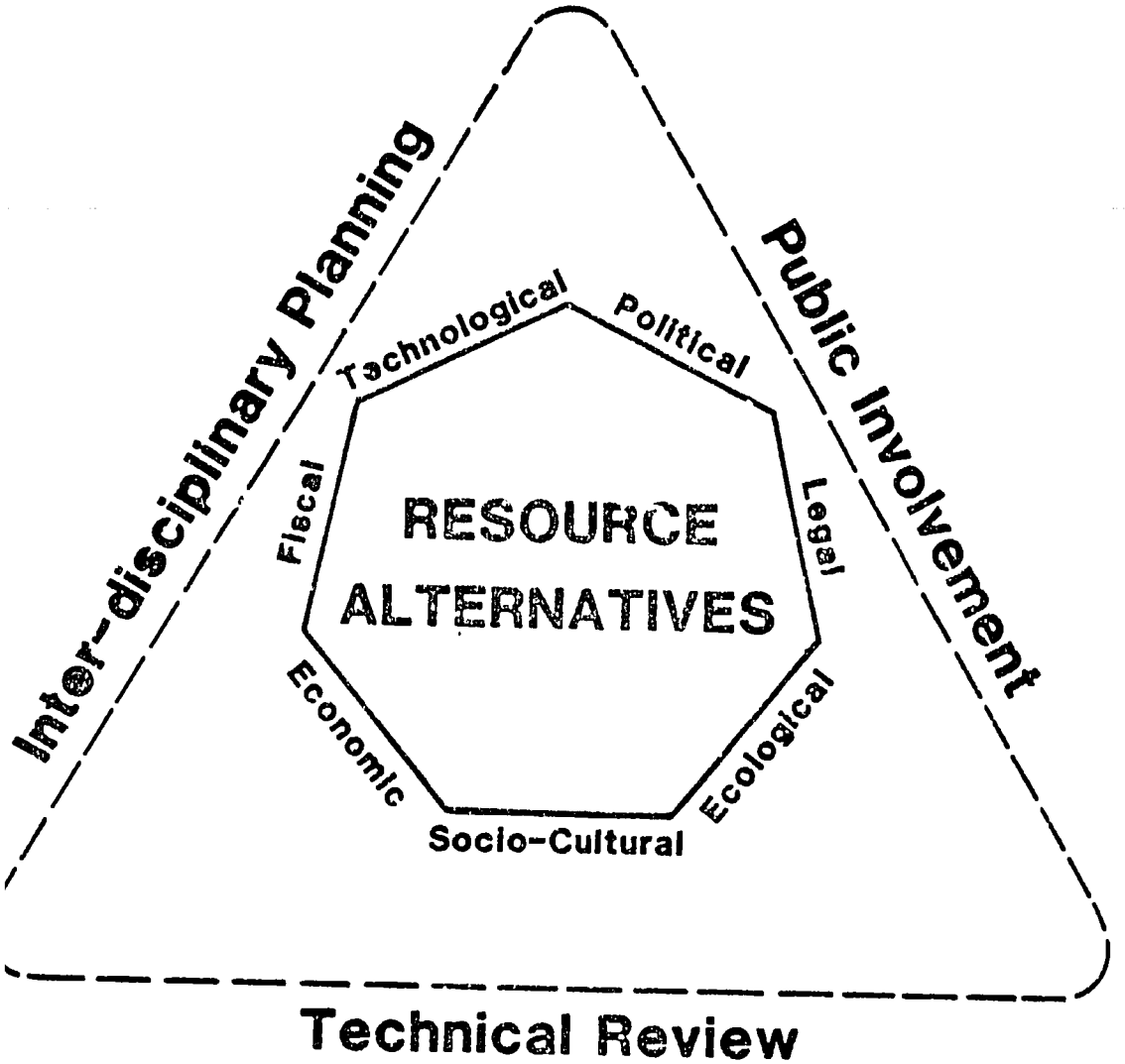
Transactive planning theory is based on the idea that planning should involve face-to-face contact with the people who will be affected by decisions. Planning should be a process of dialogue and mutual learning -- by both planners and local people. The emphasis is on the process of personal and organizational development, rather than on a specific "plan" or "targets" to be met.

Land Use Planning

(From the Society of American Foresters): Land use planning is the process of determining optimal use in terms of land capabilities, people's wants and needs, and factors such as market forces, landownership, and uses of related lands. The process is continuous because these capabilities, needs, and factors are dynamic and often bring about shifts in optimal use over time.

(From Man, Land and the Forest Environment by Marion Clawson): Land use planning is a form of social engineering . . . Land use planning and social control over private land is a political process.

(From Forest Resource Management: Decision-Making Principles and Cases by Duerr et al. 1979): A land use plan depicts the way land may be allocated during a future period and explains the objectives sought, the expected flow of services, the projects needed to implement the plan, the costs and benefits, and other matters, including an environmental impact analyses, especially when required by law.



Planning Considerations and Constraints

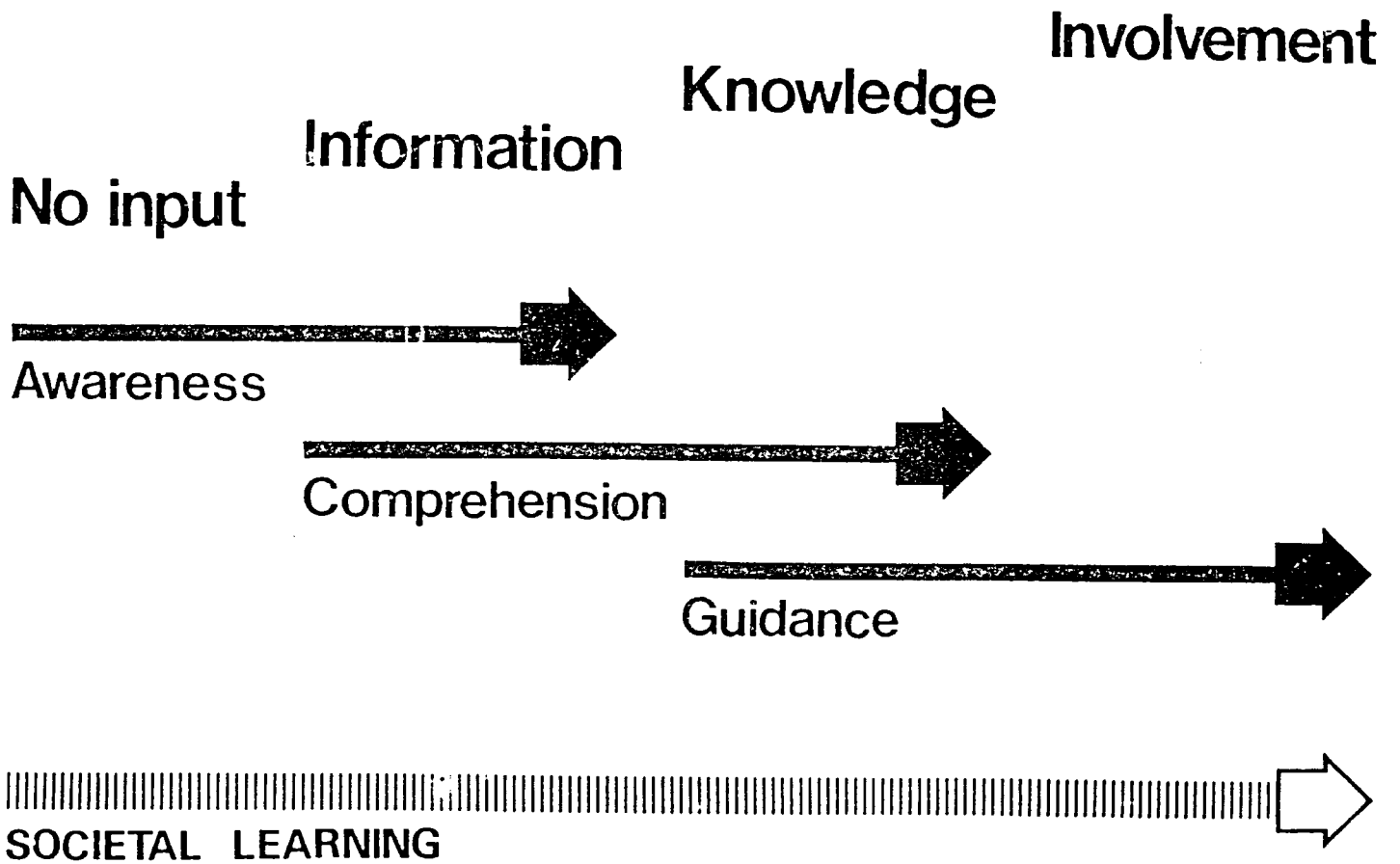
Adapted from: Gospel-Hump Wilderness Study
and Land Management Plan
Report No. USDA-FES (Adm) R1(17)78-4

NATIONAL FOREST MANAGEMENT ACT 1976 (NFMA)

NFMA Regional and Forest Planning Process

A 10 Step Process

1. Identify issues, concerns and opportunities.
2. Prepare planning criteria.
3. Collect inventory data and information.
4. Analyze the management situation.
5. Formulate alternatives.
6. Estimate the effects of alternatives.
7. Evaluate alternatives.
8. Select an alternative.
9. Implement the plan.
10. Monitor and evaluate the plan.


Involvement
Knowledge
Information
No input
Awareness
Comprehension
Guidance
SOCIETAL LEARNING

DIAGNOSIS & DESIGN (D&D)

Purpose: To assess the performance of land-use systems and identify constraints that prevent it from working to its maximum potential. Then to design appropriate technologies to overcome those constraints that are socially adoptable.

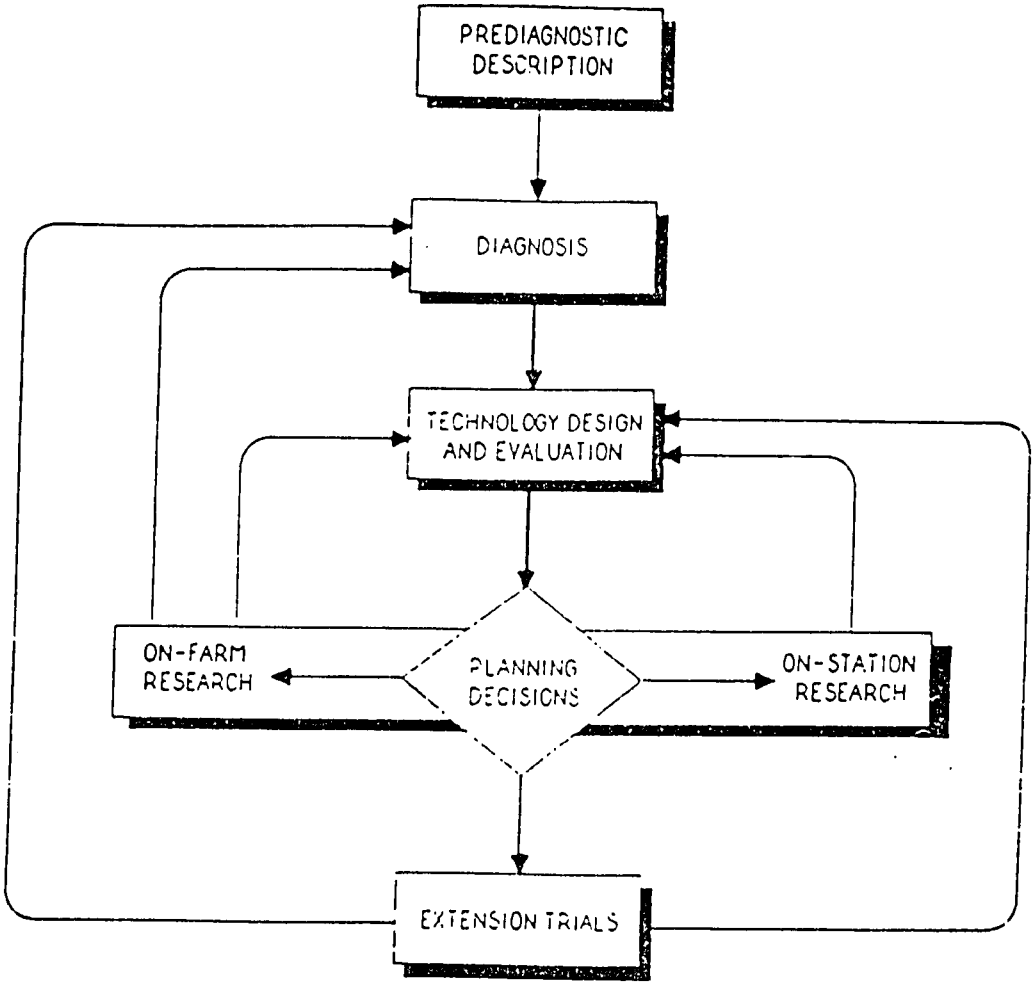


Figure 3.1 Components of project design incorporating the iterative process of diagnosis and design. Note feedback linkages.

Source: Raintree, J. B. 1990. Theory and practice of agroforestry diagnosis and design. Pages 58-97 in K.G. MacDicken and N.T. Vergara, editors. Agroforestry classification and management. John Wiley & Sons, New York. (Page 68)

TABLE 3.2 Basic D&D Procedures for Project Planning and Implementation: Level I

Basic Questions to Answer	Key Factors to Consider	Mode of Inquiry
	Prediagnostic Stage	
Definition of the land use system and site selection (Which system should one focus on?)	Distinctive combinations of resources, technology, and land user objectives	Seeing and comparing the different land use systems
How the system works (What are the output subsystems, and how does it function to achieve its objectives?)	Production objectives and strategies, arrangement of components	Analyzing and describing the system
	Diagnostic Stage	
How well the system works (What are its problems, limiting constraints, problem-generating syndromes, and leverage points for technological intervention?)	Problems in meeting system objectives (production shortfalls, sustainability problems) Causal factors, constraints, and intervention points	Diagnostic interviews and direct field observations Troubleshooting the problem subsystems
	Technology Design and Evaluation Stage	
How to improve the system (What is needed to improve system performance?)	Specifications for problem solving or performance-enhancing interventions	Iterative design and evaluation of alternatives
	Project Planning Stage	
What to do to develop and disseminate the improved system	Research and development needs, extension needs	Research design, project planning
	Project Implementation Stage	
How to adjust the plan of action to new information from research activities	Feedback from on-station research, on-farm trials, and special studies	Rediagnosis and redesign in light of new information

Source. Kaintree, J. B. 1990. Theory and practice of agroforestry diagnosis and design. Pages 58-97 in K.G. MacDicken and N.T. Vergara, editors. Agroforestry classification and management. John Wiley & Sons, New York. (Page 67)

GOAL

Broad, general statement of purpose.

Usually unquantifiable .

Usually no specific date by which it is to be completed.

OBJECTIVE

Clear, specific statement of planned results to be achieved within a stated time period.

Should have four elements.

1. What is to be accomplished.

2. The time period within which the expected outcome is to be achieved.

3. What are the measurement factors so it can be verified that the objective was achieved.

4. Who is responsible for achieving the desired results.

Appendix 6.1 Checklist for Preparing Social Forestry Programs and Projects

Data required	Probable sources of information: Country, state, district	Probable sources of information: Project area	Comments
Extent, topography, and climate of project area			
• General description		x	Should include brief description of the area including slope, soil fertility, erosion intensity, communications systems, lakes and rivers, in sufficient detail to permit conclusions on agricultural and forestry potential and constraints.
• Altitude		x	
• Slope		x	
• Soil types		x	
• Nutritional status		x	
• Soil depth		x	
• Geomorphy		x	
• Rainfall		x	
• Rainfall distribution		x	
• Rainfall intensity		x	
• Temperature		x	
• Temperature distribution		x	
• Water resources		x	
• Groundwater level		x	
Demographic data			
• Population	x	x	
• Sex ratio		x	
• Population growth rate	x	x	
• Ethnic configuration		x	
• Income distribution	x		
• Land distribution		x	
• Sociological survey		x	Specific information relating to the habits and attitudes of people likely to affect the planning and implementation of the proposed program or project.
• Surveyed number of farmers interested in farm forestry		x	Availability and cost of labor depends on the nature of work opportunities. A record of their variations is important, since forestry work typically coincides with the agricultural cropping season and therefore often results in seasonal labor storage.
• Labor availability		x	
• Labor profile		x	
Environmental status			
• Areas of special interest		x	Much of the information under this heading would have to be qualitative rather than quantitative. Rather than burden the planning document with extensive texts, reference can be made to annexes or relevant supporting documents
• Existing reserves:	x		
area		x	
main purpose		x	
present status		x	
• Flood conditions	x		
• Desert encroachment	x		
• Air pollution condition	x		
• Present use of pesticides		x	
• Status of biological cover on the land		x	
• Status of pollution in lakes and rivers	x		
Land use and production data on agriculture			
• Area of land under different crops	x	x	The level of detail for information on agricultural activities will depend on the degree of interdependence with the forestry crops. In a project where the technical solution of the
• Farm sizes		x	
• Land tenure		x	

Appendix 6.1 (continued)

Data required	*Probable sources of information*		*Comments*
	Country, state, district	*Project area*	
• Degree on dependence of population on land-based income of subsistence		x	land-use problem is likely to be a highly integrated system, such as in hill watershed, desert encroachment, and marginal land development schemes, this type of information must be provided in sufficient detail. In other cases, e g , projects limited to wood energy production, a general description of the country, state, or district might suffice.
• Production and productivity of different crops		x	
• Livestock			From existing livestock census or if required from census carried out specially for the planning.
- Number of cows		x	
- Bullocks		x	
- Sheep		x	
- Camels, etc.		x	
- Consumption per livestock unit of grass		x	
- Tree fodder		x	
- Other		x	
- Availability of animal health		x	
Data on forest production			
• Forest types	x		General description avoiding too much detail and Latin names, but concentrating on the state of the forest and its potential. Caution is needed to define the different categories clearly and meaningfully. Private land must be included as well as government land.
Area of forest			
- natural	x	x	
- planted	x	x	
- broadleaved	x	x	
- conifers	x	x	
• Species distribution	x	x	
• Yield in m^3/ha/yr for natural and planted forest by species and type of land	x	x	
• Densities of natural and planted forest			Some of this information could be provided through remote sensing; either aerial survey or satellite pictures.
• Age distribution of natural and planted forests			
Total standing volume	x	x	These figures are not always readily available, but are vitally important. Therefore, if not available, assumptions for estimations should be given.
• lumber size			
• small lumber size			
• other			
Total annual increment			Data on governmental forests are sometimes available, but the production estimates are often based on old forest management systems rather than on actual production. Production on private land is even more difficult to assess. Estimates based on remote sensing is one possibility, another way is to survey number and/or area of private trees combined with an assessment through random sampling of standing volume and annual yield.
• m^3 or ton/yr			
	x	x	
	x		
	x		
Consumption of forest products			
• Fuelwood of which is from:	x	x	Avoid obvious survey mistakes, such as estimating consumption for one specific season only or accepting quantification by the surveyed persons without control.
- stemwood	x	x	
- branches			
- twigs			

Appendix 6.1 (continued)

Data required	Probable sources of information: Country, state, district	Probable sources of information: Project area	Comments
• Fuelwood as share of total household energy	x	x	
• Pulpwood	x	x	
• Small timber	x	x	
• Poles	x	x	
• Timber	x	x	
• Total wood consumption in M ton or Mm3	x		
• Wood-using industries	x		
• Number in different categories	x		
• Capacities in different categories	x		
• Output in different categories	x		
Wood production/ consumption balance	x	x	This information would be used to detemine investment requirements to meet demand for products. Balance figures could be used to identify priority areas, i.e., where the gap between production and consumption is the greatest and therefore where the need for development is the greatest and at the same time the response from the local population is likely to be the greatest.
Earlier forestry experience			
• Data on survival			Summarize information available from monitoring and evaluation of ongoing or completed projects. Attach any special studies on subjects such as yields and developmental impact.
• Spacing			
• Production			
• Area covered			
• Labor requirement			
• Costs			
• Environmental impact			
Costs and Prices			
Unit costs			
• Labor			
• Equipment	x		This information could be provided as part of the cost tables.
• Land	x		
• Buildings	x		
Unit prices			
• Fuelwood	x		
• Poles	x		
• Small timber	x		
• Pulpwood	x		
• Timber	x		
• Sawn timber	x		
Institutional arrangements			
• Organization chart of implementing agency	x	x	
• Job description	x	x	Refer to existing documentation.

Appendix 6.1 (continued)

Data required	Probable sources of information: Country, state, district	Probable sources of information: Project area	Comments
• Staff list with number, level, and salaries • Links between the implementing agency and other agencies responsible for related activities (irrigation, animal husbandry, tribal welfare, NGOs, etc.)			

Source: Gregersen, Hans, Sydney Draper and Dieter Elz. 1989. People and Trees: The Role of Social Forestry in Sustainable Development. EDI Seminar Series. Washington, D. C.: The World Bank. Pg. 115-118

TECHNICAL REPORT NO. 1

AGROFORESTRY CONSORTIUM
Washington State University

THE IMPORTANCE OF LAND AND TREE TENURE IN AGROFORESTRY

By

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PERSPECTIVES IN AGROFORESTRY
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October 6, 1987

THE IMPORTANCE OF LAND AND TREE TENURE IN AGROFORESTRY

Louise Fortmann

Agroforestry is the latest rage in rural development circles. It has been suggested that it can simultaneously solve problems as wide ranging as erosion, animal and human nutrition, and the fuelwood crisis. And indeed, although agroforestry shows no promise either of curing the common cold or of improving our children's table manners, it is clear that in *some* places it can offer solutions to *some* problems. The very fact that agroforestry systems have been in place for thousands of years leads us to the conclusion that the people who practice agroforestry must be on to something.

However, agroforestry raises one problem of its own: where are we going to put it? This is a substantially different problem from the same question raised about annual crops. Annual crops are here today and gone next year. But planting trees involves a much longer commitment of the land and this not only creates opportunity costs it raises questions of property rights. In Western law trees are considered "fixtures" or "permanently affixed" on the land and therefore belong to the owner of the land. In other societies, however, the system of tree tenure may be quite separate from the system of land tenure. Hence agroforestry may raise questions of who owns the land once a tree is planted on it as well as who may use the tree itself.

I'd like to make a brief aside here and note that a separate system of tree tenure is not as foreign to our society as one might think. Anyone who is familiar with the phrase "windfall profits" has a dim awareness that at one time in European and American societies fruit which fell to the ground was common property, not the property of the owner of the tree or the owner of the land.

Without trees, there is no agroforestry, therefore I am going to concentrate only on the trees and land in agroforestry. In the time we have before us I would like to make the following arguments: First: it is impossible to design a successful agroforestry project without a careful consideration of land tenure and tree tenure: and second: even a project that is successful in the sense of getting agroforestry systems onto the ground can be a disaster from the tenure viewpoint.

In order to make these points, I would like to explore three questions with you:

a) What are the elements of tree tenure systems?
b) How are land tenure, tree tenure and tree planting interrelated?
c) What effects might agroforestry projects have on property rights?

What are the elements of tree tenure systems?

The metaphor traditionally used to describe land tenure systems is a bundle of sticks. Each stick represents a different right- for example, the right to sell the land. It is rare that all these sticks are held by a single person. Rather different people (including the State in its role as a fictitious individual) tend to hold different sticks at different times. Or one stick may be broken up and given to several people to hold at one time. This same metaphor can be equally applied to tree tenure.

For example, suppose we have an oak tree standing in the middle of a village green. It may be that everyone in the village has the right to gather the acorns that fall from that tree (one stick broken up and held by several people). The State has the right to trim any branches that endanger electrical wires but no one else may remove branches (the state and

only the state holds that stick) and the planter of the tree and her heir may sell the tree (a stick is transferred from one person to another over time).
There are five kinds of sticks in the bundle that comprises tree tenure.

1) The right to own trees
2) The right to plant trees
   This is particularly important, a point we shall return to in more detail later.
3) The right to dispose of trees
   This includes:
   - the right to destroy trees by uprooting them or chopping them down
   - the right to lend
   - the right to lease, mortgage or pledge-cocoa trees in West Africa
   - and the right to sell.
4) The right of inheritance
5) The right to use
   This includes:
   - gathering rights such as gathering dead branches, gathering things growing on the tree such as fungus or insects or gathering tree products from under the tree such as pine needles or fallen fruit, the old familiar windfall.
   - the use of the standing tree such as hanging honey barrels in it
   - cutting part or all of a living tree
   - harvesting produce- such as fruit or leaves from the branches.

So while there are only five kinds of sticks in our bundle, there may be many sticks of each kind and all of this can add up to very complicated property arrangements. For example, due to the Islamic rules of inheritance, palm trees in the Sudan may be owned by a large number of heirs. Or in Nigeria, women traditionally had rights over the kernels of palm trees but not the oil, which belonged to men.

This then raises the question of who holds what rights. Just as with land, tree rights can be held by different aggregations of people:

Individuals

In parts of Nigeria the umbilical cord of a new baby was planted under a tree making the baby the owner of that tree

Households

In parts of Indonesia, the household is the unit of rubber tree ownership

Residents of a geographically defined area (communities)

Communities may own and manage forests or trees on the commons. Indeed, in Nepal one of the most serious ecological mistakes ever made by the government was to remove forests from the control of communities and make them government property. Customary law in west Africa distinguished between members of the community and "strangers". As early as 1901 the colonial courts upheld the right of a community to forbid strangers to harvest wild palm trees.

Non-kin aggregations

In some villages in Botswana, certain easily reached areas were reserved for wood gathering by old women.

Non-kin groups such as corporations

Multinational corporations may buy the timber rights to forests without buying the land. This is just as true in the United States as it is in Indonesia. In the United States private companies buy the rights to harvest timber on national forests, but those rights do not give them any right to the land.

The State

We are all familiar with state and national forest land here in the United States. Forests in developing countries were held by many traditional rulers and more recently by colonial and post Independence governments.

It would seem a fairly straight-forward proposition to determine what rights are included in the tree tenure system of a particular area and then to find out who holds them. However, the question of who holds what rights can be complicated by a number of factors.

Differences between statutory and customary law.

The State may declare itself the owner of all trees or may give rights to harvest trees to commercial timber companies. But local individuals or local communities may under customary law hold rights to those same trees. Such conflicts often seem to involve marginal or minority people- the tribals in India, the Dayaks in Indonesia, the Indians of Amazonia and so on. Thus, in 1981 the Government of India was involved in passing a forest bill which observers said would result in the dispossession of tribals. The government of Indonesia sold timber rights on East Kalimantan to Weyerhauser and other multinational timber companies even though the land on which the trees were growing was part of land which the Dayaks had held for millennia and which they used as part of an extensive shifting cultivation system.

So the answer to "who has what right to this tree" will often differ depending on whether you ask an indigenous resident or a government official. Let me give you an example. In the midst of government-owned forests in the foothills of the Himalayas in India, there are many villages. The villagers depend on tree products for their livelihood. They chop foliage for fodder, collect firewood, and use poles for construction. To obtain these products they use and manage the forests which are officially owned by the government. Within each village, individual households control the forest around their own buildings. Thus, there is no question about who are the *de facto* owners and managers, regardless of what the statutory situation may be.

There is a clear warning here. While the government clearly has the statutory right to allocate your project a piece of land, that will not prevent local people who consider it their land from being annoyed by your activities. Whatever statutory law may say, the person with the axe, match or goat controls the fate of your project. It is useful, indeed essential, to find out how that person/people defines the land and tree tenure systems.

Is the tree wild or planted?

A wild tree and its produce are often common property, but it may also be the property of the owner of the land, or the property of whoever invests labor in obtaining the produce. For example, among North American Indians, maple trees belonged to the person who tapped them; a rule based on the investment of labor. Among the Tonga of Zambia anyone could pick wild fruit even from trees growing in peoples' gardens; common property. But among the Barotse in the same country no one could pick wild fruit if it was growing inside a garden; it belonged to the owner of the land.

A planted tree and its produce are generally either the property of the planter or the owner of the land. This distinction is crucial as we shall see: In present day China, a tree belongs to its planter. Tenancy reform in India included protecting the rights of tenants who had planted trees to the usufruct of those trees or compensation. Customary law among the Fanti of Ghana did not permit a landowner to be improved out of his land. Therefore, the landowner had rights over any tree planted by a tenant.

What right is involved?

Certain rights may be absolute. For example, in Korea fuelwood may be collected from all trees even if they are planted trees growing on private land. Subsistence and commercial rights are often differentiated with the former being favored.

That is, people often may gather or cut fuelwood for personal use in a wide variety of places but may gather or cut it for sale only on their own land and/or from their own trees.

A wonderful U.S. example of this comes from an article by Homer Aschmann on fruit stealing by small boys and girls in Southern California in the 1930's. The children had very clear rules about what you could and could not steal. It was quite all right to swipe fruit that was never sold. But commercial species were quite literally, forbidden fruit.

Special considerations

Religious beliefs may both create or revoke rights. In Nepal, everyone including adults could pick fruit from private trees on the festival celebrating the day when the Lord Krishna stole fruit as a young boy. This tended to interfere with the growth of an indigenous citrus industry. In many parts of the world individual sacred trees or sacred groves have been protected and have been an important way of preserving genetic diversity.

By now it should be clear that tree tenure can be extraordinarily complicated and can have considerable effects on an agroforestry project. If you are hoping, for example, to persuade people to alley-crop coppicing trees for fuel, it would be useful to know who will have the right to collect the wood- the planter, the land owner, or everyone in the community?

If it is the land owner, he or she will have an incentive to plant. If it is the planter, then landowners will have an incentive to prevent others from planting on their land. If it will be a common good, then no one has a particular incentive to plant individually and considerable effort to organize cooperative action will be required if planting is to happen.

Let me give you an example of how important this can be. I recently got a letter from a Peace Corps forester in the Gambia. She wrote:

> When I arrived at my posting, there was an orchard/garden project already underway...It provided for the distribution of fence-posts, barbed-wire, a well and fruit tree seedlings. To ensure that the trees would be watered and weeded, the project stipulated that women should be encouraged to grow their vegetables beneath the trees. Therefore, to establish the orchard/gardens, I dealt mainly with women's groups. The project, however, did not specify who (men or women) were to plant the tree seedlings. My counterpart and even the women themselves assumed that the men were to plant the mangos and cashews; the women never before having planted seedlings from polypots. I ascertained from discussion that if the men planted the trees, tree ownership would be theirs. This seemed like an unfair outcome to men since the women would be doing all the work of watering and weedings. So I proceeded to teach the women how to transplant. Thereafter, they enthusiastically planted the trees themselves.

While there is no direct evidence in this letter, I would be willing to speculate that participation by women was higher when they controlled the products of the entire system, not just the vegetables. But we have just brushed the surface of complications. Now we must add the even more complicating factor of land tenure and ask the question

How are land tenure, tree tenure and tree planting interrelated?

I have already mentioned that the right to use a given tree might belong to either the planter or the owner of the land Now I would like to explore the implications of this a bit further.

One of the things which makes tree planting so contentious in addition to the fact that it ties up the land for a long time is that various manipulations of trees can affect one's title to the land In some systems, cutting down trees creates tenure-if you clear the land, the land is yours. This is consistent with the principle found both in western and non-western theories of property that people are entitled to the fruits of their labor. Labor, in this case, creates a property right. (Elizabeth Colson has observed that the colonial Officers who enunciated this principle for so many African systems may simply have been applying their own theories to the situation. So we may be hearing the wisdom of African peoples. But we may also be hearing the echoes of John Locke or, on other aspects of tenure, Edmund Burke.)

If establishing property rights requires cutting down trees, we are unlikely to find much enthusiasm for planting trees which rather takes the wind out of the sails of an agroforestry project. But another way of establishing rights to land is to plant trees on it. This can be both an advantage and a disadvantage in agroforestry projects. In can be an advantage if people see this as a way of establishing clear title to their land.

For example, the World Bank thought it was implementing a remarkably successful reforestation project in Pakistan. But when a sociologist went out to look at the project to see if it could be replicated elsewhere, he discovered that the project was in fact a monumental land grab by the rich who were planting trees on what had once been common land thereby securing their title to the land. Perhaps this will teach the Bank never to send out a design team without a sociologist, but I doubt it.

Another example comes from Bong County Liberia. Peasants planted project-supplied coffee and cocoa tree in unprecedented numbers, in part because it would very clearly establish their use of the land (which technically was owned by the government) and prevent the government from selling it to speculators from Monrovia.

A third example comes from Costa Rica where squatters do their level best to plant peach trees on the land. In this case, the tree but not the land belongs to the planter. However, the costs of compensating the planter for the trees tend to discourage the land owner from evicting him/her.

There is, of course, a flip side to this coin. And that is that land owners will do *their* level best to prevent others from claiming their land by planting trees. Thus, under customary law in many places there are rules forbidding tree planting by people with temporary rights to the land such as borrowers, lessees, tenants and so on.

Similarly under some systems, most notably in Africa, women are forbidden to plant trees least they become empowered by obtaining land in their own right through this route. The rationale for preventing women from planting trees may be hidden behind myths such as any house built from a tree planted by a woman will fall down or if a woman plants a tree, her husband will die.

There is an obvious problem here. If large numbers of farmers are women (as they definitely will be in Africa) or people with temporary claims to the land such as are common in South Asia and Latin America, they may not be able to practice agroforestry because they are not allowed to plant trees. The landless, of course, have no place at all to plant trees.

There are ways around this. For example, the definition of tree is a social as well as a biological concept. Not all plants which botanists consider to be trees are so defined by the local social system. For example, California foresters have traditionally considered the mighty oak to be a weed, not a tree. Similarly, women may plant certain fuelwood species in some parts of Kenya because they are not defined as trees So in cases where

there are strict rules about tree planting, it is probably wise to incorporate only species which are not locally defined as trees.

Another possibility is to make state land available for tree planting. For example, in India individuals have been allowed to plant trees along roads, canals and railways and to retain the usufruct for themselves. Or the state may make available common lands its owns. This causes additional difficulties as we shall see in a minute.

A final problem associated with the creation of tenure by tree planting is that tree planting (including agroforestry) programmes initiated by the State may be perceived as land grabs by the government. There have certainly been enough seizures of land by the State or by government officials and their cronies to make peasants justifiably wary. In such a situation, the prudent peasant will plant the trees he or she has been given upside down or forget to keep his/her goats penned. The damage which can be wrought by a single marauding goat is a wonder to behold. Whatever the tool used, the point is to ensure that the trees do not survive so the state cannot grab the land.

Another aspect of tree tenure which can adversely affect tree planting is over-zealous government protection of trees. Some governments try to protect the nation's trees by enacting very stringent legislation about tree cutting, turning foresters into tree cops. This seems to be particularly associated with francophone Africa, Central and South America, and the Caribbean. At the extreme all trees may be nationalized as was done in Burkina Faso. While this has a certain hard-nosed appeal, it has the effect of bringing all tree planting to a screeching halt. There is no point in planting a tree if you cannot use it and if you are in danger of having a government forester demand a fine or bribe from you should something happen to the tree. Indeed, in some places peasants are vigilant to destroy any volunteers of valuable tree species on their land. For if they are allowed to mature, government concessionaires may come in to harvest them, destroying the peasant's crops and other property in the process.

A recent outstandingly effective agroforestry project in Haiti which resulted in the planting of 20 million trees in the ground succeeded in part because it faced this issue head on, assigning clear title of the trees to the planters who could use the trees as they wished when they wished without having to obtain permission from the government.

If agroforestry takes the form of taungya (in which in return for caring for the seedlings peasants are allowed to farm in tree plantations until the canopy closes) the wise peasant will ensure there is a high mortality rate among the seedlings in order to retain the use of the land.

A final aspect of land tenure which can reduce the likelihood of success of an agroforestry project is fragmentation. If land is held in extremely small parcels, it may be impossible for a farmer to devote any land to the cultivation of trees. Such fragmentation may be the result of population pressure or of highly inequitable land distribution as occurs in much of Latin America.

Suppose despite all these complications, we actually manage to get an agroforestry project into the ground. We still have to answer the question:

What effects might an agroforestry project have on property rights?

As I have already suggested, agroforestry projects may have the effect of making property rights more secure through tree planting. This can take the form of a land grab by the rich as in the Pakistan case or it can make the rights of the poor more stable as in the Costa Rican case.

Agroforestry can also have the effect of reducing the security of property rights or eliminating them altogether. As we have already seen, the sticks which comprise the bundle of rights that is tree tenure can be held by different people at different times or may be shared by the different people at the same time. Thus, it is very important to work through the list of rights I have presented determining who holds what rights when. The

"when" is important, because some rights may be emergency rights only. Just as the loss of emergency drought pastures has hurt both pastoralistists and the environment they could use, so could the loss of emergency tree rights have detrimental effects on other rural people, particularly the poor.

People may lose property rights because of where the agroforestry project is located. For example, land which has traditionally been used by borrowers, sharecroppers, or tenants may be put under trees because that is now a more economic use. This has been identified as a problem in India. Similarly, if the State decides to allocate its marginal lands to the landless for agroforestry, people (including the landless) who have used this land for grazing and gathering may be dispossessed. In this regard, a good rule of thumb is to look all "unused land" in the mouth. Truly unutilized land is a rare commodity. Land that appears to be unutilized is often part of some system of rotating land use which will be detrimentally affected by the loss of any of its constituent parts.

Even if a household does not lose property rights, individual members within a household may suffer. For example, in parts of Nigeria women plant their food crops between the rows of the men's crops. The introduction of alley-cropping into this farming system has the effect of dispossessing the women of their land without, it must be noted, relieving them of the responsibility to provide the family with food.

A second effect of agroforestry is that is may drive the land tenure system towards privatization. Cultivating commercial tree crops has been observed to result in the privatization of communal land in both Latin America and Africa. The process of privatizing communal land has been observed in Kenya to have at least four negative effects:

1) people in general, but the poor in particular, lose gathering rights
2) women lose their traditional usufructuary rights
3) production which requires access to particular kinds of scarce trees drops off - in this case, honey production, which requires access to honey trees
4) certain features of the communal landscape such as sacred groves are destroyed because no private individual can afford to commit so much of his/her land to this purpose.

As I have already mentioned, sacred groves have been shown to preserve genetic diversity and to serve as a means of preventing erosion and other forms of ecological degradation. Such a common good, serving a common purpose most easily exists on common land.

So what does all of this mean?

Well, obviously it means that it is absolutely essential to investigate the existing systems of land and tree tenure before plunging into an agroforestry project. Not to do so is to risk at least 6 adverse effects:

1) Excluding individuals or groups who lack the requisite land or tree rights from the project. These individuals and groups are most likely to be women, youth, marginal groups (pastoralists, ethnic minorities), the landless and those with only temporary claims to the land.
2) A related problem is skewing benefits to the rich because only they have the land on which to plant trees.
3) Destroying existing use rights. This is particularly a problem with common land which may have been used for grazing or gathering. It can also be a problem if certain commodities- fuelwood, for example- which previously have been a common subsistence good suddenly assume a commercial value. In such cases usufructuary rights may be withdrawn. Similarly, if agroforestry is profitable, landowners may evict tenants, so that the result of the project is dispossession.

4) Having large areas of land excluded from the project because the owners are unwilling to allow others to plant trees on it.
5) Experiencing a high mortality rate among the trees because they are seen as government (or agency) land grabbing attempts.
6) Trying to solve a social problem with a technical solution.

I have noted that there are situations in which agroforestry is simply unadoptable- for example, where land holdings are so fragmented that the plots are too small to allow tree planting. But it is exactly in such circumstances that agroforestry has come to be viewed as attractive by some governments. An agroforestry system can be attractive because it may allow otherwise marginal land to be brought under arable production and because in a relatively small space it can meet more needs than can monoculture of trees or crops.

However, the reason that marginal land needs to be brought under production or that peasant families must meet their subsistence needs from minute plots of ground may be a highly inequitable land distribution. In such cases tinkering with agroforestry may be an inappropriate response to the problem.

Land and tree tenure, then, are institutions which affect the results of an agroforestry project including whether it will begin at all. More than one project has already foundered on the shoals of an inadequate understanding of land and/or tree tenure. The more common errors include:

1) not thinking about land and tree tenure at all
2) assuming that land and tree tenure are identical
3) assuming that western freehold property rights constitute the only viable form of property
4) assuming that the tenure system last described by an anthropologist or colonial officer in 1927 still exists.

In the end, we have to remember that systems of land tenure reflect the encompassing society and the distribution of power in that society so that what we do in terms of agroforestry, although we may think of it as a politically neutral technology, is rarely neutral in fact.

We need also to remember that land and tree tenure systems change as do all other forms of social organization. Since that is the case, the best and last piece of advice I can give you in closing is- if you want to do agroforestry, never leave home without a rural sociologist.

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SOCIAL FORESTRY NETWORK

BEYOND COMMUNITY WOODLOTS: PROGRAMMES WITH PARTICIPATION

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BEYOND COMMUNITY WOODLOTS: PROGRAMMES WITH PARTICIPATION

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THE SOCIAL PREMISES OF REFORESTATION PROGRAMMES

The 'social' in social forestry should be understood to signify a broader meaning than individual behavioural change alone: it includes collective action, institutional development, and the establishment of enduring social structures and value systems that activate and organize individual actors.

Collective actions have the highest chance to occur and be effective when people belong to organized groups, when they are informed and consciously perceive that it is in their best interests to act purposively in a coordinated manner. Performance of these groups will also improve when the group has developed leadership structures and internal norms and procedures capable of organising and managing its members and to overcome conflicts and deviant behaviour. The common position of many people as direct users of a certain resource is a propitious social condition that often turns itself spontaneously, and can certainly be turned deliberately, into a powerful motivating and organizing force for producing the needed resource. The deliberate construction of user groups is therefore particularly important for using and husbanding a common pool resource in programmes such as afforestation or irrigation which depend on sustained, long-term consensual action of a large number of individual actors.

When an innovative programme is deliberately pursued, central among the social prerequisites for success is a unit of social organisation capable of sustaining that programme. Therefore, social forestry projects must start with the identification (or the establishment) of such a viable unit or group; aim to engage the rural users of forest products in patterns of collective action for producing the products they need; tend to ensure a match between the silvicultural technologies they promote and the social groups they address; and deal with the issues of social engineering (group formation, leadership,

participation in decision-making, intra-group structures, incentives, penalties, communication, benefit distribution, and so on) with the same scrupulous attention as is given to the technical or financial elements of the strategy.

Unfortunately, the planners of financially induced social forestry programmes often do not yet realize that consideration of these social factors has to be woven into the very fabric of such programmes from the outset. There is often a contradiction between the theory and the practice of social forestry and 'many projects that are called social forestry are a far cry from the theoretical vision of social forestry' (Fortmann, 1988). The penalty for ignoring the social factors is project failure.

Practical recipes for how to incorporate these social prerequisites into action plans are not readily available. Culturally informed forestation strategies have to be produced, tailored, and retailored anew for each socio-ecological context. For that, foresters, planners, and action-orientated sociologists and anthropologists have to cooperate, search, predict, design, test, monitor, learn, redesign, and retest in order to combine effectively the technical and social approaches into coherent reforestation programmes (Guggenheim and Spears, 1990). In the quest for creative new solutions, much of the already existing sociological know-how can be mobilized and used as a stepping stone to action, to testing, and to new knowledge.

Recognising that there is a need for creative, sometimes new solutions for each context does not mean that no substantive sociological knowledge is available about the general socio-cultural processes in forestry and everything is still to be discovered. Much of the already existing sociological know-how can be mobilised and used as a stepping-stone to actions, to testing and to new knowledge. There is no justification for sociologically illiterate social forestry programmes.

SOCIAL FORESTRY IN AZAD KASHMIR

This study of two successive World-Bank assisted social forestry projects in the same area of Pakistan describes how good intentions proved to be no substitute for missing social knowledge. The study demonstrates the costly fallacies of

planning without having a sound sociological understanding of the socio economic forces spontaneously at work and of the social strategy requirements for translating pursued goals into social actions. Salient sociological factors are at work always, and forcefully so, under the thin layer of the new 'reality' temporarily constructed by the financial in-flows of the programme. Such factors in this case were: the existing land ownership system and the rights-to-use system; the local power and authority system; farmers' tree planting behaviour; and the absence of social structures for collective action aimed at reforestation.

The Hill Farming Technical Development Project (HFTDP) began in 1978 in Azad Kashmir as a pilot test of new approaches in several agricultural sub-sectors, with the intention of replicating the successful ones in a subsequent, larger-scale project (World Bank, 1978). The pilot forestry component financed fuelwood plantations, tested new tree species under local conditions, and established tree-seedling nurseries.

Increasing demand for fuelwood and timber had caused large-scale deforestation in Azad Kashmir over the preceding 30 years. In 1972 about 1.5 million residents, or 300,000 families, relied entirely on gathering fuelwood for cooking and heating. Pressure on government forests was increasing as people cut trees both for fuel and for clearing forest land for farming.

Both the formal regulations (enacted under British colonial rule) and the old customary rules in Azad Kashmir have allowed rural people to remove deadwood, branches, and non-commercial species from reserved forests without payment, primarily for personal consumption. In practice, however, customary rights have been liberally interpreted and broadened, while the limits set through formal regulations have been transgressed. In the Chir pine areas, long thin vertical slices of the bole of the tree are removed at stump level for kindling. Forest resources have also been devastated by local livestock that graze without adequate controls. The situation is aggravated by the transhumant livestock of semi-nomadic populations coming from Punjab and the North-West Frontier Province to use the Azad Kashmir alpine rangelands during summer.

Under such circumstances, the Forest Department needed the cooperation and support of the area population to stop and reverse deforestation. Instead,

however, it came into open conflict with many local inhabitants. At the time of project appraisal, over 50,000 cases of forest offences were pending in the Azad Kashmir courts. This amounted to about one household in six involved in an alleged forest offence. Many farmers were therefore reluctant to participate in reforestation schemes and were suspicious of the Forest Department.

Far-reaching changes were therefore required, both to improve the management of existing forests and to reforest depleted areas, if the increasing need for fuelwood was to be met.

When the pilot project was prepared, it was thought that social support for the programme (contributions from private users) could be blended with public support (government financing). Accordingly, the strategy was designed to experiment with both the technical and the social variables of developing forestry, particularly to involve local users in planting and maintenance. Community acceptance was regarded a crucial for the project's success. The government was to finance the establishment of four local nurseries (at Patika, Kotli, Hajira and Bagh) to produce seedlings for sale at a low price to the area farmers. The government was also prepared to finance the costs of planting trees in several communities on common property lands in order to work out a model replicable by other communities and benefitting primarily the small farmers.

The project design was based on a set of assumptions made by technicians and planners about the tenure of the land to be reforested, about community processes, and about farmers' willingness to participate. In hindsight, these assumptions appear rather naive and uninformed.

Lacking a sociological field analysis, the appraisal report relied on explanations about land tenure offered by local officials, as understood by the members of the appraisal team. The report vaguely identified **shamilat** land as 'land generally left uncultivated, owned jointly by a number of families' (World Bank, 1978). Shamilat land was considered to be community land, over which all villagers had decision-making authority as well as rights to share in its use. The appraisal report estimated the existing shamilat areas to be a major resource, totalling some 325,000 acres. This was equivalent to more than half the total farmed area in Azad Kashmir, then about 500,000 acres.

Based on these estimates, the project planned to finance the pilot planting of 3,000 acres of fuelwood, mainly on shamilat land; only a small proportion was expected to be planted on government or private lands. The small farmers in Azad Kashmir, who had limited access to firewood, were expected to be the primary beneficiaries of project-financed planting on communal land. An explicit assumption was that local village-level institutions would mobilize villagers' support for fuelwood planting, in the form of labour, payment for seedlings, tree protection, or other contributions toward reforestation costs, in exchange for which the project would generate tangible benefits for the people involved. The community structures were assumed to be strong enough to enforce the temporary closure of reforested areas to prevent indiscriminate grazing and protect the tree seedlings.

During the first project year the physical targets of the reforestation component were met: fuelwood trees were planted on 500 acres and the first nurseries were established. The project staff reported that the owners and users of private and community land agreed to its allocation for fuelwood plantations, although no formal contract was signed.

For the second year, the project had an increased planting target of 1,250 acres. Other landowners came forward and volunteered their non-arable lands for tree plantations, and the project staff tentatively identified for planting about 750 acres of community and private land and 500 acres of government land. The farmers' response seemed to suggest that significant tracts of community (shamilat) and private lands could be incorporated into the fuelwood production circuit.

THE PRIVATISATION OF THE COMMONS

In 1978-80, a social analysis was undertaken of the progress of the forestry component. The study assessed the socio-economic status of the farmers who had been contacted by the reforestation component; determined the tenurial status of the lands involved in the project in the first two years and estimated the likely beneficiaries; evaluated the procedures used in implementation, particularly the communication patterns between the project staff and the farmers. Attention was also paid to the mechanisms of community decision-

making and to the envisaged procedures for sharing the expected profits from the forestry investments.

The analysis of the tenure system in Azad Kashmir showed that there were three basic categories of lands:

Khalsa, (Khalisa) or Crown land, is land that is 'reserved', land unassigned and unencumbered by title; the authority over this land is vested in the government. Khalsa land usually consists of 'demarcated' and 'undemarcated' forests.[1]

Shamilat land belongs to the communities and derives its name from the concept of 'getting together'. These lands are used as grazing areas, forests, sites for village public buildings and village graveyards.

Malkiat land is privately owned. Ownership rights are recorded in the revenue register and are validated by it.

While these were the main legal categories for Azad Kashmir land, field assessment of the status of specified land plots discovered, however, significant difference between the legal/formal status of the lands as recorded in the land register and the de facto situation.

Contrary to expectations, what was called shamilat land appeared to be for the most part, not true community land. Over time, cumulative changes in most of Azad Kashmir had resulted in a dual, divergent status to evolve. Although shamilat continues to be considered in principle community land, now much of

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[1] The official definitions of these categories of forest land, given in the 1930 Jammu and Kashmir Forest Regulation Act, N° 2 are:

Demarcated Forest means forest land or waste land under the control of the Forest Department, of which boundaries have already been demarcated by means of pillars of stone or masonry or by any other conspicuous mark, or which nay hereafter be constituted as demarcated forest;

Undemarcated Forest means and includes all forest land and waste land (other than demarcated forest and such waste land as is under the management and control of the Revenue Department) which is the property of the Government and is not appropriated for any specific purpose.'

Generally, the demarcated forests are of higher density and better quality than the undemarcated ones, which are often located between the demarcated forests and the cultivated lands.

it is operated and used as private land. Usufruct benefits from this land are now accessible to selected individuals, rather than to the whole community.

Thus, the sociological study invalidated a basic assumption made when the planting of shamilat was originally planned. This different actual tenure was likely to cause unanticipated consequences for the planting programme, mainly by diverting the intended flow of benefits away from the target population.

How did this major change in tenure come about?

Historically, shamilat land was set apart for joint possession and use by a village as pasture, graveyard, woodlot, or a water source for use by people and cattle. The village's shamilat was not necessarily one consolidated plot, more frequently it consisted of several plots of land located at various distances from the core settlement. The shamilat plots had often both different users and uses. Villagers living at different locations closer to one or another plot of the shamilat land became its more frequent users and sometimes encroachers. Increasing needs and skewed household abilities in using shamilat resources asserted themselves over time. Patterns of differential use and access gradually crystallized, and subtle changes in the actual status of various plots cumulated over time.

Three broad historical stages in the evolving condition of shamilat can be roughly distinguished over time:

Informal Partitioning

Village households whose land directly adjoined the shamilat areas became increasingly associated with the use of specific sections of shamilat, thus beginning an informal allocation of common land among themselves. Within the traditional institution of brotherhood, which allowed each one of a number of peasants linked together by common ancestry to have individual separate possession of the land cultivated, the plots of partitioned farming land were not necessarily equal. Strong group entitlements were gradually eroded by recurrent individual use, and recurrent use evolved into privileged use. In the process, the more remote and smaller farms were excluded from this informal gradual partitioning.

Aggressive Appropriation

Although the land laws formally forbid co-sharers of shamilat to encroach on it for private and exclusive use[2], powerful village households or farmers with land adjoining shamilat nevertheless began to illegally take over segments of community lands and even to cultivate them. Power played a role in the use, control and appropriation of the jointly held land, as it did in reinforcing and expanding inequality in the ownership of disproportionate shares of farming land.[3] Informal entitlements to shamilat were customarily transferred through inheritance or sale of fractions of the privately owned (malkiat) adjacent areas. Thus, these malkiat lands carried with them more or less recognized rights to proportionate fractions of shamilat plots.

While this *de facto* appropriation advanced, shamilat kept its formal status as community land and was not entered in the revenue records as belonging to private households. As a result, the benefitting households did not have to pay land taxes on 'their' shamilat plots.

Formal Privatisation

Since 1974, when the tax on land was abolished in Pakistan, the pressure has grown to have shamilat plots formally entered in revenue records in the names of the households who appropriated them. The goal of these households was, and is, to have such lands validated as privately owned lands. The interested households resorted to various means, many illegal, to change the formal registration of pieces of both shamilat and khalsa lands.

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[2] Land Revenue Act, Sect. 150 A. In principle, according to the law, when a co-sharer of shamilat encroaches upon it and includes it in his cultivated areas, he can be ejected at the request of another co-sharer. However, such grievances and particularly their enforcement, have been rather infrequent.

[3] W.H. Moreland quotes the following description from the revenue records of 1822-1833: The strong and crafty too frequently in past and present times have got the better of the weak and simple: the absence of those entitled to share, the incapacity ... of some of the resident proprietors, has enabled others, on pretence of deposit or management, to obtain and keep possession of shares very disproportionate to their hereditary rights.

Through such processes, the nature of the commons as a property regime has been considerably changed in large areas of Azad Kashmir, with villages progressively losing control, *de jure* or *de facto*, over land resources they previously owned and used. The physical extent of the commons has shrunk, even though the historical process of partitioning, appropriating, and privatizing community land has advanced at uneven speeds in various areas of Azad Kashmir.

The historical cycle described above appears to be continuing. Its creeping advancement is facilitated by regulations and by backdoor influence or corruption which allow the transfer of khalsa (unallocated) land to villages so that it becomes community land.

Against the backdrop of such incremental but profound historical changes in the land-tenure systems, it becomes understandable why the staff of the HFTDP was not able to identify genuine community land for project financed reforestation. On close inspection, it was found that planting reported by project staff to be on shamilat land turned out in fact to be on land under individual private control. Social analysis revealed that tracts of shamilat land that had been offered for planting - and assumed by the project staff to benefit the communities - had surreptitiously changed their tenurial status to become private land. The de facto owners hoped to get 'their' shamilat lands planted at government expense, without making repayment commitments. No community decision-making was involved, and no community woodlot was established. Wherever there were still some genuine communally used plots of land, the communities did not come forward to offer them in support of reforestation, but preferred to save them for other uses.

The community forestry component, based on inaccurate assumptions and lacking from the outset a social structure to sustain it, could not accomplish its 'community' objectives, even though overall the first pilot (HFTDP) did stimulate reforestation work.

Further analysis of the farmers who offered their private (malkiat) land for project reforestation and of the farmers who were in control of the nominally shamilat plots revealed that larger landowners tended to take advantage of the project. The wealthiest landowners, who have the resources to contribute to the costs of establishing and protecting tree stands, had not done so, nor did

they intend to do so in the future. At one of the reforestation sites, the main part of the 100 acres planted in the first year belonged to one influential household of six brothers, only one of whom was 'almost' a full-time farmer, while the others were absentee landlords operating shops and small enterprises in Muzaffarabad. Another landowner, who offered about 125 acres of land for planting in the second project year, flatly refused to contribute any payment; he justified his position by arguing that 'the government of an Islamic country should provide for its citizens'. A third large farmer, who wanted his 56 acres planted, asked for government-paid guards to protect the plantation and to restrict the access and customary rights of smaller farmers to collect grass and tree branches.

The smaller farmers hesitated to accept project planting on their private lands. They were fearful of losing possession or control over their land to the government once it was planted by the Forest Department, or of being deprived of rights to collect fodder and graze their cattle. Most of the smaller farmers interviewed indicated that they might offer small plots for project planting, provided they could be convinced that the Forest Department would not alienate their lands and that they would be able to cut grass for their cattle.

In significant contrast, the larger landowners did not regard tree planting by the Forest Department as a threat to their ownership of land and trees because they were confident of their political power. They tended to manipulate available project opportunities and resources to their own benefit. This was facilitated by the absence of a legal framework that defined the obligations, not merely the rights of the large farmers whose land was being reforested through government contribution. The absence of a contract left a huge loophole that enabled large landowners to avoid making contributions[4].

The findings of the sociological analysis led to midstream changes in the forestry component of the Project and generated several lessons of broader validity. The project's management was asked to reexamine the areas identified for fuelwood planting and to stop planting on fictitious shamilat land. During

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[4] In a neighbouring province of Pakistan, the N.W. Frontier Province, the Hazara Forestry Act (1936) provides an interesting example of contractual relationships that ensures legal protection for the ownership rights of the farmers, while vesting the right to manage their forests in the Forest Department. This Act also institutionalizes a contractual mechanism of cost recovery, whereby government costs for forestry management and commercial exploitation are covered by a fraction of the proceeds from sold timber.

the following year the project reexamined the 800 acres of allegedly community and private lands that had been identified initially for planting and retained only 400 acres, of which only 25 acres were shamilat land. The intent was to prevent the slide of the pilot project into a full 'giveaway' programme, before a cost-sharing system could be designed. The funds that remained were redirected in the short run to planting on khalsa land. The project's selection of private (malkiat) plots for experimental planting with fast-growing species was oriented toward smaller farms. However, it proved impossible in midstream to maintain priority for reforestation on communal lands. According to the ex-post evaluation report, the fuelwood plantations on shamilat land ended up being the smallest fraction (15%) compared to planting on Khalsa (30%) and on malkiat (55%). Moreover, due to various delays the pilot project initially planned for three years took some six and a half years to complete.

When the follow-up Integrated Hill Farming Development Project (IHFDP) in Azad Kashmir was appraised in 1983, an attempt was made to avoid the earlier errors. The IHFDP appraisal report stated that in the new project 'overcoming the social constraints to systematic hill development programme would constitute the real challenge'. It recognized that most hillsides were controlled under various tenure systems of private land, government forests, and community land (shamilat), and that the land plots under these systems were intermixed. Since a hillside is a natural ecosystem, the new project concluded that it was of little use to implement conservation measures on one part of the hill when runoff from another part remained unchecked at the same time. Consequently, the new project began to pursue agreement (contracts) between the individual owners in each catchment area (or relevant communities) and the government, regarding the definition, acceptance and implementation of 'Hill Management Plans' with some cost-sharing and benefit-sharing arrangements.

The IHFDP has been implemented mainly by government departments, since strong sustaining structures within the farming communities were neither identified nor established in the available time. Some 9,000 acres were to be planted with fuelwood species on hillsides and additional land has been planted to coniferous species within demarcated state forest areas. In parallel, IHFDP under its farm forestry programme, has encouraged farmers to plant trees on their farms. The project has financed the distribution of 12 million seedlings free as an incentive for such planting.

Summing up, the sociological analysis discussed above brought three sets of social variables into the limelight: the complex land tenure system and the processes affecting it; the community as a cluster of non-homogeneous groups, with differential access to 'common' goods and limitations on consensual action; and the behavioural patterns of individual farmers. It bears repeating that no social forestry project can be conceived and prepared without in-depth and timely recognition of at least these three sets of social variables.

DESIGNING STRATEGIES AROUND SOCIAL ACTORS

One of the most critical factors in designing the social strategy of forestry programmes is the adequate identification of the unit of social organisation able to carry out the programme and the definition of the conditions under which this unit can act effectively. Many recent or ongoing forestry projects have lumped together, under the broad umbrella of 'social' or 'community' forestry, different objectives with vague or unfocussed appeals to various heterogeneous or undefined populations.

Operationally, it is not only a challenge but an absolute necessity to disaggregate the broad term 'people' and to identify precisely **who** and **how**: what units of social organisation can and will do afforestation, and which social units and definable groups can act as sustaining and durable social structures for long-term production and management activities.

Such units of social organisation can be either:

(a) natural (existing) social units, such as the individual household or a tightly knit kinship group/subgroup;

(b) groups organized purposively to plant, protect and cultivate trees; and

(c) groups established for other purposes than forestry, but which are able to undertake forestry-related activities as well.

Forming enduring units of social organisation is particularly important in the case of social forestry strategies, given the long duration of a production cycle. Even small self-managing groups enhance the individual productivity of their members; they increase the cumulated impact of the individual contributions and enable members to perform works and achieve goals that might not be attained by each acting separately.

In forestry, self-managing groups acting as economic agents can achieve for their members significant economies of scale in several respects: (a) primarily (but not only) with respect to labour required for tree planting and cultivating; (b) in labour for harvesting and transporting; and (c) groups usually can bargain more effectively than individuals when selling the harvest or when negotiating with authorities. Furthermore, some specific technological needs or constraints may be more easily solved by groups, particularly watching and protecting tree plantations against theft, fire, or destruction by animals. Small, self-managing groups can also act as psychological motivators for the consensual action of their members.

The need to identify or establish social units capable of collective action introduces one more sociological dimension in forestry development projects and into the work of forestry departments. If properly conceived, social forestry projects can become a mechanism for encouraging and forming groups, thus building up the social capacity for development. Helping users to organize themselves into groups and to undertake production and management functions in forestry would in fact restore the balance of the 'participation equation': the users of forests and forest products act as the primary producers and decision-makers, and the forest department will 'participate' in their activities, rather than the other way around.

Establishing a functional social group means, of course, much more than simply lumping individuals together into an artificial entity given the label 'group' on paper. It implies a process of selection or self-selection of the members, the willingness to associate, the members' perception of both self-advantage and co-responsibility, and the establishment of an enduring intra-group structure with well-defined functions.

At the same time, however, social forestry modeled on groups has to address certain complexities resulting from the actor being a group of farmers, rather than an individual farm household: namely, issues of joint dependence over a piece of land and, sometimes, group tenure over trees; issues of group management, labour allocation, and monitoring; and, probably the most sensitive, the issue of benefit distribution. Therefore, organizing and

promoting **groups** as units of social organisation for social forestry programmes means designing clear social arrangements for tenure, management and distribution, arrangements that are known, implemented and adhered to consensually.

The range of different social actors apt to get involved in forestry projects is broad: communities, village governing bodies, farm households, groups of farmers, cooperatives, schools, private companies, public agencies, non-governmental organisations, and so on. Some of these potential actors are analyzed below in light of their sociological advantages or disadvantages for social forestry.

COMMUNITY WOODLOTS: PROGRAMMES WITHOUT PARTICIPATING ACTORS

Many planners and foresters assumed that massive planting of fuelwood could best be induced on communal lands by involving large numbers of people in planting, tree protection, and in sharing the benefits. Therefore, it seemed at first natural to introduce this innovation through the community as the support group. The term 'community forestry' became a buzzword, even though very few bothered to define the community's composition. The emphasis was put on establishing woodlots either on communally owned lands (or lands assumed to be owned communally, as we saw in Azad Kashmir), or on certain state owned lands.

The apparently plausible social assumptions were that communities would influence their members to plant, would mobilize labour and promote self-help, and would collectively protect the young plantations on 'their' land. It was also assumed that they could ensure the wide distribution of benefits among the small farmers who make up the majority of the community. Successful village woodlots in countries such as Korea and China, which had been supported authoritatively by the government, lent credibility to this approach and were assumed to be valid models for other social contexts.

However, when replicated in other countries the community woodlots fared much worse than expected. Azad Kashmir is but one example. Results in Uttar Pradesh, Karnataka, Gujarat and other Indian States, in Niger and other

African countries, and elsewhere have been, and continue to be, similarly disappointing.

Evidence about community woodlots documents that they are not what their name suggests them to be and do not achieve their stated objectives. Over the last 10-12 years, considerable financial resources have been channelled by both international donor agencies and national governments in many developing countries to social forestry programmes that use the community woodlot model. Between 1977-1986, about 50% of World Bank's lending for forestry went to 27 projects which included some form of community forestry. The Bank's lending for social forestry tripled in the 1987-89 period compared to the previous decade. Major funding came also from bilateral donors like USAID, CIDA, ODA, SIDA and others. Yet in most cases, according to evaluation reports, the actual planting accomplished under the 'community' model fell below targets and did not justify the investments made.

The analysis of these projects reveals that their initial assumption - namely, that communities (villages) would be effective actors for implementing 'community forestry' - was not confirmed. This assumption was sociologically naive, lacking understanding of the nature and structure of village communities. Strong empirical evidence supporting this conclusion emerged in the mid-1980s from three large social forestry projects assisted by the World Bank in India (in Uttar Pradesh,[5] Gujarat[6] and West Bengal[7]). None of these three projects managed to achieve or to come close to their targets regarding the establishment of community woodlots. However, they were effective in other approaches and - to some planners' surprise - even surpassed their targets in farm forestry.

In Uttar Pradesh, for instance, village woodlots could be established only on a total of some 136 ha (2 ha woodlots on average) against a project target of 3,080 ha of community woodlots planting. In Gujarat the self-help village woodlots component achieved only two-thirds of the 9,200 ha targeted, while in West Bengal, because of similar low performance, some of the project allocations for village woodlots had to be shifted at mid-term to farm forestry. Summarizing the causes of such failures, a Bank report on the Uttar Pradesh project noted: 'poor villagers proved unwilling to contribute their labour as expected by the project in exchange for rather limited potential benefits from

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[5] World Bank, Uttar Pradesh Social Forestry Project, Staff Appraisal Report, May 1979, processed.

[6] World Bank, Gujarat Community Forestry Project, Staff Appraisal Report, processed.

[7] World Bank, West Bengal Social Forestry Project, Staff Appraisal Report, processed.

a small woodlot, after many years of protection and maintenance ... The social forestry organisation lacked relevant know-how and resources to deal with the sociological and technical problems associated with densely cultivated areas and very small farms' (World Bank, 1985).

At the time these unsatisfactory results became known, a new National Society Forestry Project for India (covering four Indian states: Himachal Pradesh, Rajasthan, Uttar Pradesh and Gujarat) was already advanced in the appraisal process; it included again a significant component of village woodlots (85,000 ha), although this component represented only a relatively small fraction of the total projected planting (708,000 ha). On account of the little interest shown by community members, the model was modified to give considerable management authority over village woodlots to the village panchayats. Of course, this was an administrative substitute for user/producer responsibility, wholly missing the crux of the social forestry strategy.

The slippage of community woodlots into panchayat woodlots did not remedy anything. Subsequent mid-term assessments in 1988 and 1989 again confirmed earlier conclusions. Many of the newly established village woodlots are beset with social, management and distributional problems that prevent the accomplishment of their community fuel supply and poverty alleviation objectives. A Bank staff sociologist concluded in 1989 that no user-supported management system for the protection and maintenance of 'community' woodlots has emerged so far (Salem, 1989). Communities as a whole are not getting involved; instead, the village panchayat (or the state forestry department) takes over the administration of the woodlot, often commercializes the products outside the village, and invests the revenue in other assets (World Bank, 1988). Disappointment among the subsistence farmers with the distribution of benefits from these woodlots saps future interest in maintaining or expanding them.

A 1987 evaluation of the Orissa Social Forestry project found that 82% of the villagers did not know how the produce from village woodlots would be distributed; most of the people did not expect any share from the final output and looked upon such woodlots as another category of reserved forests (Arnold & Stewart, 1989). It is therefore not surprising that in such social forestry programmes 'on village commons and wastelands ... villages have proved most reluctant to manage trees planted as a corporate resource' (Shepherd, 1986).

Convergent conclusions result from observing community woodlots in other geographical contexts. In West Africa's 'bois de village' (village forests) the community system was also found 'ill-suited ... to serve as a vehicle for

reforestation' (Thomson, 1980), and in several other Asian countries its adequacy was questioned as well (Noronha, 1980; Rao, 1984). Often forestry departments were asked to set up the village woodlots and then to hand them over to the village committee. It also appeared in numerous cases that the village committees were uninformed and unaware of what they should do with the woodlots. Referring to several non-Bank financed social forestry projects in India, Sen and Das (1987) concluded:

> One of the most vital problems being faced by the community forestry programme is lack of people's participation. The very mechanism of raising, maintaining and protecting the community plantation ... should be examined carefully ... Villagers are rarely consulted at the preplanting stage .. and selection of site and species is generally done by the local forest officials. The village panchayat or similar agencies offer the land (often with no or half information to their members) for plantation activities by the forest departments.

Similarly, synthesizing the findings of numerous evaluations of woodlot projects on communal lands in India during the 1980s, Arnold and Stewart (1989) provide a description replete with references to the missing social arrangements:

> The communal groups charged with the dialogue with forest departments over the planning of woodlots and with their eventual take over have nearly everywhere been panchayats ... rather than a user group or a body selected by a village specifically for managing the woodlot...
>
> ... Mechanisms for direct consultation by the forest department with villagers have generally not been put in practice ... (Forest Committees) have been formed in an ad-hoc manner, without much if any prior consultation among the various groups in the village about their composition and in many cases were not functioning at all actively ...
>
> The literature reports an almost universal failure to precede woodlot establishment with public discussion. Repeatedly reports record villagers being unaware that the woodlot has been established for the community; it was a [government woodlot] ... Benefit sharing agreements are frequently neither finalized nor

formalized ... Most of the people did not expect any share from the final output.

The absence of the basic sociological knowledge needed to guide social forestry policies and project work is of more consequence than the bureaucratic hindrances that have appeared during the implementation of induced development programmes. However, the weaknesses or distortions during project execution are not the primary cause that renders community woodlots ineffective. In many cases, community woodlots cannot be effective because woodlot schemes inspired by the romantic myth of homogeneous communities are misconceived from the outset and because appropriate social actors and social arrangements have not been put in motion.

There are seven basic sociological reasons for which 'communities' as population clusters cannot and should not be treated as ready-to-use corporate actors (units of social organisation or economic agents) for afforestation programmes:

1. Communities and villages are geographical residential units, not necessarily corporate organisations. Physical vicinity alone is not sufficient to engender the type of long-term collective action required for community woodlots.

2. The interests of community members often differ to such an extent that the kind of collective unified action required by a long-term afforestation programme is generally not possible. Usually, communities have become heterogeneous population clusters, stratified and split in factions and subgroups with fragmented socio-economic interests. What is advantageous for one subgroup in not necessarily advantageous for another.

3. Community land is limited and often there is reluctance to make it available for tree planting. Tree block sites are small, costs are high. The poorest households have an interest in not allowing the commons, which to them are a continuous even if meagre source of products, to become closed, inaccessible woodlots. As Jodha's research in India has demonstrated, poor households are more dependent on products from the commons than those that are better off (Jodha, 1986).

4. The tenure status of the common lands is often uncertain and engenders uncertainty about the tenure of planted trees; it is similarly unclear which social body has jurisdiction over the allocation of common lands[8].

5. Authority systems have uneven power over community subgroups. Local community leaders often appear reluctant, or not strong enough, to mobilize the individuals belonging to different subgroups to work for establishing woodlots, or to enforce restrictions to protect the trees.

6. Distributional arrangements to ensure that the products of village woodlots reach those entitled to receive them are usually not thought through at the outset and have not worked in practice. Usufruct rights on commons are often blurred. Clear intra-group rules and guarantees for distribution commensurate with labour contributions are lacking, and this alone is sufficient to doom the community approach. Exclusionary rules against non-contributors are absent as well. The long production cycle for trees weakens the confidence of those planting today that they will get wood eight or more years later, and it favours the lingering suspicion that the authorities will appropriate the wood.

7. Many communities are not organized as joint producers in other respects and thus do not offer a matrix on which additional activities can be grafted. Externally designed programmes, which do not bother to establish grassroots organisations, cannot foster by decree the kind of close interdependence of members required by community schemes.

Because such characteristics t d to be widespread, the poor results have also been virtually general. Resu. are likely to be poor in the future as well

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[8] Michael Horowitz, analyzing rural afforestation alternatives in Zimbabwe, pointed out that the 'important issue where communal lands are involved is correctly identifying the locus of authority over land use allocation.' See Michael K. Horowitz, **Zimbabwe Rural Afforestation Project**, Social Analysis Working Paper, Binghamton, N.Y.: Institute for Development Anthropology, 1982, p. 51.

whenever such corporate woodlots are expected to be sustained by non-corporate communities. Positive results with community woodlots tend to be occasional exceptions linked to the exceptional nature or circumstances in a particular community.[9] It is important to identify the structural, cultural or political conditions that make them possible or replicable.

Anthropologists and sociologists have long called attention to the processes that have changed the internal structure of village communities as social units. As settlements, villages are, of course, units of social organisation. But that is not synonymous with saying that they are units capable of undertaking collective or coordinated action. Although historically various forms of corporate villages have overlapped with kinship units of a corporate form, Eric Wolf noted already a quarter of a century ago that 'corporate peasant villages are growing fewer in the modern world' (Wolf, 1966). Louis Dumont has similarly emphasized that, in India, given its caste system, the very expression 'village community' is not adequate because it conceals the existence of factions and the omnipresence of hierarchies.[10] Dumont did not see the village as a significant unit for social action in India and stressed that what is generally called a 'village panchayat' is actually a 'caste panchayat' (Dumont, 1980).

More recently, in an excellent field study of Indian community-based irrigation systems, Robert Wade engaged Dumont's above point in discussion, defending the opposite view - namely, that the community can act as a unit of social organisation. He argued that what the panchayat does is as important as the panchayat's composition (Wade, 1988). However, even if and when a specific panchayat proves able to mobilize the totality of the village's factions for a certain activity, this would indicate more the particular organisational, administrative or coercive capacities of that panchayat rather than indicating that the village is intrinsically a homogenous unit of social action.

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[9] Matthew S. Gamser reported on an interesting community forestry project in Sudan (Um Inderaba) where the village community (some 600 families) was effective in planting, hand-watering and maintaining the trees against extremely adverse conditions: complete lack of rain and large transient animal herds. It appears that the village committee and the local sheikh were able to aggregate effectively the villagers' activities, while incentives and protection payments were provided together with technical advice from foresters. (See Matthew S. Gamser, *Letting the Piper Call the Tune: Experimenting with different Forestry Extension Methods in the Northern Sudan*, ODI Social Forestry Network Paper 4a, June 1987.

[10] Dumont wrote: 'The overall point is that within the village and within the dominant caste itself there is division into units which spring from no traditional principle, and in which each man's adherence is mainly or to a large extent governed by his interests.'

ALTERNATIVE UNITS OF SOCIAL ORGANISATION

The increasing awareness that the community-centred approach is less effective than assumed has led to a perceptible shift in thinking and strategies among foresters and planners. They began to focus on the individual household unit as an alternative to the community-based programmes in social forestry. This is not to say that all interest in promoting village woodlots has now disappeared, or that promoting tree-planting on individual farms is a totally new departure.

Various World Bank-assisted forestry projects - in Karnataka, Kerala, Haryana, and other Indian states, as well as in Mali, Tanzania, Nigeria, Nepal, Haiti and elsewhere - now provide support and incentives for tree planting on small farms. Farm forestry is now a substantial part of the follow-up IHFDP in Azad Kashmir. In the design of India's Jammu and Kashmir and Haryana social forestry projects, village woodlots represent only 11.3% of the total planting programme, while farm forestry represents about 43%, supported by a distribution of about 47 million seedlings free to individual farmers (World Bank, 1982); a similar approach was taken in the Kerala Project (World Bank, 1984). Some of the most spectacular results in farm forestry are being obtained in Gujarat and Himachal Pradesh, demonstrating a receptive response by farmers to project-provided incentives (free seedlings, etc) and technical assistance. During the first three seasons of the National Social Forestry Project in India (1985-88) farmers have planted approximately 500 million seedlings, the equivalent of over 325,000 ha on their private lands, exceeding the already high target by some 18%.

Farm forestry replaces broad joint (community) responsibility for planting with individual (household) responsibility. It moves from promoting joint tenure and ownership of trees to promoting individual ownership. It also vests the management authority over the tree plantation in an individual rather than in a diffuse non-homogenous entity. Land tenure on individual farm holdings is unambiguous. Of great importance is that the divisive problems of intra-group distribution of benefits are eliminated. Thus the correlation between farmers' inputs (labour and cash) and outputs become direct and clear to farmers, understandable, proportionate and less risky.

Trees can be grown on individually-owned land not just in small woodlots but also along linear landscapes such as farm boundaries, internal field borders,

roads and watercourses. Tree planting technologies that maximize the use of interstitial locations and other marginal land-patches are particularly suitable for individual small farmers because they do not compete with existing land uses and other crops. Even small farmers who cannot afford to set aside an arable plot for a tree block can use their hedgerows for planting. Foresters have concluded that since farmers secure most of their fuelwood by lopping branches, trees planted along homestead boundaries can produce several times more volume per tree than those felled from plantations. This has obvious implications for mitigating tree product shortages, since it is easier to persuade a household to plant on its own farm boundaries than to persuade communities to provide scarce land for block plantations.

Since farm forestry is adopted through individual decision making, the spread process is free of difficulties such as factionalism that impede the collective adoption of community forests. Tree planting is incorporated into the farmer's own farming system rather than remaining parallel to it on a remote communal lot.

The farm household is an enduring social unit able to sustain forestry development programmes. Tapping its potential requires a deftly tailored integration of technical, sociological and economic elements as well as operational cooperation between foresters and sociologists in designing and implementing this strategy.

Small Groups

The current growing success of household-centred forestry may obscure the fact that group-centred approaches retain development potential that should not be overlooked because of the ineffectiveness of the earlier community approaches. The challenge is to find social formations between the entire community and the individual farmer which are capable of acting as supporting structures for the development of forestry or other natural resources. The problem is to have a group that is free from the inner conflicts of larger communities, yet able to generate the synergy that makes groups more effective than the sum of their members.

The limitations intrinsic to communities as social actors result from their large size and internal stratification. Homogenous groups of an easier manageable size could prove more functional. In small groups a common interest that links the members can be pursued more effectively by joint action than by individual action. A small group can also enforce rules about contributions (labour or financial) through peer pressure, so as to limit free-rider behaviour.

Coordinated and collective action does not ensue automatically when a set of individuals stand to gain from such consensual action. They must understand subjectively the commonality underpinning their objective interests and be willing to act consensually.

One successful example is a group farm forestry scheme started in the early '70s in West Bengal. A group of unemployed or underemployed villagers, landless or marginal farmers, was given a block of marginal public land for tree-planting. The members were not granted title to the land, but were given usufruct of the land and ownership of the trees they had planted and protected. Under this system there was tight group control over the temptation to change land use or mortgage the land. The area allotted and the number of trees to be planted guaranteed enough wood from lops, tops, dead trees and branches to meet a household's domestic requirement. The protection of planted parcels was organized jointly by the group. Thus the group strategy not only maximizes land use for forestry but also encourages and facilitates collective action for tasks that would be performed less effectively if carried out individually (Bannerjee, 1983).

The target group of this West Bengal scheme was highly dependent on the income generated by their labour and could not be expected to work without remuneration. Incentive payments were therefore made to help meet household consumption requirements during the early stages of the plantation. Incentives were also given for each surviving tree to encourage maximum survival rates.

The operational principle behind group farm forestry is to create a clear link between a well-defined small group and a well-defined piece of land that is converted into a woodlot. There also needs to be a clear correlation between contributions and returns, and authority and benefits must be restricted to members of the group.

Age Groups: School Nurseries

Many traditional societies, particularly in Africa, entrust to subgroups certain maintenance or service functions in the society. Some of these groups are defined by age or gender. They are accountable to appointed group leaders as well as to the overall authority structure.

One of the notable successes in recent years has been the involvement of school-age youths in establishing tree nurseries for social forestry (in Kenya, Malawi, Gujarat, and Haiti). The characteristics of such groups are propitious for certain collective actions: school children form a homogeneous age group, concentrated, organized by virtue of their main activity -going to school - and with a built in leadership system. Although the transitional nature of this age groups limits its participation activities of long duration, it is perfectly suitable for short-term collective efforts such as the production of seedlings. To formalize and expand this group's support to social forestry, it is possible to promote institutional arrangements in the form of a 'partnership between schools, communities and government agencies' (Chowdhry, 1983).

At the outset of a social forestry programme in Gujarat in 1980 there were less than twenty schools with tree-nurseries. The Forest Department decided to encourage schools and private farmers to raise seedlings rather than to expand the state's nurseries. In three years about 600 schools opened nurseries in which schoolchildren, with guidance from foresters and teachers, produced several million seedlings a year. The persuasion/motivation required to generate such action was combined with one economic incentive: a guaranteed price for seedlings; when ready for transplanting, the state forest service buys the seedlings for distribution to local farmers. This economic incentive was backed by technical advice from extension workers to help schools construct and operate small tree nurseries. In addition, many schoolchildren took the seedlings home and planted them around their family homestead, thus extending the educational outreach of the programme from school to the home (Spears, 1983).

Women's Groups

Experience with women's groups in forestry is expanding every year. Since in many cultures women are the direct users and gatherers of fuelwood, they would appear to be the ones most directly interested in producing it; women also possess a good knowledge of the growing requirements of various tree species. Recent evidence from a number of social forestry programmes points

out the major contribution women could make to them (Hoskins, 1979; Molnar, 1988).

Although women have been organized for different productive or household related activities in many countries, little has been done to involve them in group action for the cultivation of woodlots. Even in a country such as Kenya, where women's groups are widespread and effective, a field study reported that out of 100 women's groups active in one district (Mbere), none was directly involved with tree planting (Brokensha *et al.*, 1983). In other districts, however, women's groups have started planting some woodlots for their own use. In Himachal Pradesh in India, multipurpose women's groups called Mahila Mandals frequently include tree planting among their activities (Dioman, 1989).

Establishing women's groups that induce mutual help and cooperation for forestry-related activities is likely to be a more effective social device than if each woman spent the same amount of time and labour on individual farm forestry.

CONCLUSIONS

The alternative type of social units examined above do not exhaust the list of potential social actors for afforestation programmes. The same line of thinking can be continued in order to spotlight other kinds of social units and thus multiply the array of social actors able to involve themselves in forestry development.

In a broad sociological sense, the forest departments themselves are also a form of social organisation created to perform, by using state investments and resources, the functions of conversing, managing and developing forests. As administrative bodies, forest departments are of a different organisational nature than the type of social units - organized population groupings - that have been discussed in this study. But forest departments may play a critical role in fostering and encouraging the formation of such groups among users of fuelwood and in providing them with silvicultural, organisational and economic assistance to produce trees. Foresters, by and large, are still far from knowing how to accomplish the social side of their task, but they must learn to work with people as well as with trees.

In turn, the many nongovernmental organisations that make forestry and environmental conservation their own agenda, may become also the organizers of people's productive organisations and help users to act and structure themselves as producers. Identifying or creating social units is a task that requires both informed sociological understanding of what is to be done and methods and skills for social organisation. The point is that such social forms need not necessarily pre-date the development intervention, nor should they all be created from scratch. In order to grow trees on the gigantic scale necessary now, people's capabilities must be enhanced through organisational strengthening, adaption and innovation. Such enhancement itself is part and parcel of the development process.

In conclusion, it may be adequate to stress that social forestry carries with it the connotations of both a philosophy of development and a pragmatic operational strategy. The philosophy postulates the centrality of people in forestry, of users becoming producers. It breaks radically with the stereotype that forest growth is the business of professional foresters alone. The practice of social forestry is wide open to multiple approaches, open to the creation of diverse patterns of social organisation as matrices for action. It is open to imaginative and informed innovations in land tenure, of various forms of ownership or usufruct, of tested or unorthodox tree growing techniques, and of age-old or novel social structures from the household to all kinds of purposively created groups.

There is no single 'best' social strategy available as a universal key to all development approaches in forestry; such strategies span a broad spectrum. Sociological knowledge is therefore instrumental and indispensable for conceiving, designing and implementing any effective approach to forestry development.

REFERENCES

Abdul Salem (1989). Field report on sociological aspects in the National Social Forestry Project, Gujarat Sub-project, January 1989, processed.

Arnold, J.E.M. and Stewart, W.C. (1989). *Common Property Resource Management in India,* Report to the India Agriculture Division, The World Bank, June 1989, 25 pp, processed.

Bannerjee, A.K. (1983). Local Needs of Small Timber and Fuelwood in India, in K.R. Shepherd and H.V. Richter (Eds.) *Forestry in National Development,* The Australian National University, Development Studies Centre N° 17.

Brokensha, David W, Riley, B.W. and Castro, A.P. (1983). *Fuelwood Use in Rural Kenya: Impacts of Deforestation,* Institute for Development Anthropology, Binghamton NY, USA.

Chowdhry, Kamla (1983). *Schools as Partners in Social Forestry,* Ford Foundation Discussion Paper Series, Delhi August 1983.

Dioman, D.R. (1989). *Involvement of Women in Social Forestry in Himachal Pradesh,* paper presented at the NWDR Seminar, New Delhi, Feb. 1989.

Dumont, L. (1980). *Homo Hierarchicus. The Caste System and its Implications,* University of Chicago Press, Chicago and London.

Fortmann, Louise (1988). Great Planting Disasters: Pitfalls in Technical Assistance in Forestry, in *Agriculture and Human Values,* Winter/Spring.

Guggenheim, Scott and Spears, John (1990). Sociological Dimensions of Social Forestry Projects, in M. Cernea (ed.) *Putting People First, Sociological and Anthropological Variables in Rural Development,* 2nd edition, Oxford University Press.

Hoskins, Marilyn W. (1979). *Women in Forestry for Community Development,* US Agency for International Development, Washington D.C., USA.

Jodha, N.C. (1986). Common Property Resources and the Rural Poor in Dry Regions of India, in *Economic and Political Weekly,* N° 27, July 1986.

Molnar, Augusta (1988). *Women and Forestry: Operational Issues,* World Bank, Washington DC, December 1988, processed.

Noronha, Raymond (1980). *Village Woodlots: Are they a Solution?* Paper prepared for the Panel on the Introduction and Diffusion of Renewable Energy Technologies, Washington D.C: National Aeronautics and Space Administration, November 1980.

Rao, Y.S. (1984). Community Forestry: requisites and constraints, in *Community Forestry: Some Aspects* Bangkok: United Nations

Development Programme, East-West Centre, and RAPA/Food and Agriculture Organisation.

Sen, D. and Das, P.K. (1987). *The Management of People's Participation in Community Forestry: Some issues*, ODI Social Forestry Network Paper 4d, June 1987.

Shepherd, Gill (1986). *Forest Policies, Forest Politics*, ODI Social Forestry Network Paper 3a, October 1986.

Spears, John (1983). *Appropriate Technology in Social Forestry*, paper presented at the Interregional Workshop on Appropriate Technology, Kathmandu, Nepal, November 1983.

Thomson, J.T. (1980). Bois de Villages (Niger): Report of an investigation concerning socio-cultural and political-economic aspects of the first phase of the project and design recommendations for a possible second phase. Montreal: Canadian International Development Agency, February 1980.

Wade, Robert (1988). *Village Republics: Economic Conditions for Collective Action in South India*, Cambridge University Press, Cambridge.

Wolf, Eric R. (1966). Kinship, Friendship and Patron-Client Relations in Complex Societies, in Michael Banton (Ed.) *The Social Anthropology of Complex Societies*, Tavistock Publications, London.

World Bank (1978). Staff Appraisal Report for the Azad Kashmir Hill Farming Technical Development Project (HFTDP).

World Bank (1982). Jammu and Kashmir and Haryana Social Forestry Project, Staff Appraisal Report, September 1982, processed.

World Bank (1984). Kerala Social Forestry Project, Staff Appraisal Report, December 1984, processed.

World Bank (1985). India: National Social Forestry Project, Staff Appraisal Report, May 1985.

World Bank (1988). Mid-term review materials for the National Social Forestry Project in India, June 1988, processed.

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AGROFORESTRY

Agroforestry

Rationale

Agroforestry is one land use option for farmers in Pakistan. It is the practice of growing trees or shrubs together with agricultural crops or livestock. Agroforestry is not a new practice, many people have traditionally grown trees as part of their farming system. An increasing awareness of the potential positive returns from these activities has led land use managers to examine how different agroforestry systems can be improved or new ones devised to help farmers reach their various objectives.

Agroforestry has the potential to address several problems faced by farmers in developing countries such as Pakistan. Natural resources professionals working with rural farmers in Pakistan may find agroforestry and other farm forestry activities to be appropriate land uses for meeting the diverse needs and constraints of their clients.

Objectives:

By the end of this unit participants will be able to:

1. Define agroforestry and discuss basic agroforestry concepts.

2. Describe the basic categories of agroforestry systems classification and apply agroforestry configuration knowledge to what was observed on the field trip.

3. Evaluate and discuss the usefulness and potential of agroforestry systems in the areas where they work.

4. Conduct a financial analysis of various land use alternatives for a small farmer.

AGROFORESTRY

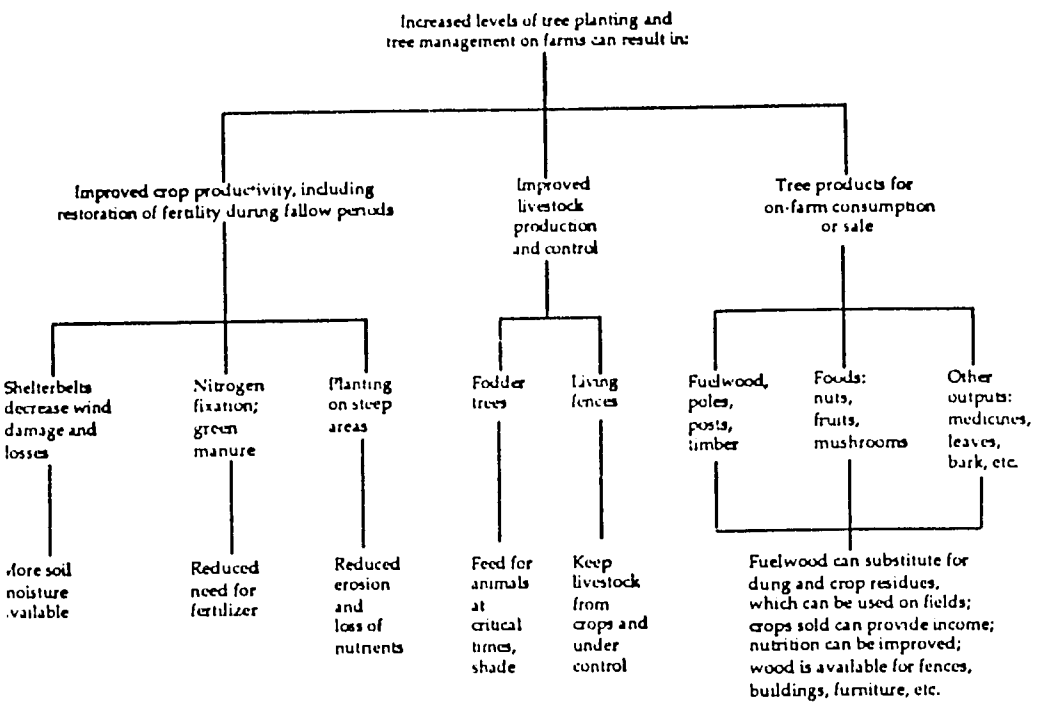
A term for land-use systems where trees or shrubs are deliberately managed with agricultural crops and/or animals over time or space. In AF systems there are both ecologic and economic interactions between the different components.

ATTRIBUTES OR CRITERIA FOR AF SYSTEMS

* PRODUCTIVITY
* SUSTAINABILITY
* ADOPTABILITY

Source: Gregersen, Hans, Sydney Draper and Dieter Elz. 1989. People and Trees: The Role of Social Forestry in Sustainable Development. EDI Seminar Series, Washington, D. C.: The World Bank. Pg. 5.

Figure 1.1 On-Farm Benefits from Trees in the Farming System



LEARNING NOTES

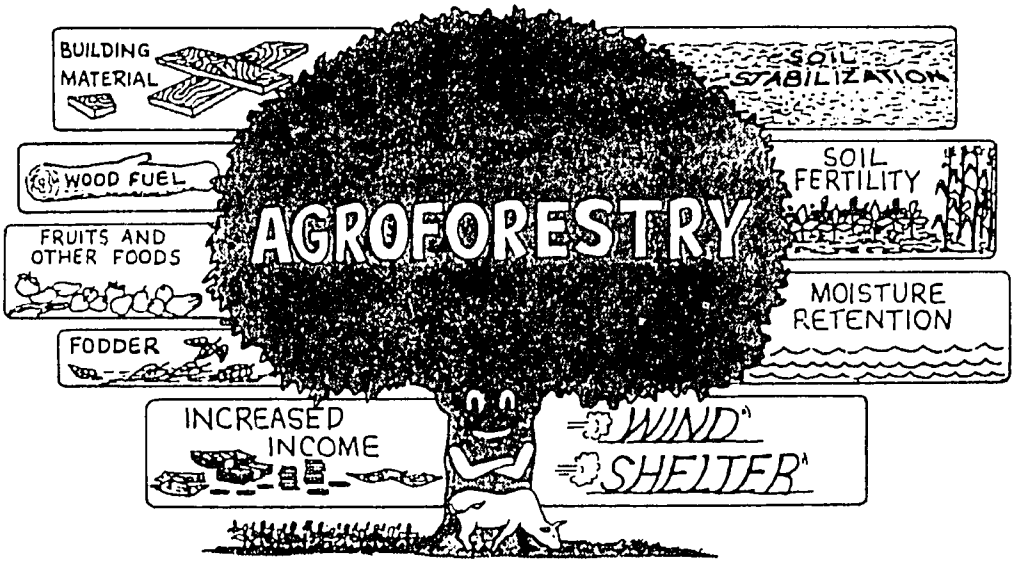
AGROFORESTRY: WHAT IT IS AND HOW IT RELATES TO DEVELOPMENT

INTRODUCTION

Agroforestry is receiving more and more attention from governments and development organizations around the world. These groups are finding that agroforestry has the potential to address several environmental and development problems at the same time. Developing countries are finding that agroforestry may be o. e important way of dealing with problems affecting their citizens.

Agroforestry is a way of managing land. Agroforestry is a term used to describe the deliberate growing of trees and shrubs together with agricultural crops or livestock. Agroforestry is known as a strategy which attempts to reduce land use conflict and increase what the land can produce (land productivity).

Agroforestry can be used to provide the following benefits:



Agroforestry emphasizes the role that trees/shrubs can have on farmers' land. Trees produce outputs, or things which are of benefit to the farmer and his/her land. These are listed above.

Our approach to agroforestry is aimed at encouraging farmers to practice agroforestry on their lands so that the benefits (outputs) are directly related to their needs and lives.

Let us examine agroforestry and the role it can play in farmers' lives.

Source: Buck, L. E. 1989. Agroforestry extension training sourcebook. CARE-International, New York

PART 1

AGROFORESTRY - HOW IT RELATES TO DEVELOPMENT

A major problem facing many countries in their efforts to develop is their growing population and the demands people make on resources of all kinds. We see the results of a growing population reflected in changes in the land.

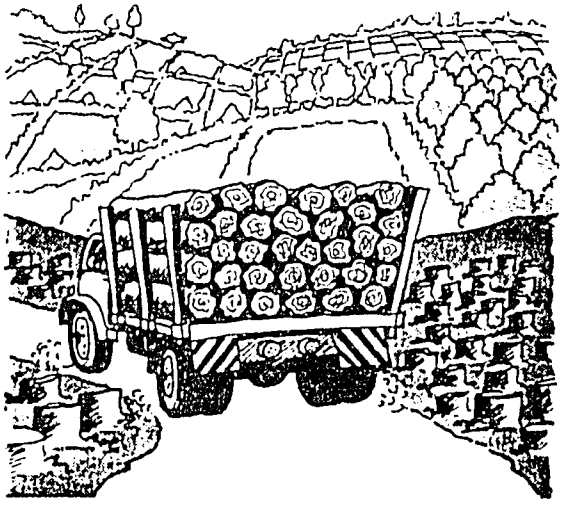
Forests are cleared to make more land available for growing crops and livestock.

People are forced to move from "high-potential", good agricultural areas, to areas which are less suited for agriculture.

Good agricultural areas, "high-potential" areas, are being sub-divided into smaller and smaller plots of land. Farming practices are forced to change or the land will not produce enough food.

Forests and woodlands are being "poached" for fuel, building materials and other forest products.

Forests and woodlands are being harvested for industry and commercial purposes.



As urban populations increase, the demand for energy increases as well. Most of the energy in developing countries is provided by wood. Most wood energy is used in the form of charcoal in cities and towns, because it is easier to transport. But changing wood into charcoal is most often inefficient. A lot of energy is lost in conversion. In Africa, for example, as much as 90% of the original energy in wood is lost in the preparation of charcoal.

All these activities result in serious negative effects for people who practice farming or livestock grazing as a livelihood.

The improper cutting of trees, forests, woodlands, shrubs, etc. results in what is known as deforestation - or the loss of forests and trees. When areas of land are deforested, the following can happen...

SOIL EROSION

Soil erosion results when trees, forests, woodland and shrubs are removed from the land and no trees, etc. are planted in their place. Soil erosion also results from bad agricultural practices - where people cultivate on steep slopes or they practice poor agricultural techniques. When grass, trees and shrubs are destroyed in order to make room for other practices, there is a good chance that soil erosion will occur, unless the land is properly managed.

Some soils are more likely to become eroded than others; when it rains, the force of gravity causes the water to carry soil, which is unprotected by trees, shrubs, grass or good agricultural practices, down the slope. This results in loss of good soils and often dramatic changes in the quality, shape and appearance of the land.

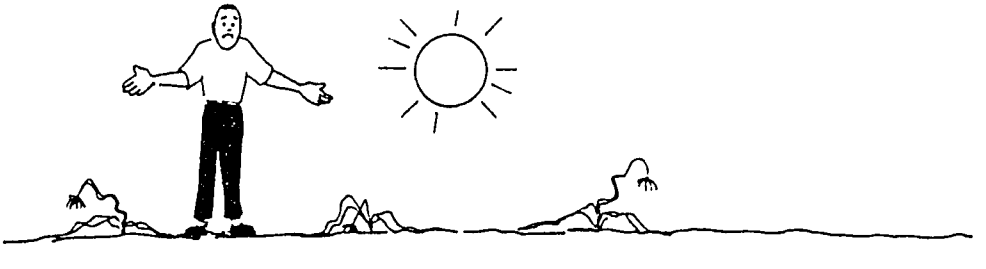
In drier areas, soil erosion results when livestock have overgrazed the land or when poor agricultural methods have been used. Wind and water remove good soils, leaving the land less productive. Many traditional livestock keepers move their livestock each season in order to protect the land and not over-use it, but this practice is changing.

Population growth and poor agricultural and livestock practices are increasing soil erosion around the world.

SOIL INFERTILITY

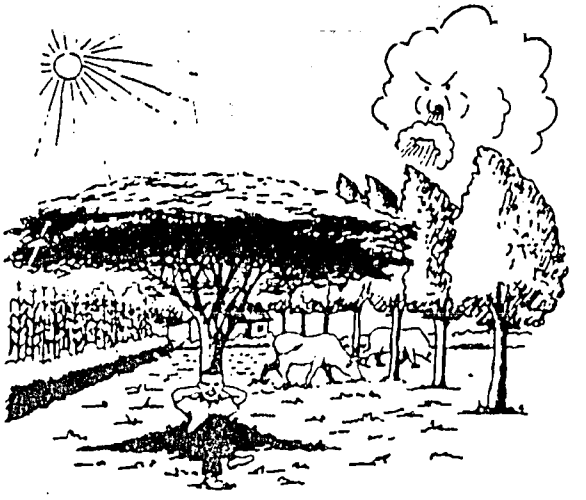
When people are crowded on farming lands, or settle in areas where land is poorly suited to farming, the result can be soil infertility. Soil infertility is the result of pressure on the land to grow a continuous cycle of crops or grasses without allowing it to rest. Land which is not allowed to rest, or lie fallow, loses many of its important organic nutrients and becomes less productive. Many countries use expensive fertilizers in order to restore the nutrients in the soil, but for many farmers, this is not practical or possible.

Composting, crop rotation, and allowing lands to be fallow are ways of avoiding the soil infertility problem. Many farmers, however, are not able or do not practice these agricultural methods.



CLIMATE AND NATURAL DISASTERS

Too much water or periods of drought also have a negative effect on land, especially where trees, shrubs, grasses, etc. have been destroyed or removed. Natural vegetation and well-managed land cannot solve the climate problems of drought or flooding, but it can help reduce the effects of these natural occurrences on the land. Trees protect us, animals and crops from too much sun and wind.

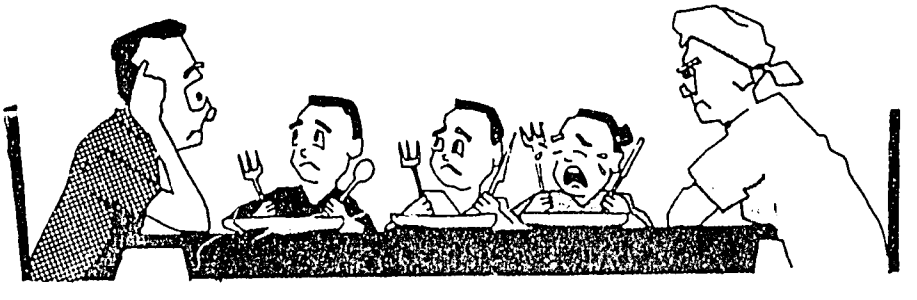


CROPS AND LIVESTOCK - FOOD PRODUCTION PROBLEM

Soil erosion, over-grazing, soil infertility and climate, all these problems can have negative effects on the production of food. As these problems increase, food production decreases. Low food production is particularly a problem in marginal areas, or "low-potential" areas, where farmers have been forced to move by population growth.

NUTRITION PROBLEMS

When food production is low and people do not get enough of the right food, the result is often nutrition problems. Low or inadequate food production affects the health of the population.



As you can see, all these problems are related. The extent of these problems varies from area to area and country to country. You will however, have an important role to play in your project as you gather information about such problems and how they relate to the lives and well-being of the people in your project area. Therefore, it is important to understand:

> The reasons for the increasing loss of trees and decreasing quality of land in the developing world.
>
> The effects the loss of trees and soil quality is having on the productivity and sustainability of farming and livestock systems around the world.

WOODFUEL SCARCITY

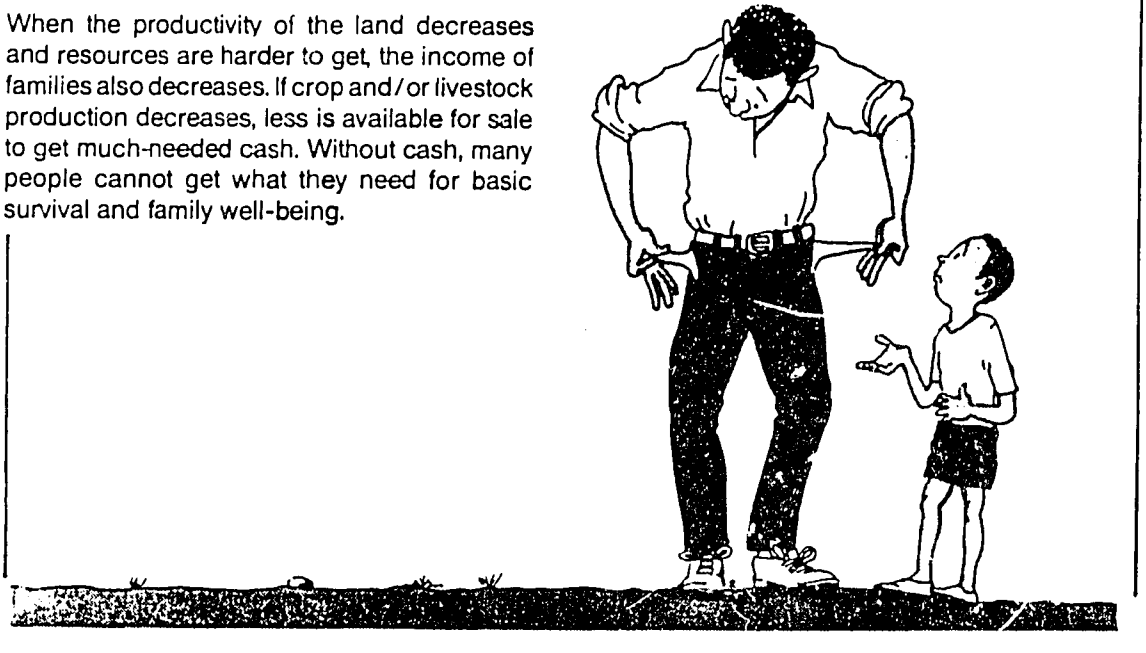
When forests are cut and cleared, woodlands are destroyed for agricultural purposes, timber is cut for industrial and commercial purposes, charcoal is produced and taken to towns, and population growth increases faster than the resources of a country can provide, **one result** for many people is the **loss of woodfuel**. When woodfuel supplies become more difficult to get, people are forced to use poor quality woods or other alternatives. Woodfuel becomes more expensive. Some people burn the remains of crops or dung, taking away potentially valuable nutrients from the soil. In addition, many people are forced to walk many kilometers for fuel, using a major part of the day and a lot of their own energy.

BUILDING MATERIAL SCARCITY

A rapid loss of trees means fewer materials for building. Poles and timber are hard to get and become more and more expensive to buy.

INCOME (CASH) SCARCITY

When the productivity of the land decreases and resources are harder to get, the income of families also decreases. If crop and/or livestock production decreases, less is available for sale to get much-needed cash. Without cash, many people cannot get what they need for basic survival and family well-being.



PART 2

WHAT IS AGROFORESTRY?

Agroforestry is a name given to practices of using agricultural and pastoral lands where trees are included. People define it in different ways, and you will probably see many definitions in other readings you are assigned.

For our purposes, let us use this definition:

> Agroforestry is a name for a land use system where trees/shrubs (also known as woody perrenials) are actively and deliberately managed as part of the agricultural and/or livestock activities, on the same land.

Characteristics of an agroforestry system include:

> Trees and shrubs which are grown and managed in certain, specific arrangements on the land, over time
>
> They have both environmental (ecological) and economic benefits
>
> Agroforestry systems involve two or more species of plants (or plants and animals) of which one species, at least, is a tree or shrub (woody perennial)
>
> Agroforestry systems involve more than one crop cycle - they are always more than one year long
>
> An agroforestry system always has two or more outputs (products)
>
> Agroforestry systems are more complex than single crop or single animal systems

The important thing to remember about agroforestry is that all good agroforestry systems are based on knowledge and experience of many traditional land use systems and practices. Agroforestry is not nothing new. Modern agroforestry, however, focuses on the **improved management** and **organization of traditional agroforestry practices** to give better results.

Agroforestry can be intensively practiced, just like intensive agriculture, on good, fertile lands. We are focusing our agroforestry efforts, however, on lands where the following problems are shared by many people:

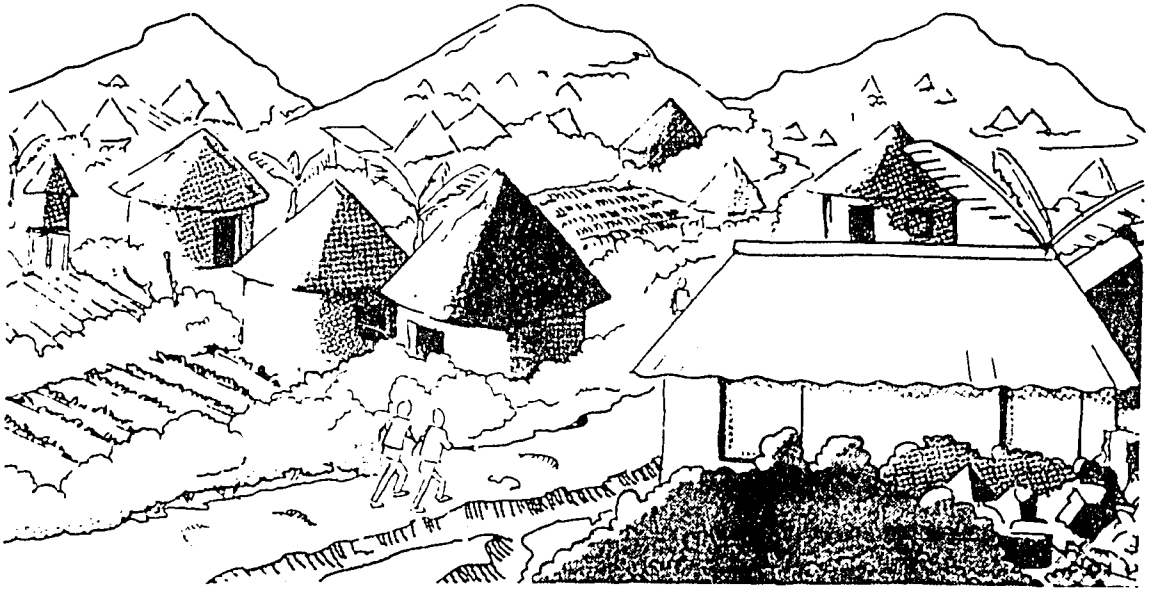
Lack of fuel ● Soil infertility

Inadequate food production

Soil erosion ● Poverty ● Poor nutrition

Lack of building material

Inadequate extension services



Our project area probably has people who must produce their basic needs of food, fuel, fodder and shelter and cannot afford to buy most of these.

Agroforestry is a system which is designed to help farmers improve traditional farming systems, to make them more productive. It is most readily applied to farming systems in the tropics.

Traditional farming systems used in tropical countries were developed, primarily, to reduce the risk of crop failure. These traditional systems are not productive enough, in many cases, to meet the needs of the rapidly growing population in the tropics. Thus, our use of agroforestry is an attempt to combine knowledge about traditional farming (or land-use) systems, together with modern ideas and research findings about how to improve these systems, to develop better practices. Better practices must be more productive in both the short and the long terms. Agroforestry practices should help make land use systems more **sustainable**. Sustainable increases in land productivity is the main objective of agroforestry.

Different professions are interested in different aspects of agroforestry. Foresters, agronomists, livestock specialists, land-use planners, etc. have different ways of looking at it. Most interpretations of agroforestry do have the following principles in common:

COMPONENT Agroforestry systems are made up of different **components**, or species of pla, and animals.

INTERACTION All agroforestry systems involve an **interaction** between these components and between the components and the environment. The benefits of an agroforestry system stem from this **interaction.**

VARIABILITY Agroforestry systems are **variable.** Components and their interaction can vary a lot, as can the interaction between components and their environments/areas.

COMPETITION Components of an agroforestry system can also **compete** for resources such as water, light and nutrients. This competition between components can be reduced if components are chosen wisely and managed well.

COOPERATION When agroforestry components are selected wisely and are managed well, they should complement each other. When we have reduced the competition between components, we can say that the components are **cooperating** for the best possible effect. Cooperation between components should yield higher **outputs.**

Many new agroforestry practices are still experimental. These experiments continue to be based c traditional practices and knowledge, but again with a view towards improving the agroforestry systen **output.** Your role in the project will be to both encourage the adoption of new, improved agroforestry practices and work closely with farmers to help ensure that the benefits are **needed** and **sustainable.** There is still a lot of research and experimentation to be done. Your project can help to contribute to the growing body of knowledge on modern agroforestry and its success.

CLASSIFYING AGROFORESTRY SYSTEMS

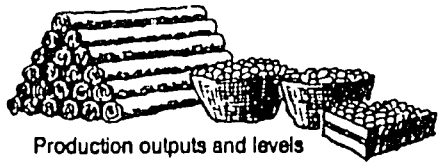
Agroforestry Systems can be classified according to:

Physical appearance and structure

Social and economic characteristics/benefits

How components of the system interact over time

Importance and role of components



Production outputs and levels

13

Most agroforestry systems are classified in terms of what the system is designed to produce and how successful the production output is.

Here are some terms most often used to describe agroforestry systems.

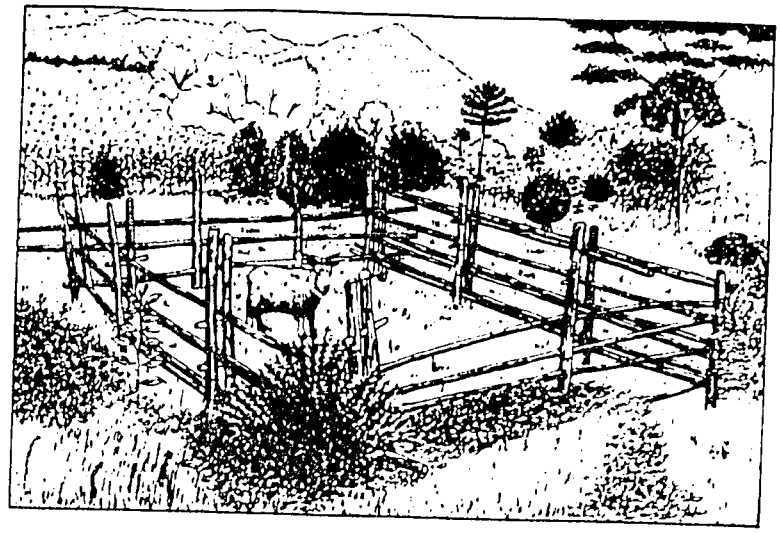
Agro-silviculture system. The management of land for the production of agricultural crops and forest products.

Silvo-pastoral system. The management of forests for the production of wood and for raising domestic livestock.

Agro-silvo-pastoral system. The management of land for the production of agricultural crops, forest products and domestic animals.

Source: Agroforestry Today 3(2):11-13. April-June 1991.

Tree planting and livestock don't mix ...or do they?



Drawing B Alcaiga

A key component of the successful tree-planting project in Salle village, Nepal, was the introduction of stall feeding. Animals found grazing in the tree-planting area were impounded and their owners were fined

by
B. Thapa, L. Joshi, S.L. Sherpa, I.B. Karki, R.K. Kusle, Y.N. Jha, and M.P. Mainali

In the hills of Nepal, large tracts of natural vegetation that once protected the steep slopes from monsoonal rain have gradually disappeared as subsistence farmers have cleared the forests to obtain fodder, fuelwood, timber, and land for cultivation. The plight of these Nepalese hill farmers is similar to that of many rural communities around the world—declining forest resources coupled with smaller farms have led to more intensive and unsustainable agricultural practices resulting in lower soil fertility and degraded land.

The Nepalese Government has developed plans to preserve the remaining forests and, in addition, gives high priority to tree planting on farms. This is stressed in the recently completed 25-year Master Plan for the Forestry Sector. Yet, as many government institutions and development agencies have discovered, it is not easy to motivate farmers to plant trees.

Experience in Nepal and in other countries shows that inducements such as free seedlings are seldom enough. So, when a tree-planting project on private farmland is successful, it is worthwhile identifying what made it work. One such successful project involved the Pakhribas Agricultural Centre (PAC) and the villagers of Salle—a small community in Hattikharka Panchayat, Nepal.

Farmers see a need

Hattikharka Panchayat is one of seven panchayats in the PAC's Local Target Area where extension and research activities have been concentrated for more than 12 years. An extensionist trained in forestry has been based in the district since 1977, encouraging farmers to plant fodder and fuelwood trees on their farms. By 1987, some of the farmers had planted and protected blocks of trees on the *nagi* land—privately owned uplands above the village. These trees were already producing fodder and fuelwood.

In late 1987, a large group of farmers came to the PAC's Forestry Section seeking advice and assistance. They had decided to plant trees on the remaining *nagi* land. This upland area, owned by 68 households, was being used by the owners and other villagers as open grazing for livestock.

Following the request, the staff of the Forestry Section began a series of farm visits to find out exactly what help was needed. Initially, individual farmers were contacted at their homes to discuss their needs, problems, and some possible solutions. Further discussions were held with small groups of farmers. Women farmers, in particular, were encouraged to participate. All these meetings helped to establish rapport with the farmers and to create awareness of legislation governing private tree planting. Similar discussions were held with the local school teacher and pupils.

After a succession of farm visits, the forestry staff and the farmers met at the planting site above the village to decide on a plan of action. The outcome of this meeting was the formation of a com-

Salle village: some facts and figure

The population of Salle is about 1300, comprising 226 households with an average of 6 persons in each. Settlement and cultivated land is largely confined to areas below 1800 metres elevation. Above this, at the top of the village, lie about 30 hectares of privately owned downs or uplands covered in grass, known as *nagi*.

The soil in the area is acidic, with a high level of organic matter in the top soil. Annual rainfall averages about 1400 millimetres. The climate is monsoonal: 80 to 90% of rainfall occurs between June and September. Snow falls occasionally in winter, and there are frosts from the first week in December to the third week in February.

The average farm size is 1.5 hectares. The farmers grow mainly potatoes and maize and generally do not irrigate their fields. They also grow a few fruits and vegetables around their homesteads. Livestock, including chickens, pigs, cattle, buffalo, goats, and sheep, play an important role.

As there is almost no access to natural forest, every household depends on privately grown trees for fodder, fuelwood, and timber.

	Before Project		After Project		Change (%)	
	Number Owned	Percent Owning	Number Owned	Percent Owning	Number Owned	Percent Owning
Cattle	2.4	85	1.6	57	-33.3	-33
Buffalo	3.9	76	3.0	95	-23.1	+25
Sheep	3.6	28	0.2	4	-94.4	-86
Goats	4.3	52	1.9	42	-55.8	-19
Pigs	1.4	100	1.2	92	-14.2	-8

Table 1. Average number of livestock owned and percentage of farmers owning livestock in Salle village before and after the tree-planting project.

munity self-help group that would be responsible for developing a village-level project to plant the area over a two-year period. The PAC made a commitment to support the scheme with advice and to help establish a village nursery.

During the first half of 1988, the farmers' group met with staff of the Forestry Section to discuss how they would implement the project. The farmers decided to construct a nursery with labour contributed by each household, to prepare a simple plan for the plantation, and to formulate rules for the protection and management of the plantation area.

The group also selected one villager as a nurseryman. After undertaking training at the PAC, he went back to the village and constructed the nursery. The farmers helped excavate the site and supplied soil and bamboo poles. The PAC supplied plastic containers and water pipe.

Tree planting succeeds

During 1988 and 1989, the farmers planted 59,000 trees of 14 different species. More than 72% of these survived—tangible evidence of the project's success.

But what were some of the reasons for the villagers' commitment? And what changes have occurred since the project began? To find out, at the end of 1989, we interviewed 44 households selected at random from the population of Salle village.

Our survey revealed that livestock play a central role in the production system of these hill farmers. Domestic animals provide the main drought power for cultivation. They also process crop residues, provide essential organic manure, and generate farm income when they are sold.

However, as supplementary fodder from the natural forests diminished, it became increasingly difficult to find enough food for these animals. Similarly, fuelwood and timber, traditionally obtained from the forest, were also in short supply. This scarcity was clearly the major incentive for farmers to plant trees. They were also motivated by observing the trees planted previously by a few individuals, as well as by the long-term committment of the PAC.

The farmers' choice of species was revealing. *Alnus nepalensis*, an indigenous multipurpose tree, accounted for more than half the total planted, followed by *Ficus auriculata*, an important fodder species. Private tree-planting schemes in Nepal are sometimes criticized on the grounds that they are oriented towards cash rather than subsistence fuel, fodder, and timber—an orientation, it is said, that benefits the wealthier farmers. By contrast, the primary motivation of the farmers in Salle was to attain self-sufficiency in wood and fodder.

Advantages	Percentage Reporting	Disadvantages	Percentage Reporting
More manure produced	95	More fodder required	77
Healthy animals and more milk	19	Forced to reduce number of animals	19
Animals avoid leeches	19	More bedding required	100
More children in school	47	More tethering required	5

Table 2. Farmers' views on the advantages and disadvantages of stall feeding.

Protecting trees calls for tough decisions

Having made the decision to grow trees in a co-operative venture, the villagers spent several weeks deciding how to plant, protect, and manage them. The major problem was livestock: free-ranging animals have damaged young seedlings and destroyed many tree-planting projects elsewhere in Nepal. But in Salle, the farmers developed a detailed plan for the protection of their trees.

The farmers' plan centred on the decision to introduce compulsory stall-feeding for all their livestock. To help enforce this decision, they built a small pound. Any animals found grazing in the plantation area were put in the pound and the owners were fined. Villagers who did not own their own land were allowed to cut grass from *nagi* without payment, provided they consulted the land owners. People caught stealing grass from the *nagi* were fined. To help enforce these rules, all owners of *nagi* land took turns providing a watchman. They also had to contribute labour for the construction of fire lines.

Within a short time, many farmers in Salle village had adopted stall-feeding systems for their animals. Specialists have often stressed the importance of stall feeding in the hills of Nepal, but attempts to promote this practice have often failed. Why was stall-feeding adopted so quickly in Salle?

For one thing, the villagers *themselves* had decided to adopt stall-feeding, even though this required major changes in their husbandry practices. In fact, about two-thirds of the farmers interviewed had to reduce the number of animals they owned in order to be self-sufficient in fodder. It is doubtful whether this could have been achieved so easily if the directive had come from outside the community.

Table 1 shows some of the major changes in livestock ownership immediately before and after the decision to introduce stall-feeding. Apart from chickens, the average farmer kept fewer animals after the project was initiated. Interestingly, although the numbers of buffalo owned by each farmer decreased, the percentage of farmers keeping buffalo increased. The major reduction in sheep and goat numbers could be associated with their browsing habit and the difficulty of keeping them in stalls. Another factor may have been an earthquake in 1989, which caused considerable hardship and forced farmers to sell livestock to obtain cash.

When the farmers were asked for their opinion about stall-feeding, they mentioned several advantages and disadvantages (see Table 2). The most striking response concerned the increased number of children attending school. These children were previously engaged in herding animals. Now they collected some fodder before they went to school and any additional fodder required was collected by adults.

All the farmers interviewed said that the total time spent caring for livestock was about the same, but that farm labour was better utilized with stall-feeding. Previously, at least one member of the family had to be herding animals full time.

These results contradict the commonly held belief that more labour is required to feed animals kept in stalls. One factor, in this case, could be the reduction in the numbers of animals, which reduced the demand for fodder and thus for labour.

Some lessons

The wide variation in socio-economic, agronomic, and ecological conditions of subsistence farmers suggests caution in transferring the Salle experience directly to other communities. Nevertheless, some interesting principles have emerged.

For one thing, the forestry staff at the PAC recognized from the outset that the farmers were well aware of the problems associated with a declining supply of tree products from common forest land. In other situations, development workers have assumed that farmers lack awareness and knowledge of trees—an attitude that usually results in poor consultation, indifferent participation, and not many trees planted or nurtured.

Second, because the crop, livestock, and tree components of the agricultural system were strongly interdependent, the farmers had to select tree species with all their needs clearly in mind. The Salle farmers knew what species they wanted. The high seedling survival rate demonstrates their willingness to learn and to apply appropriate establishment techniques.

Finally, the experience in Salle has shown the value of a patient extension effort over many years—one that develops a rapport between the forestry staff and the farming community. This long-term approach, plus the ability to respond quickly and appropriately to farmers' requests, are the keys to success.

This article is based on A community scheme to encourage private tree planting by farmers in the hills of Nepal, Technical Paper 134, published by the Pakhribas Agricultural Centre in May 1990. Further information may be obtained from Pakhribas Agricultural Centre, c/o BTCO, P.O. Box 106, Kathmandu, Nepal.

Designing Windbreak Experiments

by
Richard D. Coe

In the previous issue of *Agroforestry Today* (January–March 1991, pages 15–16), Esohe G. Oboho and L.C. Nowboshi described a two-year windbreak experiment they conducted in Northern Nigeria. Here are a few practical suggestions for other agroforesters who may be interested in studying the effects of windbreaks.

Researchers may wish to conduct experiments either to evaluate the effectiveness of windbreaks or to compare different designs. In either case, the principles of experimental design are the same as for other field experiments. However, there are a number of practical difficulties specific to windbreak experiments. Some points to consider are listed here:

- **Site:** Can you find a site for the experiment that has representative soils and exposure to wind? Can you find a site that is a large enough? Remember that the experiment could be on the ground for several years.
- **Plots:** The plots are the areas of land on which different treatments will be applied. Each plot must be large enough to contain enough of a windbreak and surrounding land to show how the system as a whole would behave. Thus, if the windbreak design involves parallel hedges, each plot will have to contain several hedges, not just one. Remember the effect of a windbreak will be different in the middle and near the ends. Each plot will have to be large enough to evaluate an area uncontaminated by end and edge effects. As in other experiments, you must also replicate the plots to compare the treatment effects with random variation.
- **Treatments:** The treatments are the different windbreak designs to be compared. Are you going to include a control treatment with no windbreak? This will be necessary if you wish to evaluate the overall effect of the windbreak. The control plots will have to be situated far enough away from the others not to be affected by them, but near enough to ensure that they experience the same wind conditions.
- **Field layout:** Remember the usual principles of randomization and blocking. In arranging plots into blocks, you are trying to group similar plots together. These will probably be plots that you anticipate will be exposed to similar wind patterns. Orientation of the windbreaks is a key consideration. Normal practice is to orientate perpendicular to the direction of the prevailing wind. Because wind direction may change at different seasons, you must choose the orientation based on the time of year when protection will be most important.
- **Measurements:** You have to decide what measurements to take in order to compare treatments. Do you want to measure effects on crops and soil or on meteorological variables? Meteorological variables such as windspeed, rainfall, evaporation, and temperature are easy to measure. However, you have to think carefully about the sampling frequency—do you want to know about gusts or is the total wind run in 24 hours sufficient? Interpretation of findings can also be difficult—how much does wind speed have to be reduced for a windbreak to be useful? Measuring crop yields is an alternative, but if differences in crop yield are found for different windbreaks you might want to know why, and this would require information on the meteorological variables. Finally, if reducing wind-blown soil loss is an objective, you will have to try to measure that.

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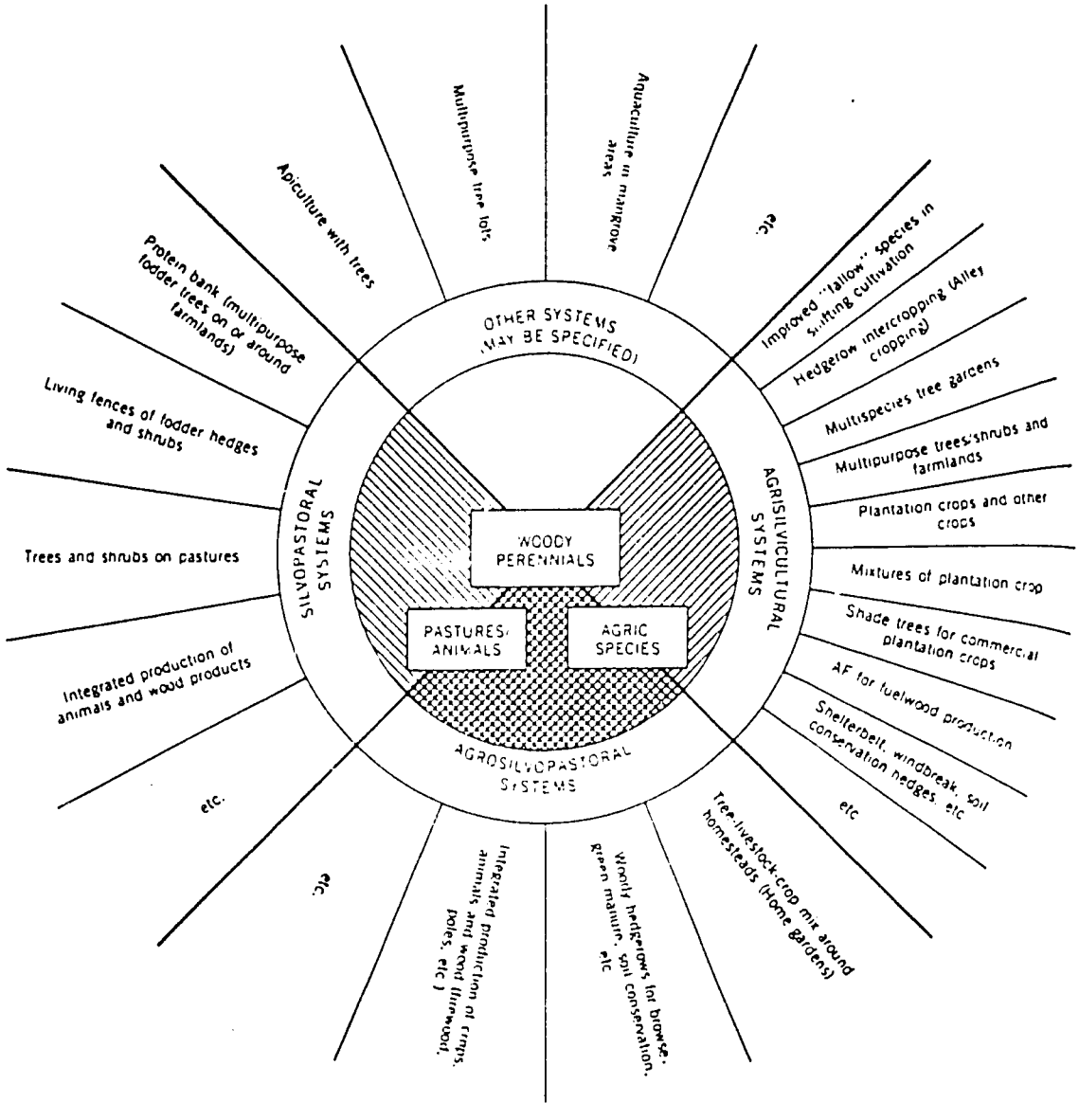


Figure 2.1 Categorization of agroforestry systems based on the nature of components (with examples of common subsystems or practices under each system).

Source: Nair, P.K.R. 1985. Classification of agroforestry systems. Agroforestry Systems 3: 97-128.

Agroforestry Configurations

Arrangement	Nature of components	Potential Benefits	Potential limitations
Taunga	agrisilviculture	- landless people can get government land for cultivation - free tree planting and protection - timber production - crops protected by trees	- government land must be available - area must be suitable for crop production - tree affect on crops
Shelterbelts Windbreaks	agrisilviculture	- crop protection - animals kept off - shade benefits sometimes	- management difficult - shade problem - competition
Hurri (improved fallow)	agrisilviculture	- fixing nitrogen - increasing soil fertility - products (pit props)	- competition for water - makes it impossible to grow anything or to graze
Plantations	silvopastoral	- timber & fuelwood - fodder - land stabilization	- grazing impossible
Alleycropping	agrisilviculture	- reduces risk - improve soil fertility	- small landowners can't adopt it
Nurse crop	agrisilviculture	- frost protection - provide shade - wind protection	- competition for nutrients and water - late maturity of crops
Live fences	silvopastoral & agrosilvopastoral	- protection of cash crop from animals	- obstruction in farm operations
Boundary plantations	agrisilviculture	- increased productivity. - more land under cultivation - delineates boundaries	- shade,water competition - management
Dispersed trees	agrisilviculture	- diversification labor & land resources - Water for lower strata	- obstruction of ag. operations - competition of birds

FINANCIAL ANALYSIS

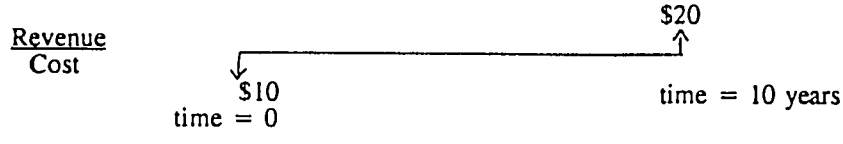
Rationale

Natural resource managers need to have an understanding of the sources of income for people whose behavior they are attempting to influence. They need to be able to gather the basic information on inputs, outputs, and markets to determine cash flow for traditional land uses. This unit looks at the information that must be gathered to understand the cash flow for a small farmer. This information is then used in a cost-benefit analysis to present a comparison of traditional land uses with those proposed by the extension agent. Financial analysis serves as an important tool in extension in presenting to the farmers the "with" and "without" project situations.

Concepts

I. Cash Flow

* the concept of revenues (benefits) and costs occurring through time. If $10 invested today would yield a $20 payoff in 10 years, would you undertake the investment?



Year	Cash Flow
0	- $10
10	+ $20

II. Interest Rate

* expresses values (revenues and costs) in common terms.
* components: inflation, risk, time preference
* nominal versus real interest rate - (real interest rate is nominal or stated rate of interest minus the rate of inflation)

III. Compounding

* expressing today's dollars in tomorrow's terms (the future value)

Put $10 in the bank at 5% for 1 year, you have:

$10	+	(.05) x ($10)	=	$10.50
Present value		Amount of interest ($0.50)		Future value

or, $10 (1 + .05)

or, in general: Present value x (1 + i) = Future value

$$P(1 + i) = F$$

where:
P = present value
i = interest rate
F = future value

Put $10 in the bank at 5% for 3 years, you have:

$P(1 + i)^{time}$ = Future value

$\$10 (1 + .05)^3 = \$11.58$

* Remember: $P(1 + i)^t = F$

IV. Discounting

* expressing tomorrow's dollars in today's terms (the present value)

if $P(1+i)^t = F$, then $P = \dfrac{F}{(1+i)^t}$

- from cash flow example:
Put $10 in a bank at 5% for 10 years, you would have at the end of the 10 year period:

$$\$10 (1 + .05)^{10} = \$16.29$$

What is the $20 received after 10 years equal to today?

$$P = F/(1+i)^t = \frac{\$20}{(1.05)^{10}} = \$12.28$$

V. Investment Analysis Criteria

If $10 invested today would yield a $20 return 10 years from now, would you undertake the investment?

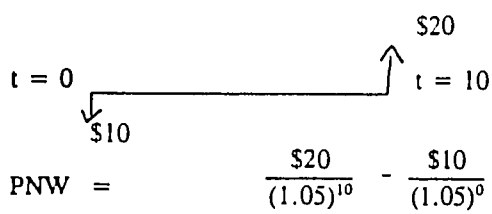
In using financial criteria:

- for any single project: does the investment yield a net gain?
- for comparing two alternative projects: which investment yields the largest net gain?

Present Net Worth or PNW

PNW = present value of benefits - present value of costs

If PNW is greater than $0.00, then it is a good investment.



$$PNW = \frac{\$20}{(1.05)^{10}} - \frac{\$10}{(1.05)^{0}}$$

= $12.28 - $10
= $2.28 therefore the investment yields a net gain of $2.28 (PNW is greater than $0) - it's a good investment

Benefit/Cost Ratio

$$B/C = \frac{\text{present value of benefits}}{\text{present value of costs}}$$

$$= \frac{\$12.28}{\$10}$$

$$= 1.23$$

does the investment yield a net gain?

if B/C is greater than 1.0, then yes, it's a good investment.

Source: Gregersen, Hans, Sydney Draper and Dieter Elz. 1989. People and Trees: The Role of Social Forestry in Sustainable Development. EDI Seminar Series. Washington, D. C.: The World Bank. Pg. 112.

Table 6.3 A Comparison of Financial and Economic Analyses

Item	*Financial analysis*	*Economic analysis*
Focus	Net returns to equity capital or to the private group or individual.	Net returns to society.
Purpose	Indication of incentive to adopt or implement.	Determines if government investment is justified on economic efficiency basis.
Prices	Prices received or paid either from the market or administered.	May require "shadow prices," e.g., monopoly in markets, external effects, unemployed or underemployed factors, overvalued currency.
Taxes	Cost of production.	Transfer of payments and not an economic cost.
Subsidies	Source of revenue.	Transfer of payments and not an economic cost.
Interest and loan repayment	A financial cost; decreases capital resources available.	A transfer payment and not an economic cost.*
Discount rate	Marginal cost of money; market borrowing rate; opportunity cost of funds to individual or firms.	Opportunity cost of capital; social time preference rate.
Income distribution	Can be measured based on net returns to individual factors of production, such as land, labor and capital, but not included in financial analysis.	Is not considered in economic efficiency analysis. Can be done as separate analysis or as weighted efficiency analysis with multiple objectives.

* Unless external loan.

Source: Gregersen et al. (1987), as adapted from Hitzhusen, (1982).

INTEREST RATE TABLE

1 + interest rate (i)

Year	1.02	1.05	1.10	1.15	1.20	1.30
0	1	1	1	1	1	1
1	1.02	1.05	1.10	1.15	1.20	1.30
2	1.04	1.10	1.21	1.32	1.44	1.69
3	1.06	1.16	1.33	1.52	1.73	2.20
4	1.08	1.22	1.46	1.75	2.07	2.86
5	1.10	1.28	1.61	2.01	2.49	3.71
6	1.13	1.34	1.77	2.31	2.99	4.83
7	1.15	1.41	1.95	2.66	3.58	6.27
8	1.17	1.48	2.14	3.06	4.30	8.16

Financial Analysis of Selected Shelterbelts Systems in Pakistan

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Abstract

Financial analyses of shelterbelt agroforestry system are compared for some regions in Pakistan. The study reveals that shelterbelts, though they may be competitive in biological terms, are supplementary in financial terms. The net present value analyses found wheat and sugarcane fields with poplar windbreaks to be financially sound in the Peshawar valley of N.W.F.P. Similarly, the agroforestry options of wheat sheltered by rows of shisham in the Mianwali region of Punjab and of wheat sheltered with eucalyptus in Tharparkar, Sindh were financially superior , to wheat monocropping. The study suggests positive financial incentives to land owner and tenant farmers for establishing shelterbelt agroforestry in these regions of Pakistan.

Introduction

The current status of agriculture in Pakistan emphasizes the need to develop efficient production system. For these systems to be successful and sustainable they must optimize the balance between input and output. Shelterbelts are considered to be one of the effective methods for increasing crop production efficiency.

Because the demand for fuel wood in the country is substantially greater than forest land can produce, privately owned farm and marginal lands must be put into production. The planting of shelterbelts/windbreaks, tree groves or individual trees in such areas is highly important since they are an integral part of the farming system. However, information regarding the economic benefits of tree rows/shelterbelts with respect to agricultural crops is scarce. The study will evaluate the economic benefits of selected shelterbelt systems.

Although the financial profitability of a shelterbelt varies with relative productivity, profitability also depends on the perspective. From the farmer's perspective, profitability is often measured in the broader economic terms of fuelwood, fodder, shade and shelter, control of land degradation, and provision of commercially valuable trees for timber, poles, and other purposes. All of these increase the value of the farm. From the government's or society's perspective, profitability incorporates not only these factor but also possible social benefits such as soil conservation, reduce wind erosion, alleviation of unemployment, improved rural economy, improved productivity, and decreased dependence on distant markets, both regional and international. The farmer is interested primarily in private agroforestry alternatives that are financially feasible for his own farm, while the government is interested in broader societal benefits and the possibility of increasing incentives to the private landowners to achieve them. In view of the current shortage in food supplies, it would not be possible for a farmer to raise block tree plantations on agricultural land. Trees could only be grown systematically around boundaries of agricultural fields.

This study looks at the information gathered to understand the cash flow for small farmers. The sensitivity of this information was also tested to present a range of comparisons of traditional crop oriented land uses with those proposed by tree oriented extension agents. Financial analysis serves as an important tool in extension in presenting to the farmers the financial difference between clear "with" and "without" alternatives.

Methodology

Data collection and analysis

The study was a part of thesis submitted by the author to the University of Idaho (U.S.A.). Three sites namely, Peshawar valley in NWFP, Mianwali region in Punjab and Tharparkar in Sind were studied in the analysis.

Data used in this analysis were collected by Pakistan Forest Institute personnel. The yield data were taken from a PFI publication on a shelterbelt windbreak project. This publication contains yield impacts but does not contain statistical or financial analysis (6). Economic data for food and tree crops were collected by students of the PFI, Peshawar in 1989 (1,8). The data obtained from farmers and market were summarized by the students and vary by crop and region.

A capital budgeting approach was used to determine the additional net cash revenue flows generated by the

shelterbelt investment over its economic life. More specifically, a net present value (NPV) analysis was employed indentifying the net value of the income stream. A common technique to incorporate effects of risk is to do a sensitivity analysis. The common risk in shelterbelts agroforestry is that wood prices may go down because of increased supply into the market or that prices of agricultural products may go up. The sensitivity analysis takes care of such questions to some extent. Such an analysis may help the decision makers (in our case a rural farmer) decide whether to invest in windbreaks or not. This analysis was carried out with price changes in input costs and market prices, as well as changes in yield functions.

Analytical Procedure

The analysis began with the cost of establishing agricultural and wood crops and ran through 6 - 10 - and 20 - year life span for poplars, eucalypts, and shisham (*Dalbergia sissoo*) shelterbelt, depending upon rotation. The crop data for wheat, cotton and suger cane were used in analysis. A representative budget under "with" and "without" windbreak conditions was constructed. The budget assumed a representative farm size of one hectare for each parcel of land in each locality.

Most international literature suggests complementarity of shelterbelts (3,5,7). However, the studies in Pakistan indicate competition in biological terms, probably because of the location of the studies. The shelterbelt in Pakistan extends over private lands in the irrigated tract of the country when production could be high without shelterbelts. There is insufficient evidence available in Pakistan regarding desert conditions in rainfed areas where production could be high due to the sheltering effect of trees.

Discount Rate

Because of the long investment horizons for shelterbelts and the exponential effect of discounting, the choice of discount rate is critical. In this analysis the discount rate used is 12 percent (4). This is a real rate which is calculated from the nominal interest rate less the inflation rate and which approximates the long-term average real rate of interest.

Defining Investment Horizons

Since rotations for all species were different for different regions, the sum of net present value of all alternatives was brought to a common point within a region in order to be comparable. In Peshawar valley, five rotations of poplar harvested on a six year period and three rotations of shisham on 10 years cycle were compared in analysis. In Punjab two rotations of poplar on a 10-year cycle and 1 rotation of shisham for 20 years with wheat were compared. Only a 10- years rotation for Eucalyptus was considered in Sindh with cotton and wheat.

Net Present Values and Benefit/Cost ratios were calculated based on annual cash flows and done "with" and "without" land rent at each of three discount rates: 10, 12 and 14 percent. The built - in command system of Lotus 1-2-3 was used to calculate the net present values of total costs, total benefits, and net benefits "with" and "without" land rent.

Results and Discussions

Influence of shelterbelts on crop yield

Crop yield showing the influence of shelterbelts at the three study sites are summarized in Table 1. These data suggest that wheat yields are less responsive to tree effect than yields of cotton and sugarcane. On the other hand, poplar reduced the yield of sugarcane by more than 10 percent in the Peshawar valley and wheat yield by about 10 percent in Punjab. Eucalyptus affects the yield of cotton by about 10 percent in Sindh while its effects on wheat yield is negligible. The effects are cumulative on a per hectare basis and are very conservative for Punjab and Sindh. Therefore,a sensitivity analysis associated with change in yield was also carried out for these two regions.

In wheat growing areas of the Peshawar valley, wheat and poplar generate the highest net present value (NPV): Rs. 85687.00 for owner cultivator and Rs. 57824.00 for tenant cultivator over a period of 30 years (Table 2a). Wheat and shisham generated the next highest NPV and the highest B/C ratio for all cultivators. There is probably no significant difference between these two options. The B/C for wheat alone is 6 percent higher than wheat with shisham. However, when relative and absolute financial criteria disagree, the absolute is the primary criterion.

In the sugarcane growing areas, poplar shelterbelts give the highest NPV of Rs. 109480.00 for owners and Rs. 53737.00 for tenants for the same 30 years period. The NPV of sugarcane alone is next. The NPV of sugarcane with shisham shelterbelt is less because the decrease in sugarcane yield due to shisham is higher than the associated cashflow increase from shisham trees.

Table 1.
Yield per hectare of agricultural crops "with" and "without" shelterbelt and the associated percent decrease in yield.

a. Peshawar Valley, N.W.F.P.

Crop or Crop combination	op yield in Kg	% decrease in yield due to shelterbelt
Wheat	4134	-
Wheat and Poplar	4087	1.14
Wheat and Shisham	4123	0.27
Sugarcane	67703	-
Sugarcane and Poplar	59883	11.55
Sugarcane and Shisham	63305	6.50
b. Mianwali, Punjab,		
Wheat	2800	-
Wheat and Poplar	2520	10.0
Wheat and Shisham	2800	-
c. Tharparkar, Sindh.		
Wheat	2800	-
Wheat and Eucalyptus	2800	0.0
Cotton	2527	-
Cotton and Eucalyptus	2274	10.0

Peshawar Valley, NWFP

There could be other reasons for relative financial efficiency of different system. Since poplar grows faster than shisham, it could give returns in 5 to 10 years while shisham takes 50 to 60 years to be fully marketable. The analysis of a 10- to 20 years horizon means harvested shisham could be used only as firewood, limiting the applicability of the shisham finding. Poplar is used for making match splinters and for packing, splinters and for packing, crating and shuttering as well as for firewood on a short rotation. The B/C ratio of this analysis favour using poplar for wheat and sugarcane and for owner and tenant cultivators.

Mianwali, Punjab

The wheat situation in the Mianwali region of Punjab is a bit different from the one in the Peshawar valley. The shelterbelt results are based on yield decreases of 10 percent using poplar and no decrease associated with shisham. Wheat and shisham combinations generate a higher NPV than the other alternatives over a 20-year period, a NVP of Rs. 31478 for owners and Rs. 17099 for tenants (Table 2b). This fact is also supported by the B/C ratio.

Growing poplars will probably decrease crop yield because the region is comparatively dry and poplar requires more water than shisham; hence it will grow slower here. also a good market system does not exist within reasonable economic distance.

Tharparkar, Sind

The financial results for the Tharparkar region of Sind are based on yield data which suggest no decrease in wheat yield and a decrease of 10 percent in cotton yield using Eucalyptus shelterbelts. Over a period of 10 years, the NPV of wheat and Eucalyptus is Rs. 22122.00 for owners and Rs. 14787 for tenants, while that for wheat alone is Rs. 18062.00 and Rs. 10995.00 in similar situations (Table 2 c). On the other hand, the NPV for cotton alone is better than that for the Eucalyptus - cotton combination. However, since the difference between these two alternatives is nominal Rs. 901.00 for

Table 2. Net present value and B/C ratio for crops 'with' and 'without' shelterbelts

	Peshawar valley, NWFP:	30 Years Investment horizen			
a.	Crop combinations	Owner cultivator		Tenant cultivator	
		NPV Rs.	B/C	NPV Rs.	B/C
	Wheat	51636	2.10	23764	1.32
	Wheat and Poplar	85695	2.87	57824	1.80
	Wheat and Shisham	56590	2.04	28719	1.39
	Sugarcane	101130	2.06	45388	1.30
	Sugarcane and poplar	109480	2.22	53737	1.38
	Sugarcane and Shisham	95658	2.04	39915	1.27
	Mianwali, Punjab:	20 years Investment horizen			
b.	Wheat	23871	1.88	9677	1.23
	Wheat and Shisham	31478	2.23	17099	1.46
	Wheat and poplar	30126	2.20	15792	1.42
	Tharparkar, Sind:	10 years Investment horizen			
c.	Wheat	18062	1.88	10995	1.40
	Wheat and eucalyptus	22122	2.10	14787	1.55
	Cotton	29240	1.79	17933	1.37
	Cotton and eucalyptus	28338	1.82	16703	1.37

Note A 12% interest rate was used for all sites but the amortization period ranges from 10 to 30 years.

owners and Rs. 1205.00 for tanants), operators may be indifferent about choosing between them. Certainly, it would be difficult for extension foresters to sell windbreaks with this such small and uncertain differences. Eucalyptus, though fast growing, does not have a viable current commercial market except as firewood. Also, cotton yield is adversely affected by trees.

In all cases the returns owner cultivators (without land rent) was greater than the returns to tenant cultivators (with land rent). B/C for owners ranged from 1.79 to 2.87 while B/C for tenants ranged from 1.27 to 1.80.

Sensitivity Analysis

A sensitivity analysis associated with increases or decreases of input/output prices was also tested for a simple case in Peshawar, NWFP. The test revealed that, though there is enormous change in NPV, the agroforestry option with poplar is better than wheat monocropping.

To illustrate how a decrease in wood prices might affect a decision, a simple case in Peshawar valley is presented where wheat and wood are supplementary. The costs of inputs were assumed to increase and to prices of wheat to decrease a 3 percent annually, while the prices of poplar wood were assumed to decrease at 3,5,10 and 15 percent annually (Table 3.a.).

The NPV for an owner cultivator under decreasing wood prices at 15 percent, per year decreases to Rs. 30070.00, which is still higher than the NPV for wheat alone (Rs. 2102[illegible]). The same tendency also holds true for tenant cultivators. Supplementarity assures that this condition will hold over large ranges.

Assuming constant input costs and wheat prices, large decreasing prices of wood were tested until an operator would become indifferent between pure crop and a crop with a poplar shelterbelt (Table 3.b). At an enormous 45 percent decrease in wood prices, the NPV for an owner is Rs. 51523.00 with shelterbelt and Rs. 51625.00 for a pure wheat crop. A 45 percent annual decrease in wood price is so large that it will not affect the decision to plant shelterbelts under supplementarity between joint products.

Table 3: Sensitivity of NPV of wheat alone and wheat with poplar S.B. at Peshawar valley associated with decrease in wood price discounted at 12%

a. 3% increase in input cost, 3% decrease in wheat prices and 3,5,10 and 15 decrease in poplar wood price.

	Crop Combination	Owner cultivator	Tenant cultivator	Rate of decrease in wood prices
Return from wheat decrease at 3%/annum	Wheat	21023	-14288	-
	Wheat with poplar	46487	11156	3%
	-do-	42168	6837	5%
	-do-	34697	-614	10%
	-do-	30070	-5240	15%

b. No increase or decrease in costs of input or prices of wheat and 0 to 45 percent decrease in prices of poplar wood.

Constant input prices

	Crop combination	Owner cultivator	Tenant cultivator	Rate of decrease in wood prices
Constant wheat prices	Wheat	51625	23745	-
-do-	Wheat with poplar	85687	57807	0%
-do-	-do-	76844	48985	3%
-do-	-do-	52525	44645	5%
-do-	-do-	65053	37173	10%
-do-	-do-	55105	25935	30%
-do-	-do-	51523	23643	45%

Conclusions

The preceding financial analysis suggests that shelterbelts in several regions of Pakistan compete with crops in biological terms but supplement them in financial terms. Though the results are preliminary and conservative in nature, they provide a good understanding of the crop-tree interaction (both biologically and economically) for future discussion and guidance with respect to integrating shelterbelts into the agroforestry system of Pakistan.

Since a price support program for agricultural crops exists to keep farms running, which actually basis the decision against windbreaks, some sort of arrangement could be made to provide tree planting incentives in the form of land revenue exemption and credit facilities for those adopting organized shelterbelts systems.

Property right stability and land tenure relationships can have a sizeable impact on the willingness and ability to undertake a long term investment in tree planting. At present, only owner cultivators can get the highest net income from the agroforestry system, and tenure uncertainty would cause lower expected values than discussed here.

The results of the study are conclusive enough that shelterbelt agroforestry is financially feasible for certain crop combinations.

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BIBLIOGRAPHY

1. Ahmed, Irfannudin. 1989. "Financial analysis of agroforestry systems in Peshawar and Charsadda districts, N.W.F.P." M. Sc. Thesis, University of Peshawar. (Unpublished).

2. Akhtar, M. Ramzan, Derek Byerlee, Abdul Qayyum, Abdul Majid and Peter R. Hobbs. 1986."Wheat in the Cotton-Wheat Farming System of the Punjab: Implications for Research and Extension". PARC/CIMMYT Paper No. 86-8, Ayub Agricultural Research Institute, Faisalabad, Pakistan.

3. Filius, A.M. 1982, "Economic aspects of agroforestry". Agroforestry System 1: 29-39.

4. Longmire, Jim; Munir Ahmad and Sajid Hussain, 1987. "Farmer's Profitability of Alternative cropping Patterns in the Mardan District, North West Frontier Province of Pakistan". PARC/CIMMYT, PAK. Agricultural Research Council, Islamabad Pakistan (Draft).

5. Raintree, J.B. 1983, "Bioeconomic considerations in the design of agroforestry system". Plant Research and Agroforestry ICRAF, Nairobi, Kenya.

6. Sheikh, M.I. and Razaul Haq, 1985. "Study of Size, Placement and Composition of Windbreaks for Optimum production of Annual Crops and Woods". Annual Technical Report, Pakistan Forest Institute, Peshawar, Pakistan.

7. Stoeckler, J.H., 1965. "The Design of Shelterbelts in relations to crop yield improvement". World Crops, March, 1965: 3-8.

8. Zulfiqar, Mohammad. 1989. "Effect of tree crop intercropping on agricultural productivity in Peshawar and Charsadda, Districts". M. Sc. Thesis, Peshawar University, (Unpublished).

SOCIAL IMPACT

SOCIAL IMPACT ASSESSMENT

Rationale

Social impact assessment (SIA) is the systematic analysis of social change. When integrated into resource development efforts, SIA can be an important part of the planning process. At both the local and regional level, the impacts of forestry and agricultural projects can be significant. This unit will focus on how SIA can aid the land use planner and social forester in predicting social change and in designing projects that focus on people's needs. Theories of social change and the diffusion of innovations will be examined. Practicial techniques for collecting and analyzing social data will be presented and used by participants during field exercises. The role of gender in determining social impacts will also be presented.

Objectives

Participants will be able to:

1. Describe the human ecological perspective, its key variables of concern, and its usefulness in land use planning.

2. Describe and evaluate several techniques of social science data collection and analysis.

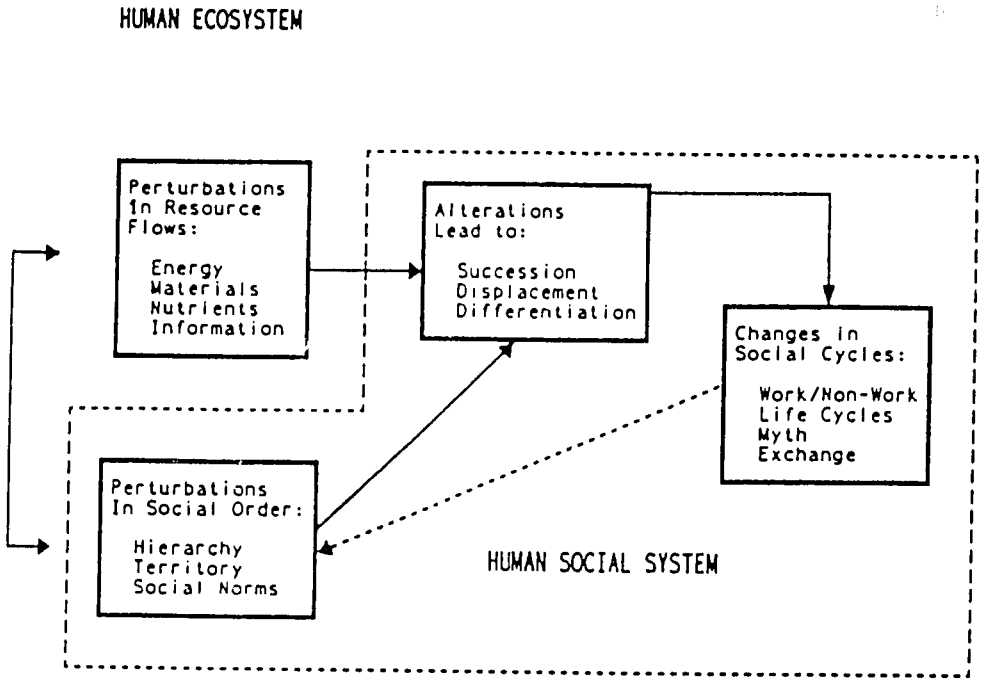
3. Use participant observation and social survey techniques and analyze the data obtained using these methods.

4. Gain an understanding of the importance of the adoption-diffusion process and be able to outline the characteristics of potential farm forestry adopters.

5. Recognize the importance of gender considerations in planning and implementing farm forestry activities.

6. Use simple tools to begin evaluating gender issues in their work situations.

A Conceptual Diagram of the Elements
in a Human Resource System



Source: Social Indicators of Development 1990. Published for the World Bank. The Johns Hopkins University Press. Baltimore and London.

Technical Notes

Sources and methods

By drawing on data already reviewed by specialized international agencies dealing with education (Unesco), health (WHO), and other social concerns, the Bank tries to begin with the most consistent and reliable series. The agencies generally collect statistics directly from the countries concerned; the countries endeavor to apply standard UN procedures, definitions, and classifications while using their special country knowledge to fit the data. But the specialized international agencies rarely have the resources to collect information universally on an annual basis; the available series are incomplete and sometimes inaccurate. The coordination processes involved and the delays in getting response mean that series tend to be less current in the specialized international agencies than in national agencies. Standard sources may therefore be supplemented by reports from member governments and figures obtained directly from countries. Another useful source is information published or provided by bilateral organizations with field staff and resident missions in many countries, such as the U.S. Agency for International Development and similar entities in Europe. Finally, the World Bank's own files provide additonal data processed by country economists and resident missions in the course of regular contacts with member governments.

SID provides a much fuller explanation of these sources and methods and, where appropriate, goes beyond conventional definitions to clarify some common misunderstandings.

Social change is measured at the level of the individual, the household, and the community, as well as for the nation as a whole. The numéraire is chosen for its appropriateness and relevance to policy issues. Thus income is measured for both individuals and households; population change is measured for urban areas and the country as a whole. The position of women and the impact of development on them is specifically identified wherever possible.

These cautionary notes are designed to enhance the reliability and to increase the usefulness of the numbers published. But the usual precautionary warnings about using the figures carefully still apply. In the meantime, the Bank is developing fuller documentation and performing more basic work on sources and methods where essential.

Data reliability

Most country data are drawn from regular administrative files, although some come from special surveys or periodic census inquiries. In the case of survey and census data, figures for intermediate years have to be interpolated or

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otherwise estimated from the base reference statistics. Likewise, because not all data are updated, some figures—especially those relating to current periods—may be extrapolated. Several estimates (for example, life expectancy) are derived from models based on assumptions about behavior and prevailing conditions. Issues related to the reliability of demographic indicators are reviewed in the UN's *World Population Trends and Policies*. Regular reports on sources of basic population data are given in the UN's *Vital Statistics* report. The table of most recent "actual" demographic estimates, in the technical notes, was prepared by referring to these sources and the related data diskette (PRED Bank) of the UN Population Division.

Inevitably, a few series report numbers on the borderline of acceptable quality and reliability. Although Bank staff try to delete clearly misleading numbers, borderline figures are usually included to give the benefit of the doubt to the compiler and to provide a more general perspective. They must be viewed in the context of the other information in the tables used to describe a country's situation.

The bibliography lists major sources for basic statistical series and social indicators. Data from these sources as well as those of the Bank are reviewed in the Bank's Socio-Economic Data Division, which checks for consistency, combines reports from various sources, and creates "derived" indicators, such as school persistence rates, using information provided by other agencies.

An important aim of SID is to promote greater international comparability and consistency in social statistics, but sometimes this is achieved at the cost of precision.

Explanation of Terms

Despite considerable effort to standardize the data, statistical methods, coverage, practices, and definitions differ widely. In addition, the statistical systems in many developing economies are still weak, and this affects the availability and reliability of data. Moreover, intercountry and intertemporal comparisons always involve complex technical problems, which cannot be fully and unequivocally resolved. The data are drawn from sources thought to be most authoritative, but many of them are subject to considerable margins of error. Readers are urged to take these limitations into account in interpreting the indicators, particularly when making comparisons across countries and economies.

Human Resources

Population (UN and World Bank)

Total population — World Bank estimates for 1989, based, in most cases, on a *de facto* definition. *Note* that refugees not permanently settled in the country of asylum are generally considered to be part of the population of their country of origin.

Age dependency ratio — Ratio of population defined as dependent (under 15 and over 64 years) to the working-age population (15-64).

Females per 100 males — Ratio of females to males for the total population. Under normal demographic and economic circumstances, a female to male ratio significantly below 100 in the general population reflects the effects of discrimination against women especially with regard to nutrition and access to health care, as well as the cumulative effects of excessive childbearing.

Population growth rate — Annual growth rate (1964-65, 1974-75, and 1988-89) calculated from mid-year total and urban populations.

Urban/rural growth differential — The tempo of urbanization, calculated as the net difference between the urban and rural growth rates. *Note* that it is not a net urban-rural migration measure because it also incorporates the basic demographic variables pertaining to births and deaths, which are likely to differ between urban and rural areas.

Projected population: 2000 — Information on total population by age and sex, fertility rates, mortality rates, and international migration in the base year 1985, projected according to country-specific trends, moderated by overall regional or global circumstances. The projections are based on a Bank model.

Stationary population — Projected population level when zero population growth is achieved: i.e., when the birth rate is constant and equal to the death rate and the age structure is stable.

Crude birth rate — The number of births per 1,000 population in a given year. The data are a combination of observed values based on a census or survey and interpolated and extrapolated estimates based on projection models.

Total fertility rate — Average number of children that would be born alive to a woman during her lifetime, if she were to bear children at each age in accordance with prevailing age-specific fertility rates. As in *crude birth rate*, the data are

a combination of observed values and interpolated and projected estimates.

Contraceptive prevalence — Percentage of married women of childbearing age who are using, or whose husbands are using, any form of contraception (i.e. modern or traditional method). Childbearing age is generally defined as 15 to 49, although for some countries contraceptive usage is measured for other age groups.

Child/woman ratio — The number of children under 5 years of age per 100 women age 15-49. As a gender ratio, this is an important measure of the reproductive/child care burden that women have to shoulder, and its implications for income-generating opportunities.

Crude death rate — The number of deaths per 1,000 population in a given year. As in *crude birth rate*, the data are a combination of observed values and interpolated and projected estimates.

Infant mortality rate — Number of deaths of infants under one year of age per 1,000 live births in a given year. As *in crude birth rate*, the data are a combination of observed values and interpolated and projected estimates. One or two countries, such as the USSR, employ an atypical definition of live births, which reduces the reported infant mortality rates relative to the standard (World Health Organization) definition.

Under 5 mortality rate — Number of deaths of children under 5 years of age per 1,000 live births in a given year. These are estimates derived from projection models based on assumptions about prevailing conditions.

Life expectancy at birth — Number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life. As in *crude birth rate*, the data are a combination of observed values and interpolated and projected estimates.

Labor Force (ILO)

Total labor force — The "economically active" population; a restrictive concept that includes the armed forces and the unemployed, but exclude homemakers and other unpaid caregivers.

Agriculture — Labor force in farming, forestry, hunting and fishing as a percentage of total labor force.

Industry — Labor force in mining, manufacturing, construction, and electricity, water, and gas as a percentage of total labor force.

Female — Female labor force as a percentage of total labor force. Labor force numbers in several developing countries reflect a significant underestimate of female participation rates.

Participation rate — Percentage of population of all ages in the labor force, based on ILO data, on the age-sex structure of the population.

Females per 100 males (15-64) — Ratio of females to males for the working age population. The significant differences between the urban and rural gender ratios reflects migration patterns.

Educational attainment of the labor force — Mean years of schooling embodied in the labor force.

Natural Resources (FAO)

Area — Total surface area in square kilometers, comprising land area and all inland waters.

Density — Population per square kilometer of total surface area.

Agricultural land — Estimate of area used for crops, pastures, market and kitchen gardens, or lying fallow, as a percentage of total land area (excluding area under inland water and rivers).

Agricultural density — Population per square kilometer of agricultural land.

Forests and woodland — Land under natural or planted stands of trees, whether productive or not, including land from which forests have been cleared but that will be reforested in the foreseeable future.

Deforestation rate (net) — Annual rate of change of forests and woodland area. A positive sign indicates an increase in the forested area.

Access to safe water — Percentage of population with reasonable access to safe water supply (includes treated surface waters or untreated but uncontaminated water such as that from springs, sanitary wells, and protected boreholes). In an urban area this may be a public fountain or standpost located not more than 200 meters away. In rural areas it implies that members of the household do not have to spend a disproportionate part of the day fetching water. The definition of *safe* has changed over time.

Income and Poverty

Income (World Bank)

GNP per capita — Estimates are for 1989 at current market prices in U.S. dollars, calculated by the conversion method used for the *World Bank Atlas*. Because they are not rounded, these figures differ marginally from those in other Bank publications.

Total household income — Income (both in cash and kind) accruing to percentile groups of households ranked by total household income. In some cases statistics obtained from other agencies are revised by Bank staff.

Poverty (World Bank, UN, UNICEF)

Absolute poverty income — The estimated level below which a minimal nutritionally adequate diet plus essential nonfood requirements are not affordable. These estimates are based on special surveys that, in most cases, are now over ten years old.

Population in absolute poverty — Percentage of urban and rural populations who live in "absolute poverty," mostly based on the surveys mentioned above.
Prevalence of malnutrition (under 5) — Percentage of children under 5 years with deficiency or excess of nutrients that produce disorders within cells, tissues, or the whole body, which are sufficient to interfere with a person's health, genetic potential for growth, normal psychological functions and ability to interact with other individuals and with their physical and social environment. Methods of assessment vary, but the most commonly used are less than 80 percent of the standard weight for age, less than minus two standard deviations from the 50th percentile of the weight for age reference population, or the Gomez scale of malnutrition. *Note* that for a few countries the figures are for children 3 or 4 years and younger.

Expenditure

Food (UN, FAO, World Bank)
Food as percentage of GDP — Percentage share of food in total household consumption expenditure, computed from the SNA defined details of GDP, collected for ICP Phase III (1975), Phase IV (1980) and Phase V (1985). For countries not covered by ICP, less detailed national accounts estimates are included, where available.
Staples — Bread, cereals, potatoes and tubers: a major subitem of food relating to the consumption of carbohydrates.
Meat, fish, milk, cheese, eggs — Approximating a protein measure but excluding beans, nuts, and other high protein-content food products.
Cereal imports — Measured in grain equivalents and defined as comprising all cereals in the Standard International Trade Classification, revision 2, groups 041-046. Cereal imports are based on calendar-year data.
Food aid in cereals — Covers wheat and flour, bulgur, coarse grains, and the cereal component of blended foods and is based on data for crop years reported by donor countries and international organizations, including the International Wheat Council and the World Food Programme. Food aid information by donors may not correspond to actual receipts by beneficiaries during a given period because of delays in transportation or recording, or because it is sometimes not reported to the FAO or other relevant international organizations.
Food production per capita — Shows the average annual quantity of food produced per capita in 1986-88 in relation to that produced in 1979-81. Food is defined as comprising nuts, pulses, fruit, cereals, vegetables, sugarcane, sugar beets, starchy roots, edible oils, livestock, and livestock products. Quantities of food produced are measured net of animal feed, seeds for agriculture, and food lost in processing. (The data are weighted by value and not calorie content which gives rise to a different perspective depending on the relative share of low- value high-calorie carbohydrates versus high-value lower- calorie livestock products.)
Share of agriculture in GDP — Covers forestry, hunting, and fishing, as well as agriculture. In developing countries with high level of subsistence farming, much of agricultural production is either not exchanged, or not exchanged for money. This increases the difficulty of measuring the contribution of agriculture to GDP and reduces the reliability and comparability of such numbers.
Daily calorie supply — Computed from energy equivalent of net food supplies in a country, per capita, per day. Available supplies comprise domestic production, imports less exports, and changes in stock. Net supplies exclude animal feed, seeds for use in agriculture and food lost in processing.
Daily protein supply — Protein content of per capita net supply of food. Net supply of food is defined above. Requirements for all countries, established by the United States Department of Agriculture, provide for minimum allowances of 60 grams of total protein per day and 20 grams of animal or pulse protein.

Housing
Housing (as percentage of GDP) — Percentage, computed as in *food* and reflecting actual and imputed household expenditure outlays, such as actual and imputed rents, and repair and maintenance charges, as well as fuel and power for heating, lighting, cooking, and so forth.
Average household size — A household consists of a group of individuals who share living quarters and main meals.
Fixed investment: housing — Percentage is computed as in *food*. Includes all outlays, public and private, on residential buildings, plus net changes in the level of inventory which in this context relates primarily to work in progress. (A major renovation or reconstruction would be included as capital formation).

Fuel and Power
Fuel and power (as percentage of GDP) — Percentage is computed as in *food*. Includes electricity, gas, liquid and other fuels, and ice.
Energy consumption per capita — Annual consumption of commercial primary energy (coal, lignite, petroleum, natural gas, and hydro, nuclear, and geothermal electricity) in kilograms of oil equivalent per capita.
Households with electricity — Conventional dwellings with electricity in living quarters, as a percentage of all dwellings.

Transport and Communication
Transport and communication (as percentage of GDP) — Percentage is computed as in *Food*. Includes the purchase of motor cars.
Population per passenger car — Total population divided by the number of private motor cars seating nine people or less.

Fixed investment: transport equipment — Computed as in *food*. Includes all outlay, public and private, on transport equipment, plus net changes in level of inventory.
Total road length — Includes main paved and unpaved roads as well as unclassified lower standard roads.
Population per telephone — The figures relate to the number of public and private telephones installed which can be connected to a central exchange. The data are generally those published by the International Telecommunication Union, as of December 31 of the year stated.

Investment in Human Capital

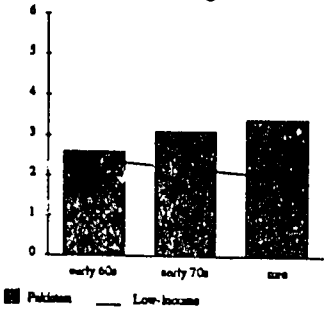
Medical Care (WHO)
Medical care (as percentage of GDP) — Percentage is computed as in *food*, covers government as well as private spending on medical care.
Population per physician — The figure for physicians includes, in addition to the total number of registered practitioners in the country, medical assistants whose medical training is less than that of qualified physicians, but who nevertheless dispense similar medical services, including simple operations. *Note* that the definition of recognized medical practitioners differs among countries.
Population per nurse — Nursing persons include graduate, practical, assistant, and auxiliary nurses, as well as paraprofessional personnel such as health workers, first-aid workers, traditional birth attendants, etc. Inclusion of auxiliary and paraprofessional personnel provides a more realistic estimate of available nursing/health care overall.
Population per hospital bed — The number of hospital beds available in public and private, general and specialized hospitals, and rehabilitation centers. Hospitals are establishments permanently staffed by at least one physician.
Access to health care — Indicates the percentage of population that can reach local health services by the usual means of transportation in no more than one hour. *Note* that facilities tend to be concentrated in urban areas. Some separate figures for rural areas show a much lower level of coverage, and hence access.
Immunized — Measures the full vaccination coverage of children under one year of age for two of the target diseases of the Expanded Programme of Immunization—measles and DPT (diphtheria, pertussis, tetanus). Coverage rates are supplied by member states. *Note* that for some countries the ages at which children are vaccinated may differ from the recommended ages. This is particularly true of European countries.
Oral Rehydration Therapy use — Percentage of diarrhoea episodes in children under 5 years of age treated with oral rehydration salts or a physiologically appropriate household solution.

Education (Unesco)
Education (as a percentage of GDP) — Percentage, computed as in *food*, includes government as well as private consumption expenditure on education.
Primary school enrollment — Gross enrollment of all ages at primary level as a percentage of school-age children as defined by each country and reported to Unesco. Although many countries consider primary school age to be 6-11 years, others use different age groups. Gross enrollment may be reported in excess of 100 percent if some pupils are younger or older than the country's standard range of primary school age.
Secondary school enrollment — Computed in the same manner as the primary school ratio; the age group again varies but is usually 12-17.
Tertiary enrollment: science and engineering — Students enrolled in science and engineering fields of study at both public and private institutions at the third level, as a percentage of all students enrolled at the third level. Field of study means the student's main area of specialization, based on the International Standard Classification of Education definition.
Pupil-teacher ratio — The number of pupils enrolled in school divided by the total number of teachers.
Pupils reaching grade 4 — The percentage of children starting primary school and continuing until grade 4, based on enrollment records. The data are affected by repeaters.
Repeater rate primary — Children in primary school who repeat a grade as a percentage of all enrolled children.
Illiteracy rate — Defined here as the proportion of the population 15 years of age and older who cannot, with understanding, both read and write a short simple statement on everyday life. This is only one of three widely accepted definitions and its application is subject to significant qualifiers in a number of countries (see Unesco's *Compendium of Statistics on Illiteracy*).
Newspaper circulation — Average circulation of a "daily, general interest newspaper," defined as a news periodical published at least four times a week.

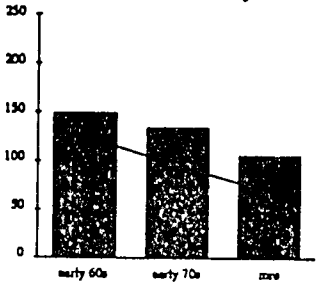
Pakistan

	Unit of measure	25-30 years ago	15-20 years ago	Most recent estimate (mre)	Same region / income group: Europe, Middle East, North Africa	Same region / income group: Low-income	Next higher income group
HUMAN RESOURCES							
Size, growth, structure of population							
Total population (mre = 1989)	millions	53	71	110	562	2,945	667
14 and under	% of pop.	46.3	45.5	45.2	37.6	35.3	37.9
15-64	"	50.1	51.6	52.2	57.0	60.1	57.6
Age dependency ratio	unit	0.99	0.94	0.93	0.73	0.65	0.73
Percentage in urban areas	% of pop.	23.5	26.4	31.6	53.9	37.4	59.2
Females per 100 males							
Urban	number	..	84	87	..	..	..
Rural	"	..	89	92	..	..	..
Population growth rate	annual %	2.6	3.1	3.4	2.1	2.0	2.1
Urban	"	3.8	4.3	4.8	3.0	5.6	3.0
Urban/rural growth differential	difference	1.5	1.5	2.0	1.5	5.8	1.9
Projected population: 2000	millions	..	..	154	714	3,620	831
Stationary population	"	..	..	556	..	..	..
Determinants of population growth							
Fertility							
Crude birth rate	per thou. pop.	48.0	47.4	45.8	31.8	29.8	30.0
Total fertility rate	births per woman	7.00	7.00	6.53	4.29	3.80	3.87
Contraceptive prevalence	% of women 15-49	.	11.0	11.0	..	56.2	..
Child (0-4) / woman (15-49) ratios							
Urban	per 100 women	..	69	71	..	..	..
Rural	"	..	76	76	..	..	..
Mortality							
Crude death rate	per thou. pop.	20.9	16.9	12.3	10.2	9.9	8.1
Infant mortality rate	per thou. live births	149.0	134.0	105.5	63.9	69.3	52.7
Under 5 mortality rate	"	..	..	130.8	63.5	161.0	81.5
Life expectancy at birth: overall	years	45.8	50.2	55.3	63.8	61.9	65.2
female	"	44.5	49.2	55.3	66.0	62.7	67.6
Labor force (15-64)							
Total labor force	millions	17	22	33	197	1,371	244
Agriculture	% of labor force	59.8	56.8	..	..	..	..
Industry	"	18.3	17.2	..	..	..	..
Female	"	8.6	[illegible]	12.3	26.5	35.9	30.2
Females per 100 males							
Urban	number	..	79	83	..	..	..
Rural	"	..	89	92	..	..	..
Participation rate: overall	% of labor force	30.2	29.4	30.0	38.8	49.5	38.8
female	"	5.4	6.0	7.6	20.6	35.0	22.6
Educational attainment of labor force							
School years completed: overall	years	..	1.2	..	..	..	..
male	"	..	..	2.3	..	..	..
NATURAL RESOURCES							
Area	thou. sq. km	796	796	796	14,738	36,997	21,088
Density	pop. per sq. km	66	89	129	36	76	30
Agricultural land	% of land area	30.5	31.2	[illegible]	31.5	36.1	36.9
Agricultural density	pop. per sq. km	217	286	399	116	212	82
Forests and woodland	thou. sq. km	21	28	33	1,025	9,154	6,084
Deforestation rate (net)	annual %	5.5	1.4	4.4	0.2	-0.3	-0.7
Access to safe water	% of pop.	..	25.0	43.0	..	..	63.5
Urban	"	..	75.0	83.0	..	73.4	77.2
Rural	"	..	5.0	27.0	..	..	46.8

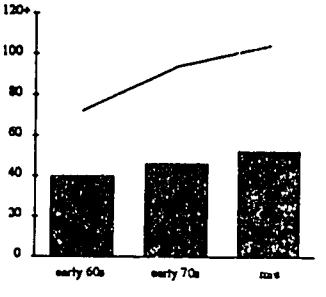
Population growth



Infant mortality



Primary school enrollment



Pakistan

	Unit of measure	25-30 years ago	15-20 years ago	Most recent estimate (mre)	Same region / income group: Europe, Middle East, North Africa	Same region / income group: Low-income	Next higher income group
INCOME AND POVERTY							
Income							
GNP per capita (mre = 1989)	US$	110	130	360	2,670	330	1,320
Total household income							
Share to top 10% of households	% of income	30	27	31	..	..	..
Share to top 20% of households	"	45	42	46	..	..	..
Share to bottom 40% of households	"	18	21	19	..	..	..
Share to bottom 20% of households	"	6	8	8	..	..	..
Poverty							
Absolute poverty income: urban	US$ per person	..	68	176	..	..	..
rural	"	..	47	122	..	..	..
Pop. in absolute poverty: urban	% of pop.	..	42.0	32.0	..	..	..
rural	"	..	43.0	29.0	..	..	..
Prevalence of malnutrition (under 5)	% of age group	..	..	57.1	..	..	..
EXPENDITURE							
Food	% of GDP	..	46.1	31.9	..	..	..
Staples	"	..	16.0	..	..	..	..
Meat, fish, milk, cheese, eggs	"	..	14.0	..	..	..	..
Cereal imports	thou. metric tonnes	1,591	1,349	378	'53,163	27,738	40,386
Food aid in cereals	"	..	789	657	..	7,122	7,767
Food production per capita	1979-81=100	85.1	93.3	105.4	103.9	117.8	99.9
Share of agriculture in GDP	% of GDP	40.2	32.0	27.0	16.5	32.8	15.2
Daily calorie supply	calories per person	1,797	2,149	2,200	2,991	2,342	2,741
Daily protein supply	grams per person	51	60	58	82	56	71
Housing	% of GDP	..	9.4	14.1	..	..	..
Average household size	persons per household	..	6	7	..	..	..
Urban	"	..	6	7	..	..	..
Fixed investment: housing	% of GDP	..	2.0	1.9	..	..	..
Fuel and power	% of GDP	..	3.8	4.2	..	..	..
Energy consumption per capita	kg of oil equivalent	135.3	136.5	207.3	1,462.6	323.8	843.7
Households with electricity							
Urban	% of households	..	..	..	..	..	..
Rural	"	..	..	..	..	..	..
Transport and communication	% of GDP	..	1.6	11.4	..	..	..
Population per passenger car	persons	428	349	213	24	..	30
Fixed investment: transport equipment	% of GDP	..	1.6	..	..	..	..
Total road length	km	..	..	107,673	..	..	..
Population per telephone	persons	..	296	154	13	..	17
INVESTMENT IN HUMAN CAPITAL							
Medical care	% of GDP	..	3.8	0.8	..	..	..
Population per: physician	persons	..	4,300	2,948	875	1,463	1,551
nurse	"	9,909	6,596	5,062	595	1,747	..
hospital bed	"	..	1,900	1,703	343	755	..
Access to health care	% of pop.	..	..	64.0	..	..	..
Immunized (under 12 months): measles	% of age group	..	..	53.0	74.9	43.5	62.9
DPT	"	..	..	62.0	79.1	41.3	65.2
Oral Rehydration Therapy use (under 5)	% of cases	..	..	41.5	32.0	21.6	27.5
Education	% of GDP	..	1.6	0.8	..	..	..
Gross enrollment ratios							
Primary: total	% of school-age group	40.0	46.0	52.1	90.5	104.3	102.0
female	"	20.0	28.0	35.1	82.1	94.7	101.1
Secondary: total	"	12.0	15.0	19.0	51.1	37.2	51.1
female	"	5.0	7.0	11.0	46.3	28.0	52.4
Tertiary: science/engineering	% of tertiary students	..	25.1	28.7	..	..	..
Pupil-teacher ratio: primary	pupils per teacher	42	40	41	29	29	26
secondary	"	20	18	18	18	18	17
Pupils reaching grade 4	% of cohort	..	56.8	50.7	..	67.8	..
Repeater rate: primary	% of total enrollment	..	..	..	6.1	..	8.6
Illiteracy rate: overall	% of pop. (age 15+)	84.6	79.3	70.4	..	43.4	25.4
female	% of females (age 15+)	..	..	81.4	55.2	56.5	31.6
Newspaper circulation	per thou. pop.	35.0	5.0	18.3	84.1	20.4	78.9

Source: World Bank International Economics Department, September 1990.

Source: Gregersen, Hans, Sydney Draper and Dieter Elz. 1989. People and Trees: The Role of Social Forestry in Sustainable Development. EDI Seminar Series, Washington, D. C.: The World Bank. Pg. 124-129.

Rapid rural appraisal

Obtaining information to design and implement projects or programs costs money and takes time, both of which are often scarce. Planners should not spend more on data collection than they must to get the information needed to design and execute a good project or program. Also, information generally has to be generated in a fairly short period so as not to lose the existing momentum of support for a project or program idea and the flexibility in design that exists before commitments have been made.

These two guiding concerns have led to a set of approaches to generating information on target populations. These approaches are referred to collectively as rapid rural appraisal (RRA) (see Beebe 1985; Chambers 1985; Khon Kaen University 1987; and references cited therein). The newer thinking in RRA questions the earlier assumption that a direct relationship exists between spending more money and time and acquiring better information (better in terms of ultimate project success) for two reasons. First, in many cases, additional information on more aspects of a community does not help to design a better project. What is needed is just enough relevant information on key factors to meet the objectives and to provide a framework for design that takes into account the wishes, needs, resources, potentials, and capacities of the local population. If the information needs are properly thought out, then in many cases only a few new items of information, combined with what has already been gathered and is known, will be sufficient for planning purposes. Second, more accurate information about a given event, resource, or need will not necessarily improve the social forestry project design or decisions about it. Certain minimum levels of accuracy (which will vary from case to case) are needed to reduce uncertainty in planning, however, in many cases, such levels are far below the levels that have been generated in existing surveys or community studies.

In addition, all information about a community does not have to be collected each time a new project is planned. Planners can often draw upon a wealth of existing social science information and use it as a base for quick verification in local communities. Too often planners spend insufficient time exploring existing data sources—including those quite separate from conventional forestry sources—before undertaking a new survey.

In sum, planners often generate too much information with a level of accuracy that far exceeds that needed to make good project or program design judgments. Generally, the greater the amount of information collected and the more accurate the measurements or observations made, the greater the time and resources that have been spent on gathering information. The key is to generate just enough relevant information of sufficient quality to permit making sound judgments on the issues addressed and objectives sought. This is what Chambers (1985) refers to as following the principles of "optimal ignorance" and "appropriate imprecision."

The RRA approach was born out of the frustration of field personnel who, on the one hand, had learned about the traditional, lengthy, and costly field survey methods used in the social sciences and, on the other hand, were faced with limited budgets and a time constraint. The aim with RRA was to find some approaches that were fairly quick, low cost, and reasonably accurate in terms of avoiding the common biases and problems associated with expert visits to project sites. Of particular concern are types of antipoverty biases listed by Chambers (1985):

- **Spatial (urban, tarmac, and roadside).** The poorer people are often out of sight of the road, having sold out and moved away. They tend to be concentrated in regions remote from urban centers and to live on the fringes of villages or in small, inaccessible hamlets.
- **Project.** Outsiders link up with networks that channel them from urban centers to rural places where projects exist, where something initiated by outsiders is happening or is meant to be happening, to the neglect of nonproject areas.
- **Personal contact.** Rural development tourists tend to meet the less poor and the more powerful, men rather than women, users of services rather than nonusers, adopters rather than nonadopters, the active rather than the inactive, those who have not had to migrate, and (inevitably) those who have not died. In all cases the bias is against perceiving the extent of deprivation.
- **Dry season.** In many tropical environments the wet season is the worst time of year, especially for the poor, since it brings hard work, food shortages, high food prices, high incidence of disease, and high indebtedness. Urban-based professionals, however, usually travel in the postharvest dry season when things are better.
- **Politeness and protocol.** Courtesy and convention may deter rural development tourists from inquiring about and meeting the poorer people. The visitor is also short of time, and the poorer people stand at the end of the line.

Many of these biases can be reduced by using common sense and the type of investigator who approaches each community with an open mind and as few preconceived ideas about the community and its needs and ways as possible.

In certain circumstances, more traditional, longer-term study of communities is justified and desirable, as in cases where past activity is being studied on an *expost* basis to gain general background information for future social forestry activity. Thus, RRA is not appropriate for every situation. Indeed, it can produce spurious and confusing results if not used with caution and understanding. However, RRA provides a starting point and a way of thinking that planners of social forestry projects can apply in the typical case in which they face resource and time limitations in trying to understand what is going on in project communities and to learn which of the four major constraints on local involvement—knowledge, resources, incentives, institutions—constitute the major barriers to planning and executing a successful social forestry activity or project.

Techniques for collecting needed information

Social scientists, working with agriculturalists and other biological scientists, have developed a number of techniques for obtaining rapid rural appraisal information. Based on the work of Carruthers and Chambers (1981), Honadle (1982), Chambers (1985), and others, the following list of possibilities emerges:

- **Examination of written records.** This is a commonly used method, however, planners too often overlook written records in their haste to get into the field, particularly when government records are not readily available.
- **Informal delphi technique.** Honadle (1982) describes this approach as a group discussion approach to consensus-building that engages informed persons in a dialogue that exposes variations in the interpretation of events, policies, or objectives. This technique aims to reach some degree of agreement in interpreting events through group discussion and is commonly used in many types of rural development projects.
- **Confidential interviews.** To the extent possible, the results of confidential interviews should be cross-checked and verified through several interviews or other sources. Often, confidentiality is difficult to secure, particularly in small villages.
- **Key informants.** This is a variation on the interview approach, in which one key individual is used as a filter of information; in a sense, the key informant is a local counterpart for the RRA team.
- **Formal workshops.** In this common method, groups of villagers, trainers, or other persons that have key information are brought together in groups to work on issues or problems; in the process, they provide the needed information for project planning or implementation.
- **Direct observation of behavior.** This approach is widely used to gather information, but can easily lead to erroneous conclusions if the observer is not adequately trained (box 7.3).

Table 7.2 Information Categories for Baseline Surveys

Demographics
- Population characteristics
- Population density; household budget, time use, energy needs
- Rates of population growth
- Migration patterns, employment

Land tenure and land-use systems
- Availability of land
- Possession of the land
- Rights of allocation and use
- Security of tenure
- Land use (agriculture, livestock, other)
- Past history of human association with trees

Social organization
- Institution regulating access
- Organization units (family, lineage, village)
- Decisionmaking
- Participatory systems
- Economic cooperation mechanisms
- Distributional mechanism
- Traditional marketing systems

Cultural attributes
- Religion
- Perceptions (of change agents, of forestry)
- Values
- Cultural practices, tradition

Incentive structures (role of)
- Economic (market)
- Social (nonmarket)

• **Ground observation of physical conditions.** A most important part of rapid reconnaissance is the reporter's ability to observe key indications: condition of crops, type of crops, condition of soils, housing standards, general health conditions.

• **Aerial surveys or inspections.** This variation on direct observation can be extremely useful if appropriate proxy measures exist that can be identified from the air or from aerial photos.

• **Village sample surveys.** Persons are picked at random or systematically and then interviewed.

In most cases, project planners use a combination of these approaches. For example, direct observation should always be part of a RRA no matter what other approaches are used. The advantages and disadvantages of most of these techniques are indicated in table 7.4.

Table 7.4 Data Collection by Rapid Reconnaissance

Data collection approach	*Advantages*	*Disadvantages*
Record examination	Language barrier is lessened. Documents can be reviewed at convenience of interviewer; does not disrupt staff activities.	Records are often inaccurate or inappropriate. Difficult to estimate sample bias. Limited range of variables covered can be very time consuming.
Informal delphi	Facilitates participation and exposes interpersonal dynamics. Increases accuracy of meanings imputed by researchers. Increases sample representativeness. Generates data beyond interview design. Low cost. Can begin dialogue among participants.	Minimizes extremes and range of perspectives by inducing consensus. Emotionally taxing. May require interpreter. Exposes view of informers. Susceptible to domination by a strong personality. Disrupts staff activity.
Confidential interview	Protects informer. Allows access to examples of actual dynamics. Increases extremes and range of perspectives.	Usually highly biased. Emotionally taxing Requires leads from other informants. If interpreter is required, protection is lost, interpreter may filter information. Sample may be limited or confidentially impossible in some settings.
Key informants	Useful in clarifying issues, testing conclusions of the investigator. Acts as filter to avoid culturally objectionable questions or data gathering techniques. Key informant linked to key decisionmakers can help prepare atmosphere for report. Involvement in process can build skills of informant.	Bias or perspective of key informants may have undue influence on results. Excessive time may be required to identify the best informants. Some informants may alienate people who are key to implementing recommendations. Rapport between key informants and evaluators is essential.
Workshop	Builds capacity as well as serving as information collection technique. Promotes interest and receptiveness results on the part of participants. Can lead directly to identification of strategies to improve situation. Communicates information to decisionmakers as part of collection process. Can produce formal commitments, recommendations, or analyses based on group effort.	Costly in terms of staff or beneficiary time and effort. Requires scarce facilitative skills for evaluators. Status difference among participants may affect attendance.
Direct observation	Provides primary data. Does not disrupt routine bias. Can expose data not anticipated by investigator. Low cost.	May be confounded by investigator's presence. Susceptible to misinterpretation by researcher. May contain seasonal bias. Lack of representativeness.

Source: Honadle (1982).

PARTICIPANT OBSERVATION

Note taking is the primary means of collecting field data as an observer. Usually, the observer has developed some guidelines prior to entering the field with respect to the particular phenomenon that will be observed. For example, in our exercise we will be observing rural life, with particular attention to the use of land for agroforestry and other forest-related activities.

Although we will be taking some notes as they occur, generally detailed notes are taken after leaving the field. For this reason it is often helpful to jot down "memory sparkers" so that later you can write down more details. "Sparkers" include the cast of characters present during the observation time; details in the physical scene which are unusual; critical verbatim comments that capture the central meaning; and any incongruent aspects of the scene.

After leaving the field, the general rule is that as much time is needed to write down what you have seen as the time you actually spent in the field itself. Notes should be written after returning home or the next morning. It is advised that you take down notes under different headings.

It is suggested that you keep five types of note materials.

Running descriptions - describing events, people, things heard; the physical setting -- often drawing a map is useful. The notes should include raw actions as they occur.

Recalled material that had been forgotten - one day's observations may help recall earlier incidents. Recalled material should be clearly labeled as recalls of earlier material.

Ideas that interpret the meaning of a situation - It is suggested that notes which offer an analysis of the situation should be set off in square brackets, so that when you go back to them, you will be able to differentiate what you interpreted about a situation from the raw description of what took place.

Personal impressions and feelings - subjective reactions you have as an observer; must be labeled as such so that you can separate them from other types of notes.

Notes for additional information - notes to remind you to take an extra look at something or to discuss something with someone else.

Analyzing the Results -- The task of analysis is to bring order out of the chaos of your notes! It is suggested that first, you should look for repeated patterns and common occurrences. Second, you should consider the converse. What is unusual, atypical or rare? The dominant cases reflect universals in a study.

(Source: Baker, Therese L. 1988. Doing Social Research. McGraw-Hill, New York. pgs. 241-44.)

Source: Feldstein, Hilary Sims and Susan
Gender Analysis in Agricultu
Hartford, CT: Kumarian Pres

Kenya: Part 1
Planning

"Let me give you some background," said Anna. "As you know, there was a terrific response to the president's tree-planting campaign. As a result, the Kenya Forest Department has begun to modify its emphasis on plantation management for timber production and is developing a rural afforestation extension scheme. However, it does not yet have the capacity in extension or seed production to meet farmers' needs. Up to now, they have relied on nongovernment organizations like CARE to propagate and distribute seeds to the groups with which they work. But this has been on a small scale. Now, the Forest Department and CARE want to develop a district-wide scheme, and the Forest Department wants a model for their own rural extension service. CARE is interested in the provision of fuelwood for subsistence level farmers, something which would benefit farmers as well as slow local deforestation. The overall objective is to improve rural welfare in Siaya District through tree planting. To do this, the project goals are to learn what species and what planting arrangements or configurations are suitable for different environments in Siaya, to produce more seeds and seedlings, and to train personnel for working with farmers. Parallel to this, CARE will be introducing those great new cookstoves which are so efficient."

As Anna put down the phone, David spoke up, "Tell me what you have been learning in the Mazingira project about working with groups."

Anna answered thoughtfully. "Well, as you know, we originally set up new groups with the idea that they would start nurseries and together have a demonstration plot. We were trying a number of interventions with both indigenous and exotic species. Alley cropping and border plantings with fast-growing, multipurpose trees were the most common. We are trying anything we can get which is known to provide fuelwood and not harm crops. *Grevillea robusta*, *Cassia siamea*, and *Leucaena* are most common, but we are trying many more. Now in each nursery, many different varieties are being grown and we are planting the best seedlings with farmers' crops. But there wasn't much sustained interest. The community plots really didn't go. Instead we are now working with individual farmers. Our field workers are walking with them over their land, developing maps, and then designing trials which fit each farm. We have about eighteen trials going now. This fine-tuning of farmers' own agroforestry systems to accomplish their own objectives within their own constraints is attracting much more interest, and we are learning more about the potentials and constraints of agroforestry. We've been monitoring them regularly and have a pretty good list of what species grow best in each zone. We've continued looking at both indigenous and exotic species and are beginning to get some ideas about which new (noncustomary) species may be substituted for known species, but provide better benefits through faster growth, better versatility, or less competition with crops."

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	KENYA
Area	584,000 km^2; 17% classified as medium or high potential for agriculture.
Population	15,327,000 (1979); growth rate 3.4%; rural population 87.6%.
Income	GDP/capita: Kenya shillings 2,800 (1980). Sources: tourism. Exports: coffee, tea, sisal, pyrethrum.
Ecological Zones	Varied: Coastal belt bordering Indian Ocean, central Highlands, northeastern desert and semidesert, southwestern lakeshore.
Elevation	Varies from sea level to 5,199 m.
Rainfall	Variable by district.
Currency	Kenya shilling (Ksh). Ksh 20 = U.S. $ 1 (1985).
	SIAYA DISTRICT
Area	2,000 km^2 centered on equator.
Population	474,516. Density ranges from 232 km^2 in Ukwala (north) to 143 km in Bondo (south).
Income	North: farming and remittances from off-farm labor. South: fishing, livestock, and farming.
Topography	Generally flat and undulating interrupted by scattered ranges of hills. Two main rivers, Yala and Nzoia.
Rainfall	800 mm on shores of Lake Victoria to 1800 mm in north. Patterns: long rains—March to June (sustained). short rains—August to November (short burst).
Elevation	1,140 m at lake shore to 1,440 m in hills.
Temperature	North: cooler, two crop system. South: one crop.
Soils	Extremely variable; widespread low fertility and poor drainage. Lake shore: heavy, poorly drained clays (Blackcotton or vertisols); Central south: sandy soils; North: well-drained red loams.

David looked up from his notes. "That's interesting about the groups. As you know, most of our research has been focused on individual farms. I have a colleague who is looking at land use problems on a larger scale, particularly soil erosion. She began working with women's groups in Kathama, in Machakos, to see to what extent they could help with gully reclamation. She found that they were organized mainly to help each other in labor exchange; that those who join do so because it is helpful to them individually. She also said not everyone can join because of the time requirements—poorer women with small children just don't have the time. There are a few men in those groups too. Since acquiring fuelwood and fodder had been identified as problems in that area, she thought group members would be interested in planting fuel and fodder trees in gullies. However, groups were more interested in starting nurseries for tree seedlings to plant on their own farms than in gully reclamation. Still, the nurseries seem to be working out well."

Anna leaned forward. "We have not yet done group interviews, but are planning to at the end of this season, evaluating the experimental plots. We have found that fast-growing legumes, such as *Leucaena*, have enormous appeal to farmers because of their fast growth and what they have been told about nitrogen-fixation. *Leucaena* does grow fast, but so far no plantings have been as bushy and fast growing as the ones we've been told about from the Nigerian experiments. *Grevillea* is also very popular since it produces poles without interfering with crops. Indigenous trees are not very popular, in large part because they are not new and farmers see little reason to plant them: 'They grow by themselves.'"

David nodded, "By meeting with the groups and with individual members, Mary has learned a lot about different niches for the planting and use of trees. Apparently, for fuelwood and fodder there is liberal access to trees in such places as public and semipublic grazing lands and along roadsides. Even on private lands, nonowners have some access rights. This is often the main source for poorer, often female-headed households. This was new information to the researchers carrying out trials with individual farmers. She also told me another story about this area. Three of the men farmers doing trials were raising their own seedlings, but women in their households were collecting and transporting the water. During the drought, they put their feet down and refused to transport water for seedlings from the only water source which was over two kilometers away."

"Hmm. Water is always a problem," Anna replied. "I am undecided about whether to begin with groups which already have nurseries, or to start new ones. The Mazingira groups were mixed, but most of our farm trials have been with men farmers. We found it extremely difficult to get information about fuelwood availability. The field officers and I have talked about this a lot and now are making a special effort to ask women about fuelwood—and we are getting some answers. Men clearly weren't interested. Now if you ask them about timber, or poles...

"What you learn there could be useful to ICRAF as well," David declared. "We are finding at Kathama that some farmers, the men doing trials and some of the women from the groups, are taking some of the species we've introduced and are planting them differently, or taking their own species and planting them in our recommended patterns. Some of their experiments are quite interesting. For instance, the original plan called for the classic alley cropping recommendation of using *Leucaena* and *Cassia* for mulch. Instead, they used biomass from fencerows and dispersed trees and put it in cow pens, a sort of precomposting, before putting it on cropland. In cropland, they planted fruit trees or used the multipurpose trees for fodder rather than mulch. In general, women wanted fruit and fodder trees in their nurseries. Alley cropping as it was originally set up in our experiments has nearly disappeared."

"David, do women plant trees in Kathama? I have heard that only men plant trees in Siaya, but we haven't found that elsewhere."

"Women do plant trees in Kathama," David replied, "although it was traditionally a few men who started nurseries and learned horticultural techniques. The recent project activity has made this knowledge available to most women in the community and they use it. However, there was no strong taboo against tree planting by women. We worked with individual farms and most were headed by men, but a few were actually run by women whose husbands were away on wage employment. They usually needed to consult with their husbands about whether and where to plant any introduced trees. Now in Kakamega, just northeast of Siaya, there do seem to be such strong beliefs, but some species which grow low and bushy such as *Sesbania sesban* are considered 'women's shrubs' and women harvest them regularly. The real resistance is to women planting commercially valuable timber or fruit trees. Well, I must go. I will think about an experimental program. Let's talk next week. Good luck with finishing the plan."

After David left, Anna reviewed the information she had on Siaya District, and the reasons that CARE and the Forest Department had picked Siaya. The district had a high energy demand and the potential for serious

deforestation. Farmers were seeking assistance in tree development, and the district forest officer had demonstrated great enthusiasm for decentralizing seedling production to small-scale nurseries, within closer reach of more farmers. Here there was momentum to build upon. Finally, there were many local nongovernment organizations and community groups, but the district was not overly full with assistance from other donor agencies.

Siaya presented a wide range of agroecological conditions, which constituted both an opportunity and a challenge to the agroforestry project. Soils were extremely variable, with widespread problems of poor fertility and inadequate drainage. The district's complex mosaic of landforms, soils, and climate was traversed by two main rivers (the Yala and the Nzoia) and numerous small streams. Together with the Yala Swamp and over one hundred kilometers of lakeshore, these features constituted one of the great resources of the district. The availability of water from rivers, swamps, or lakeshore could be a major advantage in tree planting, although waterlogging of soils might also limit tree planting and cropping activities in farmlands near water.

The natural vegetation in this landscape ranged from remnants of tropical rainforest in the extreme northeast to riverine forests, swamps, and dry acacia woodland in the south. This represented a large pool of local tree and shrub species to choose from, although little was known about most of them in forestry circles. Moreover, many of these species were disappearing, since they could not reproduce naturally under current conditions. Most of the trees in Siaya District were scattered as isolated individuals or clumps in grazing land, cropland, and homesteads. Both natural forest and swamps were under heavy pressure from harvesting of timber and papyrus respectively, as well as a strong tendency toward conversion to cropland. There was in fact a clear case for growing trees on farms in most parts of the district, across all of the ecological zones.

The higher potential, cooler and wetter zones in the north had two cropping seasons and could produce crops such as coffee, while in the south farmers struggled to raise a single crop of sorghum and millet, with perhaps a little cotton for cash. While residents of northern Siaya relied almost exclusively on farming and remittances from absentee men employed in cities and tea and sugar estates, the people in the south mixed farming with fishing and/or livestock production as major activities.

One of the most striking differences between the northern and southern extremes was the density of population, intensity of land use, and size of landholdings. In the north most of the area was occupied by cropland plots of one or two hectares, separated by hedges and occasional pastures. Trees were found on fencelines, in home compounds, and along stream banks, with a few scattered in croplands. In the drier south, cropland plots of one to five hectares were scattered within the large tracts of pasture, fallow, and occasional patches of dry woodland. Aside from the

woodlands, trees were also scattered throughout the grazing land, were fairly concentrated in home compounds, and appeared as isolated or irregularly dispersed individuals in cropland. According to George, the district forest officer, the scattered trees in croplands or fallowed areas were either left after bush clearing and tolerated for their by-products, or resulted from spontaneous regeneration.

There were very few free trees left in the north except for roadside shrubs which were heavily used by women for stickwood and fodder. Timber, poles, craft wood, and even high quality fuelwood were all commercialized due to the relative scarcity of large trees or preferred species in the landscape. Large, old multipurpose trees which used to provide abundant pods for fodder were being cleared for a single purpose, charcoal. Planted cypress and eucalyptus were common in small lots and on property boundaries. In the south, especially in the lakeshore communities, the demand for fuelwood to smoke the commercial catch, Nile perch, placed heavy pressure on the same land and trees which supplied the fodder requirement for livestock (cattle, goats, sheep). These open lands also constituted the frontier for expansion of cropland. While there were still more free trees left in the south, the environmental conditions were much harsher, so the deforestation would cause more serious damage to soil and water resources and it would be more difficult to grow new trees. (The traditional agroforestry practices which Anna observed are summarized in Appendix 7-C.)

In Siaya District, land was adjudicated and registered, usually to the male head of household.[5] Almost all land was privatized and fenced in the north except for hilltops and swamps owned by county councils. Some clan elders also held private grazing lands or water access points which were used by other clan members. By contrast most of the land in the south, except for cropland, was not fenced and was open to shared use for grazing and gathering, even if it was officially private property. Cattle, sheep, and goats also wandered freely through the landscape outside of the cropping season, which was a major constraint to tree planting.

Because the Forest Department was interested in what could be learned about extension from this project, Anna had interviewed people in each of the government extension services serving rural areas to find out what their field officers did, what training they had, and whether there were women extension officers. The Forest Department and rural afforestation extension workers had two years postsecondary education and were familiar with timber species, but had little or no training in agriculture or agroforestry. There were no women in the Forest Department extension service. The agriculture extension staff included both men and women. They had two to three years of postsecondary training, all in agriculture, with a little training in communication skills. The extension workers of the Home Economics Division within the Ministry of Agriculture, all women,

also had two or three years postsecondary training, with at least half of their program in agriculture. Community development workers from the Division of Social Services were also all women and had been trained to the B.A. level. They had little formal training in agriculture and none in forestry.

On an early field trip, Anna had been taken around by George, the district forest officer, to get a feel for the differences in agroecological zones and some of the nurseries already established. According to the forest officer and other people she met, there were basically four types of groups with which CARE might work. Some groups were officially organized and linked with schools, churches, or chiefs; there were also numerous women's groups that were registered with the government but otherwise unaffiliated. All the women's groups had a few male members and some were fifty-fifty. All the groups were Luo, the local ethnic group, and were principally clan based. The four types of groups to be considered were the following:

1. Chief's or subchief's nursery groups. Such nurseries were set up after the president had urged chiefs to make trees available for planting. They were assisted directly by the Forest Department's technicians with seed, tools, and advice. Farmers worked in the nurseries, often with the understanding that they would be paid later by the government in cash as well as in seedlings. In practice, payment most often was not forthcoming, and apathy was beginning to set in.

2. Church-based women's group nurseries. Such groups may or may not have been assisted by the larger membership of their churches. It was hoped that assistance to such groups would have a spread effect to the larger community through the church.

3. Nonaffiliated local women's groups. The Kenya Government Division of Social Services had indicated that in Siaya District there were a large number of women's groups struggling, not too successfully, with income-generating projects which could use some help. The district forest officer was aware of many such groups engaged in development activities, as some had applied to the Forest Department for assistance.

4. Primary schools. The District Forest Department stated that many schools had small-scale tree nurseries and many had applied for assistance.

Anna asked her secretary to hold all calls. She would take the rest of the afternoon to work on a plan for the project that would achieve CARE's objectives to help with deforestation, to develop a model which could be used for the Forest Department's extension service, to incorporate research into the extension process, and to identify and provide assistance for the best designs and species for different uses.

STUDY QUESTIONS

1. What are the ways in which women's and men's roles and preferences are likely to influence the introduction of agroforestry practices or species?

2. How can the proposed project be designed to encourage access for or benefits to women?

3. What is an appropriate job description for extension field staff? What criteria should be used in choosing staff? What should be included in training?

NOTES

1. The International Council on Research in Agroforestry (ICRAF) was established to undertake research on agroforestry practices and on species which could be incorporated into farming systems. For one year it ran a Kenya Agroforestry Tree Seed Project to identify and obtain tree seed appropriate for use in agroforestry projects designed by ICRAF with collaborating Kenyan institutions.

2. CARE International in Kenya (CARE Kenya) is a nongovernment organization which provides assistance to community development. Previous to the Siaya project, CARE Kenya provided financial assistance and project personnel to the ICRAF-sponsored Kenya Agroforestry Tree Seed Project and the Mazingira Institute's Agroforestry Plots for Rural Kenya Project. Other CARE activities in ten districts in Kenya are improvements in water supply, women's income-generating projects, primary school assistance, and assistance to youth polytechnic institutes.

3. The Mazingira Project was a joint project of the Mazingira Institute (a private consulting group which focuses on social research aimed at low income populations), CARE Kenya, the Mennonite Central Committee, and ICRAF. It was intended to examine the potential for promoting agroforestry land-use practices among small holder farmers. This was to be done through collaboration between local, nongovernment organizations and external nongovernment advisory organizations. It was the first effort to have the scientists, ICRAF, provide technical assistance to community groups.

4. When the CARE project began, agricultural and forestry research were both done under the auspices of the Kenya Agricultural Research Institute (KARI). This was later split into two institutions with forestry and agroforestry included in the scope of work of KEFRI. We have therefore used KEFRI throughout the text.

5. Since the late 1950s, much of the land in Kenya which was originally held communally has been measured, adjudicated, and registered to individuals as private property. The replacement of traditional communal property rights by private ownership has been accompanied by an erosion of the traditional responsibilities and protections of men and women. Women, particularly those widowed, divorced, or less favored wives, are especially vulnerable, since the absence of a husband or a husband's disfavor is not balanced by an enforcement of traditional rights.

Figure 7-2
Map of Siaya District Showing
Agroecological Zones and CARE Assisted Groups

Kenya: Part 2
The First Nine Months

David sat in the shade of the *Albizia coriara* tree under which people had gathered for discussion for many years. Its extensive leafy branches made a cool retreat from the hot sun. In front of him was the Nyasanga group's community nursery. At the moment five women, whose shift it was, were bringing water from the nearby stream and watering each seedling. Others were pricking out emerging plants from pots where more than one seed had germinated and were planting them in empty pots. Later in the afternoon, the CARE field officers would conduct a meeting with all the members of the group. The practice of arranging meetings to coincide with regular work days had resulted in good attendance of working members. As David rested he thought about how the project had started and how far it had come since his conversation with Anna nine months previously. He was now the project manager, and four field officers had been trained. Three months ago, nine groups began growing CARE seeds, sometimes in the corner of a nursery devoted primarily to timber species, and they would soon be planting out seedlings.

David was particularly pleased with how well the field officers were working with community groups. Mindful of the need to create a model for the regular Forest Department extension service, Anna had decided to experiment a bit with what made a good extension officer and what minimum education level was necessary. She had interviewed a number of people and had selected those who showed leadership skills and who had a variety of ethnic and educational backgrounds. James was a government extension agent who had worked with David in Machakos and had a three-year postsecondary diploma in agriculture. Francis had graduated from a secondary school with an agricultural curriculum and had spent two years doing extension work with a commercial firm. Joyce was a teacher with a home economics diploma. Robert had been a CARE field officer who had worked for a year on the Mazingira project.

The training program had been carefully designed to make the field officers critical analyzers of any kind of development effort. Anna and David wanted the field officers to recognize that they weren't experts, and that they needed to find out what the problems were and be problem solvers. To do that they needed diagnostic and interviewing skills as well as information about agroforestry technologies. The training had begun with hands-on work at the nurseries of the Mazingira project with a par-

ticular emphasis on record keeping. This included documenting seed collection and supply, seed treatment and management, storage, and when planted. They also tried out and discussed ways to keep groups motivated about their nurseries.

In conjunction with the hands-on experience at the nurseries, the trainees did classroom work on Diagnosis and Design (D and D), carefully taking apart each step of the D and D methodology, and they learned about different components (species and varieties) of agroforestry systems and about their arrangements and management. They learned to do farm sketches and diagnosis and how to follow up after planting. They practiced interviewing with role playing, eventually interviewing the trials farmers of the Mazingira project. To give them experience with groups, David had taken them to Machakos for a week. He had taken special pains to make sure Joyce was treated equally as a full member of the team. He insisted during that week that all the chores of housekeeping be rotated among the team members, leaving them no chance to leave Joyce with all the cooking and cleaning. The group interviews at Kathama were extremely productive. Once the team learned to make special efforts to ask questions of women, they learned a wealth of information about indigenous trees and uses.

For three weeks the group traveled to a number of tree projects, visiting large- and small-scale nongovernment organizations, individual, self-made innovative farmers, and school teachers who were well connected to communities and considered community leaders. This was to help the trainees learn about different project approaches as well as add to their inventory of possible interventions. Finally, they made a field trip to Siaya. Anna had held off on picking groups and had asked the trainees to interview a variety of groups and take part in selecting them. They had spent ten days interviewing local groups within each of the four categories. They were to look for groups which met these criteria: proximity to water sites and to a demonstration site, group provision of building materials to provide shade, secure tenure for site, evidence of group stability, high motivation, and willingness to meet the project's terms of assistance which would include a lot of interviewing. The nine nurseries chosen represented diversity in agroecological zone and group organization. One was a school group and two were chief's groups; all three had begun tree nurseries from which seedlings were sold. Six women's groups were selected—they had come together for various purposes: community gardens, labor exchange, crafts, or cooperative marketing.

Traveling with an expert on indigenous trees, the trainees had spent ten days touring the district, identifying indigenous species and current agroforestry practices. They learned that in Siaya planting was identified with new trees, usually timber species or fruit trees. Indigenous trees were viewed as something already there, to be used or managed.

The final week of training had been on formal communication skills, incorporating concepts of "I'm okay, you're okay."[1] This was done to reinforce the idea that extension in this project would not be top-down. Farmers were to be recognized as knowledgeable about their own practices and as already practicing agroforestry. This was a distinct shift from earlier practice where D and D had been used to learn about farmer circumstances, and that information used to design agroforestry technologies to be brought back to farmers as something new. Training also focused on techniques which would help ensure an equal voice for women and included role playing with each other, pretending to be shy women or outspoken men, or wealthy versus poor farmers. The implementation plan called for working with local groups to accomplish the following:

1. Identify needs for trees in their area (diagnosis).

2. Select appropriate species and general configuration (design).

3. Select with individual farmers good locations and configurations on their farms for planting trees directly (on-farm design).

4. Establish and manage nurseries for raising the selected species.

5. Establish demonstration sites near nurseries.

6. Develop appropriate tree management practices.

7. Monitor and evaluate activities and tree and crop performance, including participant judgement as a basis for modification or redesign.

The seeds given to the nurseries during the first season were chosen on the basis of Mazingira project experience: species that were popular in those project environments and which seemed suitable for the respective zones of Siaya, and species for which seed was available (see Appendix 7-D). The earlier inventory of indigenous species was taken into account. The established nurseries often had received timber and fruit tree species earlier from the Forest Department.

At the beginning of the year, the nurseries were given their materials and the field officers trained them in good nursery practices. The initial package of support consisted of funds for a guard, a wheel barrow, watering cans, a hoe, a rake, polybags for seedlings, and tree seed. Emphasis was on self-management of the nurseries rather than leaving them to a paid caretaker. Working through groups seemed to have been a good choice, since there were many well-organized groups in Siaya and there was not a

tradition of raising seedlings on individual farms. Soon the first seedlings would be ready for planting out and extension team members would begin making regular visits to members of these groups to assist in on-farm design and management. David estimated that most nurseries would have one thousand to two thousand CARE seedlings for planting out.

The plan also called for trials to evaluate introduced species under different agroforestry arrangements and under the ecological conditions in the district. A KEFRI field officer had been assigned to set up the trials at five research and demonstration sites associated with nurseries. David would be meeting with him the following week to go over the designs. Close monitoring of farmer practice was also called for. The project would change as more information was learned about the possible roles of agroforestry for small farmers in Siaya.

The nine nurseries had been established as concentration areas within each zone. The results of the trials and the D and D and extension done with these groups would be the basis of the technical packages provided to nearby groups.

David and Mary (his colleague from ICRAF) and the field officers were conducting interviews with each of the nine groups so that the project staff (and ICRAF) could develop a general procedure for diagnostic interviews with community groups. In previous diagnostic work by ICRAF and CARE, community interviews had come much later in the process. They hoped to get a good description of the existing system and how it worked and to identify land use problems that might be solved by agroforestry interventions. This format would allow the team to poll group members about types of trees and planting niches already of interest to them, and it would spur discussion among the clients themselves about some of the issues raised.

David read over his notes from the seven groups that had been interviewed so far (Appendices 7-E and 7-F). Several things were already evident: men and women had different knowledge, different ownership and access, different tasks, and different uses for trees. Men were interested in fodder and building poles, especially for sale; women in fuelwood; both in soil improvement. Some groups, particularly in the north, high potential area, were primarily interested in nurseries for income generation; that is, in selling popular seedlings such as *Eucalyptus* or *Citrus* for cash. Near the lakeshore there was a high demand for fuelwood for smoking fish. People bought fuelwood, or, if they couldn't afford it, used shrubs or *Euphorbia*. Women paid for it with their own money or with money from remittances. Some, but not enough, fuelwood was available on the roadside. In the diagnostic interviews, men were readier to speak up than women. The field officers were able to offset this by directing their questions to women, asking questions about which they would have special knowledge, or by approaching them with questions later when they were alone.

In the discussions and pooling of notes which had followed, the team had noticed that it was ranking, rather than defining, the problems that divided people more sharply. In many cases men and women recognized each other's problems and would mention them if asked specifically, or would accept the others' point if it was raised, but they usually disagreed on the relative importance of some problems and their solution. Overall, both men and women agreed on the need to improve yields, expressing an indirect concern for soil fertility and overall soil condition. At the end of the interview, group members indicated where trees could be planted and what species they would like to plant. The groups often chose the popular forest department species such as *Eucalyptus spp.* and *Cupressus lusitanica*, or the new trees, such as *Leucaenea* and *Gliricidia sepium*. The group interviews had confirmed the active use of a number of indigenous or naturalized trees and a strong interest in fruit trees.

David's notes indicated that the main gender issues to surface were whether women could and would plant trees, whether they could own the trees or use their products (whether the trees were planted by them or not), and which types of trees they would like to plant. During the interview at Ginga, the group members replied almost unanimously that a man (head, son) would plant the trees and would be considered the owner. When the women were questioned further about how this would affect their access to the trees and tree products, the women found this to be a strange question. Mary had recounted to them the experience of some women in a neighboring district who had helped to raise and tend trees planted and owned by their husbands or sons. They were denied access to the trees for coppiced fuelwood, since the men were keeping the trees for building poles, and the species and management practice did not provide much at all in the way of fuelwood by-products. The question therefore was whether these women felt that planting and ownership by men could result in such a situation. An elderly woman leader immediately replied, "One would not cook for such a man," to which first the women and later the men nodded in agreement. One of the elder men said, "That would be just." The team had agreed to let the question rest in the capable hands of the Ginga community without further concern for the moment.

In Nyasanga, where both men and women were farmers but where there were many absentee men and a clear division of responsibilities between men and women when both were present, these differences surfaced in the voting on priority farm needs. After listing all of the problems and needs that might be addressed by agroforestry technologies, the group had voted for their top-ranked choices. While everyone seemed to agree on declining crop yields as the number one problem, some controversy arose over the importance of fodder. The team had noted the apparent disagreement between some group members, and James (the dis-

cussion leader) had continued on to the next item, fuelwood. When nearly all of the women present registered their vote for fuelwood as number two, several men objected, accusing them "... but you promised to vote for fodder." Aside from being pleased that the whole topic of trees had aroused such fervent participation, the team had noted the division of interests, the attempt by the interested men to sway the women's choice, and the women's response, an independent vote. At a later interview in Ugege, the team had found a similar division of interests between women's interest in fuelwood and men's in fodder.

On the basis of the interviews and their own observations of what farmers did, the field team had decided that the most promising approach toward introducing agroforestry practices was to help farmers regularize current practices and do more planting in specific, complementary spaces. For the first season's on-farm planning with individual households, they decided to focus principally on (1) lines of trees, either living fences for protection of crops and fuelwood or boundary markers for poles or fodder and (2) alley cropping for mulch, fuelwood, and soil fertility, using the species available in the nurseries (Appendix 7-G). These packages would be the basis of the trials being conducted by KEFRI to establish the technical specifications appropriate to different zones.

The sharing of work and training as well as ownership of land, trees, and their products was still troubling Mary. She wanted to be sure that the project would introduce agroforestry technologies and would make plans that would be practical for women to manage for their own benefit. The project's approach would also require a better sense of local land and tree rights, both rules and practice, at the household and community level. Between rounds of group interviews, Mary brought up the question of the division of labor, access to resources, and control of resources between men and women.

David had very few answers, but he had just hired a young woman sociology student on vacation from the university. "Achola is from Siaya and she's expressed an interest in more in-depth social research on agroforestry technology development and extension in the district. Let's see if we can arrange for you to meet with her this afternoon. She ought to have some leads for you on these questions."

After Mary explained her interest in women's access to land and trees, Achola thought for a moment. "Under the law, on paper, the men own all the land and all the trees. But let me tell you how it really works: with a mix of traditional rules and changing practices. Most rural people live in extended family compounds, owned and managed by one man, with separate spaces for homes and fields allocated to each of his wives and later to their sons. Eventually some of the sons may move to a new site and build their own compounds while some remain on their father's compound and inherit their own portion of the holding through their

mothers. The exact sequence is a little complicated, but for us the important point is that any married woman or widow on the compound has rights to reside there in her own house, rights of access to a plot of cropland for farming, and rights to gather tree and other wild plant products from her plot or from the main fences, grazing areas, and communal lands subject to her husband's, son's, or father-in law's permission. The actual products, and particularly the harvested grain from each woman's field, are her own property. She can sell, store, or use them as she wishes. The only thing is, she's responsible for feeding and educating her own children, so it's important to get a surplus if she also wants to sell some for cash to pay primary school fees."

Mary looked puzzled. "Hmmm ... this is hard to picture. How does it look on the ground? Can you sketch a typical farm for me with men's and women's land, trees, and produce?"

"Sure," replied Achola. "Here's a compound with one elder man, his three wives, and two married sons—sons number two and three.The first son does not reside here as he must go to start a new compound elsewhere. The last son, the fourth, will be the one who stays permanently. [See Figure 7-3.] This is one version of current practice, a change from previous tradition. This will give you a general idea."

"That's pretty clear." Mary was relieved that the picture gave her a good visual grasp of spaces where trees could be planted.

But Achola hadn't finished yet. "Now remember that the man owns and allocates the land, so each woman's fields may change in size and location as the elder man or his sons take new wives."

"Whoops..." Mary continued her questioning. "So what happens if a woman plants a citrus tree in her plot and the plot changes after the tree has matured? Who owns the tree?"

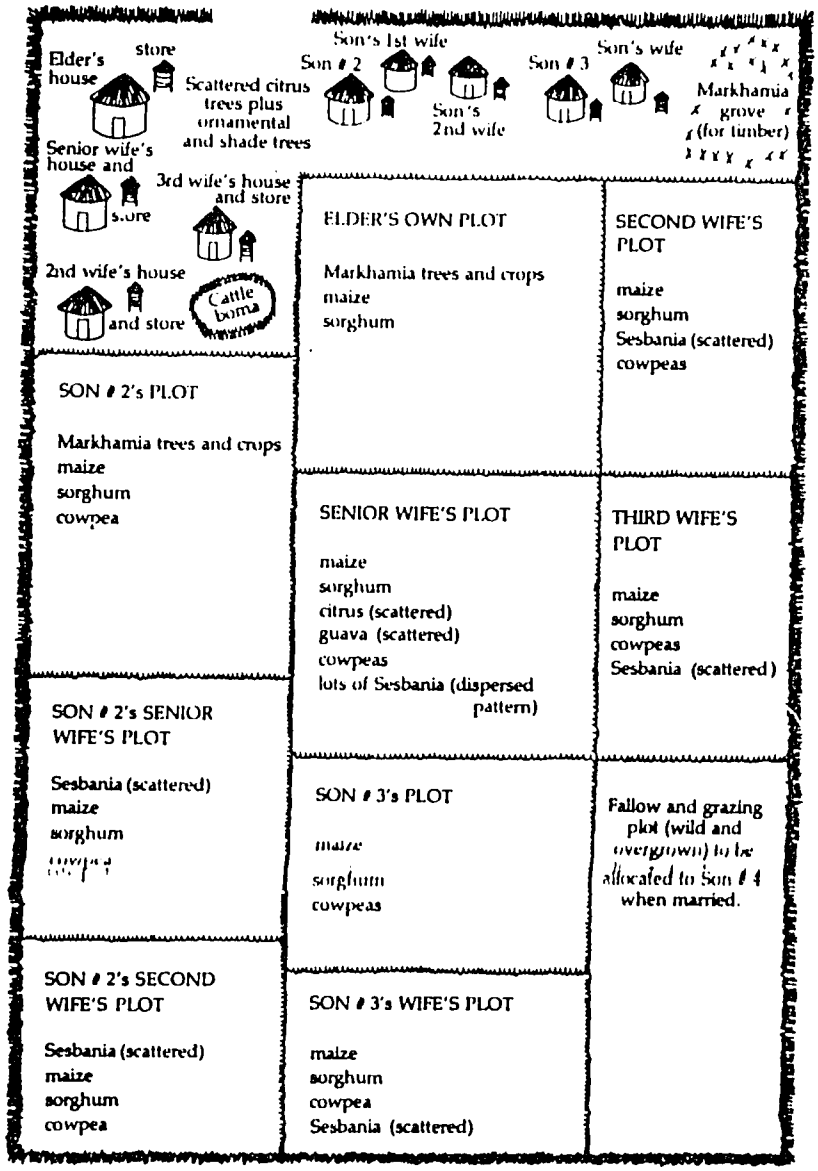
Achola responded quickly. "Mostly women don't plant trees, especially valuable trees for commercial products like coffee, timber, or exotic fruits. Probably her husband or son would plant it. But no matter who plants it, the tree is on the headman's land and it's a permanent thing, and a valuable one at that, so it's the man's property. But don't let that get in the way. The fruit would probably belong to whoever had managed and cared for the tree, if he or she continued to do so. Now if the woman wanted to cut the tree down and sell it for charcoal, that's a different matter; she'd have to ask the man's permission."

"What about some of these small trees in hedgerows? Or shrubs used for fuelwood, mulch or fodder? If a woman were to plant them or to have her sons plant them, would she need permission to cut them? On her cropland? On the boundary of her own plot? On the outside boundaries of the compound? Around her own house?" Mary paused in writing her notes.

"It will vary from one case to another," answered Achola, "but I'll tell you one thing: the men in the household, especially the headmen, are

Figure 7-3

Achola's Sketch of a Typical Farm in Siaya



going to have the most to say about where new trees can go and about who can use any existing trees in new ways. They may want to try out anything new on their own plot, which is worked by all of the women in the compound. Or, if they're skeptical about this, they may wish to limit new trees to spaces where there is little risk of interference with crops." Achola paused. "But tell me, Mary, what difference does all this make to the agroforestry project?"

"Yes," said David from the doorway. "How will this help us?"

"Maybe a lot." Mary spoke with conviction. "Ownership or secure access are usually important prerequisites for tree planting on a large scale. There could be two problems in this case: one is that if women don't feel secure enough about control over benefits, they may not plant, except for a few scattered trees here and there. The other possibility is that they do invest lots of time and effort in planting and then lose control of the benefits. This is less likely at the lakeshore where men's and women's work is still complementary. Or maybe the women plan their nursery work with one arrangement in mind and the men have a different idea which isn't compatible with the species already raised and ready to plant.... I'm worried about how the women in the nursery groups get from raising seedlings to having their own trees (or control of their own tree products) on the farm.

"What you've explained, Achola, may be worth a closer look. And I think that the field staff are going to face some tricky situations when they get to planting at the farm level. They'll have to deal with women's spaces (which are pretty limited) or with the nesting of women's plants and women's products into plots, and with planting arrangements under men's control. From what you said about the men's own fields, it sounds like women's control of their own labor and that of others can also be subject to prior demands from the senior men. Widows, wives of headmen versus sons, and senior versus junior wives may all have different constraints and opportunities in terms of planting places, arrangements, and management. And of course many people also now live in single family compounds, and their approach is bound to differ from the more common traditional situation you've just described. Gone are the simple days of interviewing the farmer. These field workers may need to know more about negotiation and less about trees!"

"Okay," said David. "But remember, this project is not only for women. Agroforestry and trees have benefits for both men and women, and what we are concerned with is improving family welfare as well as stopping deforestation. Still, I can see we're going to have a tricky transition from group nurseries to on-farm agroforestry practices, since both the actors and their roles will change. Let's think about what this means for the content and style of our farm level operations. In the meanwhile, let me introduce you both to Grace, a teacher who has done tree-planting projects in schools with both boys and girls."

Mary and Achola explained to Grace the project's concern about how to work directly with women in a situation where women's participation in tree planting might be limited. They had heard from the foresters that Grace herself was quite an active tree planter as were some of the girls in her school.

"It's very true that this taboo exists against women planting trees," Grace said. "You can't ignore it. Some people believe that it will bring bad luck and besides that they consider it to be inappropriate, much as building a house or doing other men's tasks is. But remember that it also used to be considered inappropriate for girls to go to school, or for women to teach school, like me. When I do tree-planting projects, I give the girls an opportunity and an example and I don't push. Lots of girls eventually join in, while others may limit their participation to the nursery work, which does not have this label as a man's job."

Mary wondered if this experience was typical. "But to what extent is the flexibility of some of your girl students due to their age and their level of education?"

Grace answered without hesitation. "Oh, there's no doubt. Age plays a part and so does education. But so does personality and group experience and the changing shape of families. Every woman in this district is probably involved in some activity that wasn't part of her mother's world. My advice is to make this activity available and let some women employees or leaders set an example, without a lot of fanfare. Then stand back and watch: you'll see some women planting trees, and some will find roundabout ways of getting the job done, and some will bring their menfolk into the picture as partners. Just be prepared to work with a whole range of different approaches."

Mary turned to David with a smile. "Well, David, it looks like you've got your work cut out for you. All this real-world complexity is going to demand a lot of creativity and flexibility from you and your field staff."

"And," David replied, "I've got to write a work plan and an activity calendar that give our head office and our field workers something concrete to hold onto. Let's talk about how to design this flexible construction over dinner."

STUDY QUESTIONS

1. What steps were taken by the CARE project to facilitate the inclusion of women in this project?

2. Evaluate the recommended agroforestry practices and species for Mutumbu and/or Ginga. What are the implications for gender?

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Pg. 194+

Kenya: Part 3
After Eighteen Months

HILARY SIMS FELDSTEIN, DIANNE E. ROCHLEAU,
AND LOUISE E. BUCK

A year and a half after the CARE project had begun work in Siaya, it had already expanded rapidly. The team had trained fifteen male and female extension workers to work directly with nurseries and individual farmers. The project was working with over eighty nurseries. During the year, 465,000 seedlings had been planted out, 150,000 direct seeded, and 25,000 trees established by cuttings. They were working with over one thousand farms and twenty-five school compounds; five hundred farms had been visited for individual D and D. There were over three hunc' ed alley-cropping systems established, though some of them were very experimental. Some farmers had planted one long line of *Leucaenea* or *Markhamia* across the field to see what would happen. Because of the widespread interest, the project began providing assistance to more groups with fewer materials; nursery establishment costs were down to just about Ksh 1,000 per nursery. The team was receiving many requests for assistance and was faced with questions of how rapidly and with what structure to expand.

Some new diagnostic techniques had been developed. The extension workers were not as skilled as their predecessors at probing for local knowledge of tree uses and species. A visitor from the Kathama project had suggested giving groups a week or so to answer some of the decision questions, including species preferences and priority uses for trees. This approach had interesting results. After thinking over what they needed trees for and discussing a bit among themselves, the group members had come back the following week with much longer lists, including many indigenous species used by women for a variety of subsistence products. The team observed that shyer members were more likely to speak up and that husbands and wives worked together, privately, on lists of preferred species. As a result, in voting on preferences and priorities, the groups had presented more varied lists of tree species and types of products desired than in the first round of interviews. Also, people had begun to ask questions about how to get and grow more of the local species. A number of indigenous or other preferred trees had been introduced into the nurseries' portfolios (Appendix 6-B).

oats. 1989. Working Together: Gender Analysi
.ching Notes. West Hartford, CT: Kumarian Press.

The interest of the farmers in the nurseries and the planting out of trees had allowed the team to dispense with the idea of nursery-located demonstration sites and instead to let farmer plantings serve as demonstrations. Decisions about who got seedlings had been left to the groups which worked out processes allowing for adequate numbers of seedlings for a good demonstration to one or two members, and an equitable sharing of the remaining seedlings to other members, with preference for those who had actively worked in the nurseries.

The team kept the goal of maximizing benefits to women participants clearly in mind. For instance, they taught nursery workers to pinch back *Cassia* and *Parkinsonia* at the early stages to make them bushier and better for fuelwood than for poles. The selection of the seedlings took place at the nursery, so those most active in nursery work, principally women, made the selections. Visits were made to half of the farm households to plan where the selected seedlings would be planted. Appointments were made specifically with the women, but if a husband was not absent the appointment was set for a time when the husband was there. If a decision could not be reached on the initial visit, time was allowed for private negotiation and the extension worker came back a week later. Follow-up interviews one month after planting showed that most households planted according to the agreed-upon plan. In three instances men had resisted certain species; and in three others, men had put trees in woodlots.

The general conclusion of the team was that it was acceptable for women to raise seedlings, because it was a new activity which lent itself to groups and most groups were made up of women. It was not a sex-stereotyped activity. Once women had done the work of raising seedlings and choosing what to plant, women went ahead and planted them. They identified with trees, unless there were serious objections from their husbands. Generally, once trees were planted out, men became more supportive of their wives' nursery work.

During the year, several research projects were designed to better understand the technical variables associated with different components, or species, and arrangements. These were (1) an investigation of soil fertility under different alley-cropping arrangements carried out by KEFRI, (2) a study of farmer views of two trees commonly found in farmers' fields, *Markhamia* and *Sesbania*, and (3) a mulching experiment testing soil fertility of the leafy biomass from different species, carried out by two consultants.

KEFRI EXPERIMENT

In the months of April and May 1985, five research trials were set up in five different regions of Siaya District. The main objective was to investigate the suitability of agroforestry trees in sustaining soil fertility. The trees chosen for intercropping with food crops were those that had been

shown to improve soils and to harmonize with crops in other regions with similar climatic conditions. The design and results of this research are reported in Appendix 6-C.

MARKHAMIA AND SESBANIA STUDY

During 1985, two Dutch researchers studied the characteristics and uses of two species found frequently planted in farmers' fields—*Markhamia lutea* and *Sesbania sesban*. The objective of the study was to learn more about farmers' reasons for planting and/or l[illegible]ng *Markhamia* and *Sesbania* in their fields and to investigate whether there was a contribution to soil fertility through mulching or directly through root rot. Such information would help to determine an optimal planting regime. The investigation included the following:

1. Observation of how the trees were planted in relation to crops

2. Yield measurements of crops over the season

3. Yield measurements of the tree (diameter, height, and depth of crown)
   a) When pruned and not pruned
   b) When scattered and in a hedgerow
   c) With different numbers of shoot

4. Soil samples around the trees

5. Interviews with men and women farmers with respect to
   a) methods of propagation
   b) uses

6. Mulching experiments

Markhamia lutea

Markhamia is a long-lived tree which is planted around the compounds as a boundary marker and for security. It is a source of building poles, fuelwood, timber, and other items. When a family moves and the old compound is turned into cropland, these trees are left and the maize is sown up to the stem of the tree. For hundreds of years, the trunk remains viable, producing two to four poles every two or three years.

In interviewing farmers, the investigators found that men and women gave different responses about the lives of the trees. Men often knew the

ages of trees because they had planted them. They knew how to manage the *Markhamia* in order to get good poles. Coppicing is considered a man's job, requiring heavy labor. Women were usually responsible for the crops next to the trees and used the leaves for dry-season fodder for their goats. If the tree was in a woman's plot, she knew the history of its cutting. Though she would actually prune the tree, she asked her husband how and when to prune it; he decided. Women cut out crooked poles to reduce competition for good poles. The crooked poles were sold for fuelwood as a source of income for school fees, for example.

Sesbania

Men were less informed about this tree than women. Women considered it a good fuelwood and were more often responsible for managing it. When the tree became old, it was cut and destumped and left to die. After it was dead it was pulled up. The investigators found that the nodules of this tree which had decomposed and released their fixed nitrogen after the tree was killed helped to fertilize the nearby soil. Women knew of this fertilizing effect because they observed better crop growth on the spot where the tree used to be. Some farmers therefore planted extra *Sesbania* in their fields.

Mulching Experiment

In the northern part of the district, the Dutch researchers carried out a small trial on the time for decomposition of mulch leaves. They compared *Markhamia* and *Sesbania* with *Cassia* and *Leucaenea*. Since more was known about the timing and nutrients of the last two species, they hoped to extrapolate additional information about the fertilizing capacity of the local trees. The investigation was carried on in the grounds of two schools with three replications each. *Leucaenea* broke down fastest and was eaten by termites. *Sesbania* was much slower to decompose and was not eaten. *Cassia* also was attacked by termites and decayed at the slowest rate. *Markhamia* was similar to *Sesbania* but sustained some termite damage. No clear conclusions could be drawn from these experiments because the termites fed on the leaves. It was observed that *Leucaena* and *Cassia* were preferred by the termites.

Appendix 6-A: Gender Implications of Recommended Practices: Mutumbu

Recommendation	Benefit	Who?	Gender Implications
Alley-cropping	Soil fertility	MA, FA	Which crops, whose fields?
Maize	Food, cash	MA, FA	Increased yields will depend on right species interaction; thinning or coppicing to remove shade.
Leucaena	Soil fertility	MA, FA	Depends on whose field, technical specifications not known.
	Fodder	MA, FA	May be competition between these uses; if used for fodder, needs to be protected from grazing cattle.
	Fuelwood	FA	Would supplement scarce fuel supplies, but possible competition for other uses.
	Mulch	MA, FA	Requires frequent cutting; is labor available?
Markhamia	Soil fertility	MA, FA	Tolerated in fields but actual interaction with crops not known. Alley cropping would be a new practice.
	Fuelwood[a] Timber poles?[a] Handicrafts[a]	FA MA ?	Considered a man's species so timber, poles likely to take precedence.
Gliricidia	Fuelwood	FA	
	Mulch	MA, FA	Depends on labor available.
	Fodder	MA, FA	Whose labor for cut and carry?
	Timber	MA	

Continued on next page

Appendix 6-A, *continued*

Recommendation	Benefit	Who?	Gender Implications
Spacing of trees and crops		MA?, FA?	Who plants? Effect on fertility and labor requirements for planting and pruning not known.
Fuelwood in woodlots	Fuelwood	FA?, MA	Question of women's access to woodlots (generally considered men's) or space for woodlots given pattern of moving women's fields.
Cassia	Fuelwood	FA	Poles and charcoal are competitive uses; fast growing. Can be coppiced and kept small for fuelwood.
Grevillea	Fuelwood	FA	Poles, timber, charcoal are competitive uses; poles are desirable for cash; alternate use is mulch which would contribute to soil fertility; medium growing.
Eucalyptus	Fuelwood	FA	Also considered a man's tree and valuable for timber and charcoal.
Markhamia	Fuelwood[a]	FA	Is used as fuelwood according to groups.
Hedges and windbreaks	Protection from wind	?	Depends on whose fields, compounds, etc. are being protected.
	Source of useful products	FA	Hedges or other boundaries near the homestead are more accessible for fruit, fuelwood, and perhaps fodder.
Grevillea	Various	?	See remarks above.
Cassia	Various	?	Neither species provides fodder and therefore would be good barrier to animals.

[a]Represents current uses by group, information comes from group interviews as Markhamia was not among the seedlings brought in by CARE

Appendix 7-E: Characteristics and Main Problems of CARE Nursery Groups

Group	Mutumbu	Ginga	Nyasanga	Warianda	Odkoga	Ugege	Nyawara
Women	24	22	28	6	8	80	0
Men	2	0	4	5	8	20	4
Nature of Group	Women's	Women's	Women's	Chief's	Women's	Women's	Chief's
Main problems ranked[a]							
Pests[b]	1	—	4	1,3,4	—	3,4,5	2
Striga	1	—	—	—	—	—	3
Soil Fertility	2	—	1	5	2	1	1
Ticks	3	—	—	—	—	—	—
Liverfluke	4	—	—	—	—	—	—
Rainfall	—	1	—	6	1	2	—
Fish	—	2	—	—	—	—	—
Cash	—	3	—	—	3		5
Fuel	—	4	2	—	4	7	4
Fodder	—	5	3	7	5	6	6
Land	—	6	—	—	—	—	—
Seasonal labor	—	—	5	2	—	—	—
Number of species used							
Crops	8	8	10	9	16	15	15
Fruits	11	6	10	6	11	9	1
Fuel	13	6	13	7[c]	8[c]	14	10
Timber	5	3	4	9	6	—	6
Fodder	8	7	7+	14	7	5	—
Handicrafts	2	7	4	6	—	—	—
Medicine	3	2	0	—	—	—	—
Planted on cropland	4	3	2	7	?	2	—

[a]Problems ranking: 1 = most serious, 7 = least serious.
[b]Multiple listings reflect ranking of specific pests.
[c]Includes species used for charcoal production.

Appendix 7-F: Field Notes from Group Interviews

	Mutumbu Women's Group	Ginga Women's Group
Agroecological zone	North, high potential, small hectarage	South, Lake Victoria shore; one rainy season
Farming System	Mixed—commercial and subsistence; strong dependence on off-farm income; intercropping system common in food and cash crops	Subsistence mixed-cropping with some cash crops (cotton, maize, or fruits), one crop per year; most do hand tillage; fishing and livestock important
Group Profile	Clan based, well-to-do clan; nursery in operation with expansion underway; twenty-four women and two men at meeting	Low-income farmers of fishing village seeking to supplement cash income. Formal group is recent; previously labor exchange on-farm. Twenty-two women and two male elders present at meeting
Household types	Extended family groups headed by male elders; many female-headed subhouseholds (common cooking) with absentee (wage labor) husbands	Few female-headed households; women farm and men fish, but men help with farm and women process and market fish; extended family and polygamous family units; shared compounds; each adult woman manages her own plot with husband
Crops	Fruits: Eleven species; bananas, papaya, citrus, and mango sold for cash	Fruits: Six species; tamarind for cash
	Other: Eight species; onions, potatoes, maize, beans, groundnuts for cash; finger millet, sugar cane, cassava for subsistence only	Other: Eight species; sorghum (preferred, most resistant), maize (bad yields), groundnuts and cotton for cash. Stored food is women's property; food in fields is men's property

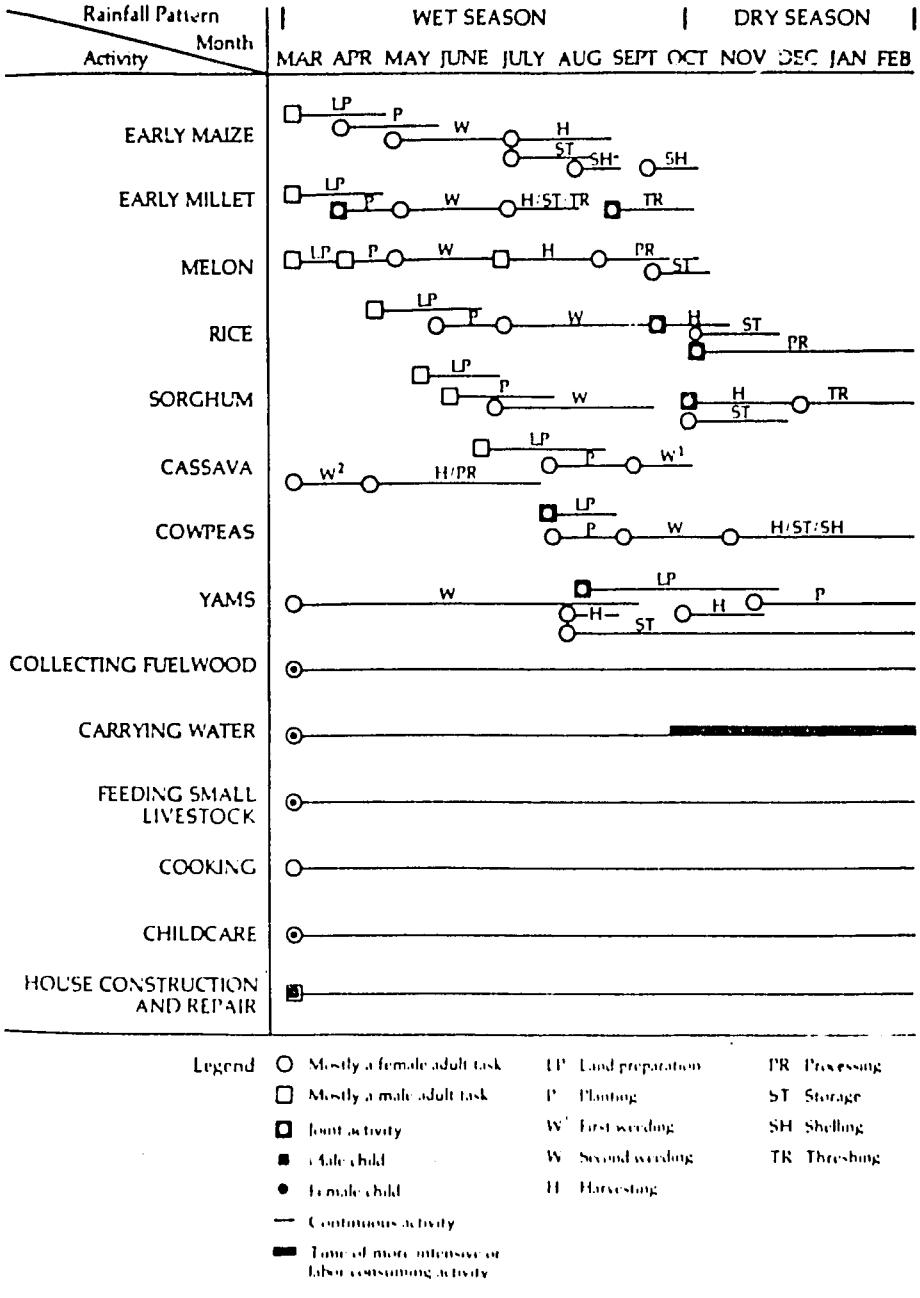
Continued on next page

Appendix 7-F, *continued*

	Mutumbu Women's Group	Ginga Women's Group
	Animals: Cattle (savings, long term), sheep, goats, chickens (sold often for cash)	Animals: Cattle, sheep, goats, chickens, one donkey, four oxen
Fuelwood	About half use charcoal in rainy season; fuelwood also purchased. Eleven species collected. Timber commonly purchased, though some sell	Six species listed; fuelwood needed for smoking fish
Fodder	Crop residues, napier grass, *Sesbania*, sodom apple; problem in dry season	Seven species listed (see below)
Most commonly used species	*Markhamia*—fuelwood, timber, handicrafts *Cupressus*—fuelwood, timber *Sesbania*—fuelwood, timber, fodder *Albizia*—fuelwood, timber, medicine *Eucalyptus*—timber	*Balanites*—fuel, subsistence fruit, fodder for cattle and pigs, spoons, building storehouses *Tamarindus*—fuelwood, fruit for sale, fodder in dry period for pigs and cattle *Markhamia*—timber, dry season fodder for cattle and pigs; preferred for furniture *Euphorbia*—fences, in very dry time fodder for goats; not liked *Cassia siamea*—timber, furniture, dry season fodder for goats
Planted in cropland	*Markhamia*—dispersed (agreement by two-thirds of group) *Sesbania*—dispersed (one-seventh of group) *Albizia*—lower density than *Markhamia* or *Sesbania* *Eucalyptus*—with sugar cane	*Markhamia*—left in cropland *Tamarindus* *Papaya*—planted *Cassia siamea*—infrequently; opinions divided over its effect

Main problems	Crop pests (striga weed, maize stalkborer, wild browsers, termites), soil fertility, ticks on animals, liver flukes (in people)	Rainfall, fishing catch (fish population disturbed), cash, fuelwood, cattle fodder, increasing land shortage
Possible planting sites	Cropland—about one-half Boundaries—all Woodlots—many Grazing land—few (a little on own farms) Home compound—most	Cropland—some Boundaries—all Woodlots—few Grazing land—few Home compound—most
Species suggested	*Markhamia, Albizia, Eucalyptus*	*Cassia* and *Eucalyptus*—for fuel and poles in boundaries and woodlots *Markhamia, Tamarindus*—in cropland *Balanites* and *Ficus spp.*—fuel, fruit, fodder; in cropland, fence, compound
Potential for trial sites	Eight people for trees in cropland	Most willing to try fence lines; four people will provide sites
Nursery objectives	Mix with commercial vegetable gardens, sell plants for cash seedlings for home planting	Vegetables for home, sale; seedlings for home, sale; want fruit, fuelwood, poles
Comments	Only two people have own grazing land; common use of some private plots and at roadways is major source of fodder. Off-farm income is a mainstay of the farm economy; major preoccupation of women's groups is for increased cash incomes, whether seedling-as-cash crop, fruit trees, poles for sale, or high-cost vegetable crops. Some interest in reduced spending for fuelwood; would plant more on farm	Heavy use of fuel for smoking fish; pay Ksh 5–8 per headload for fuelwood which will smoke twenty fish. Interest in replacing *Euphorbia* in hedgerows with fast-growing and more manageable fuelwood species. Men are present, employed, and actively interested. Economy of farm/fishing families is fairly commercial. Interest high for selling tree products or substituting own tree products for those now purchased, especially fuelwood used for smoking fish.

Figure 1-1
Example of a Gender-disaggregated Activities Calendar



Source Based on Mary E. Burfisher and Nadine R. Horenstein 1985. *Sex Roles in the Nigerian Tiv Farm Household* Women's Roles and Gender Differences in Development Cases for Planners, no. 2. West Hanford, Conn : Kumarian Press

GENDER CONSIDERATIONS IN PAKISTAN

Ms. Mamoona Wali Muhammad[1].

Introduction

Gentlemen we have just seen a video about gender analysis showing labor, income, expenditure and resources as the major sphere of human endeavors in which men and women collaborate in rural areas. When we talk of taking any action we generally talk in terms of carrying out an analysis of the situation from beginning to end so that we can reach a successful conclusion. Gender analysis is part of the analysis that needs to be done because in Pakistan as elsewhere in the world women form about half of the population; according to some figures, over 52% of Pakistan population is female, and we know that the roles of men and women are different and projects have different impacts on men and women.

Before I tell you about my idea of gender analysis, I would like to ask you to tell me what he you think that gender analysis means.[2]

Generally speaking gender analysis is considered as a methodology used to identify and analyze the roles and responsibilities of men and women in agriculture and rural development, and to this I would like to add forestry too. Simply speaking Gender analysis is, who (men or women), does what.

For the past one year I have worked with rural urban women in Taxila Tehsil and have found them very much alive to the real life issues confronting them in daily life. I have still to come across a women who was resigned to her fate or, afraid to discuss the issues that she thinks affect the family with the man in the family.

To give you an example, there is a lady in a village near Attock who has large tracks of land which she has planted with trees against the wishes of many male members of her family, just because she feels that the trees will add to the income of the

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1 SDFO Winrock International, 58 Margalla Road, F 7/2, Islamabad

2 Write definitions/answers on flip chart.

family.

Traditional roles of women in Pakistan

The pictures I will now show you will illustrate the point that I am trying to make, and also show the traditional activities of the rural women and the time spent:

Activity	Field of endeavor
1. Quilt making	Resource
2. Milk, lassi churning	Income/Expenditure savings
3. Wood load	Saving
4. Mud plastering	Labor/Expenditure save to improve sanitation etc.

Forestry Planning and Development Project has paid special attention to the improvement of women, an important segment of Pakistan's population by actively involving them in tree planting activities:

1. Little kids
2. School girls
3. Rural women in nursery et .
4. Urban women. Involving them in field visits, to witness the work done by their so called backward sisters.

Let us see if we can name some of the traditional and nontraditional activities of women in Pakistan.

Rural	Urban
Wood collection	Doctors/Nurses
Collection of fodder and feeding livestock	Education
Cooking	Office workers
Keeping poultry	Social workers
Milking the cow	Cooking
Mud plaster	Driving
Making dung cakes	Bringing up children
Water collection	Washing
Washing	Visiting
Visiting	
Attending to the sick	

Sewing, cutting, embroidery
Making hair braids
Making shalwar strings
Collection/preparation of vegetables/fruits
Using mud ovens (tandoor)

Now I will show you some slides about women forestry related activities that I have managed to get the women of my area involved in, over the last one year. After this I hope that I will be able to get some good and innovative ideas on how I can involve a greater percentage of women in my area in this activity - separately or in conjunction with their men folk - and at the same time, not offend the men and have them react negatively to the involvement of rural women of Pakistan in forestry related activities.

Constraints in Women's Participation

Projects that have made attempts to include women in their plans, have faced a number of problems and difficult constraints caused by socioeconomic situation of women in the society and the institutional orientation of foresters and other technical staff undertaking the project. The constraints generally thought as acting to restrict women activities in these fields are:

1. Women's restricted access to productive resource, such as credit, land, information, training, inputs, and marketing channels.
2. Women's restricted roles in public decision making (process) outside (and sometimes within) the household.
3. Restrictions on women's participation in some areas, in the labor market due to conflicting demands of child care and daily household tasks, including food preparation and fodder water and fuel collection.
4. Lack of skills or incentives for project personnel to incorporate women's knowledge, needs and preferences, into the design of intervention and the menu of technical recommendations.
5. Gap in knowledge about women and forestry.

From my point of view, these constraints are:

1. Social and cultural restrictions limiting the work of male workers with women upsetting social norms.
2. Rural women are generally have less education, thus needing greater and more time consuming activities for working.
3. Almost all current available data and statistics is on men, or without any differentiation between men and women.

IDEAS TO OVERCOME SOME OF THE CONSTRAINTS TO WOMEN'S PARTICIPATION IN FORESTRY

1. Work with small homogenous groups by mohallah.

2. Involve religious leaders to encourage women's participation in forestry.

3. Identify demonstration sites where people can see that women's forestry activities have contributed to family income.

4. Rules for appointments in different departments should be changed to allow for recruiting women in forestry.

5. Increase education opportunities for women (including increased literacy).

6. Introduce forestry in school and college activities (including practical activities such as nursery raising by girls).

7. Use women teachers as extension agents.

8. Encourage girl students to do a social work project in forestry.

9. Increase publicity/media to attract women.

10. Give incentives to the male family members for allowing women family members to participate (for example financial incentives).

11. Collect data by gender.

12. Sense of security for women needs to be created (trust).

MALAKAND SOCIAL FORESTRY PROJECT

PROJECT AREA	Malakand Agency Area 952 sq. Km Population 250,000
PERIOD	February 1987 - December 1991
EXECUTING AGENCY	NWFP Forest Department
SPONSORS	Pakistan and the Netherlands

MALAKAND SOCIAL FORESTRY PROJECT

OBJECTIVES

The main objectives of the Project is to raise the standard of living in the Malakand Agency by making better use of the environment, by increasing the production of the hillsides on a sustainable basis, by initiating community development activities, and to mane the Forest department become a technical backstopping agency.

STRATEGY

An effort is made to realize the objectives through community participation and ensuring benefits to all current users of the hillsides.

ACTIVITIES

Afforestation and plantation management
Rangeland improvement and management
Erosion control
Village starter activities
Village organizations
Women in development
Village savings
Training and orientation of Forest Department staff
Technical backstopping, extension and training

SUMMARY OF THE WID PROGRAM

	# 1	# 2	# 3
OBJECTIVES	To assist women in the performance of their role in the improvement of productivity and use of communal hillsides and marginal farmland.	To identify and support income generating activities related to forestry and range management.	To support the integration of women in the organization and activities of the Forest Department.
APPROACH	Assess present role of women. Seek possible improvements in present role and identify new opportunities. Go for it. Monitoring.	Identify present income generating activities relating to forestry and range mgmt. Improvement of present activities and seek new opportunities. Go for it. Monitoring	Identify opportunities for women in the Forest Department. Seek integration of women staff in the Forest Dept. Go for it by cooperating with FD. Follow up activities.
ACTIVITIES	Improved stove and bakery program. Livestock/range mgmt. program. Farm forestry. Environmental awareness raising program. Participation in land use planning.	Nursery development program. Bakeries establishment. Capital generating and investment. Bee keeping. Sericulture. Processing of fruit and vegies.	Private nurseries. Forest Department nurseries. Female forestry experts in the FD. Female forest extensionists. Multi disciplinary female staff in the Forest Dept.

WOMEN IN DEVELOPMENT

PROBLEMS

Problems at the Project level

- Limited staff
- Limited expertise and course of action
- Limited time span
- Limited knowledge about the target groups

Problems at the village level

- Reaction of village men
- Reaction of village women
- Socio-economic issues
- Lack of incentives to organize women
- Availability of baseline data on
  - Women's activities
  - Women's social and economic status

Female extension staff

- Availability of qualified extension staff
  - Village level
  - Supervisory staff
- Appropriate training and extension skills

Female implementing staff

- Availability of female staff in the Forest Department

Monitoring and evaluation of the activities

- Monitoring staff
- Evaluation of the activities

WOMEN IN FORESTRY

OBSTACLES

Women in policy making and planning forestry programs

- At the federal level
- At the provincial level
- At the Forest Department level
- At the project level

Women in the implementation of forestry programs

- Female expertise in the Forest Department
- Female expertise in the projects
- Female workers in the villages

Women as the target groups for such programs

- Participatory approach and the projects

AGROFORESTRY IN PARAGUAY

Getting a System Adopted Takes Skill and Planning, While Supporting It Afterwards Requires Continuous Agency Interaction or a Simpler Support Network

Patrick T. Evans

THERE ARE MANY TRADITIONAL land use systems which could be classified as agroforestry. Traditional systems range from simple forest grazing practices to intensive multi-cropping systems such as the Chaga Home Gardens on the slopes of Mt. Kilimanjaro (Fernandes 1984). Many development agencies and local governments are now emphasizing refinement of traditional systems and the development of new, more productive systems which are ecologically sound, i.e., sustainable, and are attractive to the local populations. Adoption of these new systems is the key. The best thought-out and designed agroforestry system is useless if the intended users are not willing to accept it.

Adoption of innovations has been the subject of extensive research over the past 30 years. A widely used theoretical framework is that proposed by E.M. Rogers in his *Diffusion of Innovation Theory* (1983). This theory summarizes much of the past and current literature on the diffusion of innovations. Rogers, and most other authors on diffusion theory, take the 'adoption perspective'—focusing on the process by which adoption occurs or the demand aspect of diffusion. According to Rogers, there are three sequential stages in the adoption process:

- Invention. The process by which new ideas are created or developed.
- Diffusion. The process by which these ideas are communicated to the members of a given social system, and
- Consequences. The changes that occur within the social system as a result of the adoption or rejection of the innovation.

Attributes of Innovations

An innovation, which an individual or agency wishes to communicate, must be suitable for the target population if adoption is to be feasible. The innovation should have attributes which are compatible with the needs of the potential adopters (Thio 1971). The communication system should be a two-way system, soliciting input from the potential adopters which is used to modify or change the innovation to better meet their needs. "What are the advantages, disadvantages, and consequences?" are questions typically asked.

Some authors suggest that rural populations in less developed countries are opposed to new innovations because they are bound by tradition and resistant to change. Roling et al. (1976) found in their studies on the diffusion of innovations that rural populations are not bound by tradition but rather are restricted by lack of opportunity and economics. Research shows that even poor, illiterate rural populations are responsive to economics. Katz et al. (1963) stated that the lower the initial capital outlay—the greater the anticipated profitability and the lower the risk of possible loss—the greater the rate of adoption for a given innovation. This is consistent with data generated from the introduction of new techniques for maize production in the widely reported Pueblo Project in Mexico. In a 1974 analysis of that project, it was reported that the rural farmers were fundamentally 'risk avoiders' and the adoption of new techniques was wholly dependent on the degree of risk involved (Biggs 1974). The degree of risk involved as compared to the probability of economic return is fundamental in the acceptance or rejection of a new innovation for both developed and

less developed countries.

Paraguay as a Test Case

Guayaybi is a small town with 800 inhabitants located in northeastern Paraguay. The term 'region' refers to the area and towns within a 50 kilometer radius of Guayaybi. A newly paved road links Guayaybi with the capital city of Asuncion, 240 kilometers to the southwest.

Located within the Paraguay River watershed, the topography of the region is gently rolling with an average elevation ranging between 200 and 250 meters. The climate is humid temperate to sub-tropical with a well-distributed average annual rainfall of roughly 1,500 mm. The mean annual temperature for the area is 24°C with hot, humid summers and cool winters. Some years are frost-free while others experience several light freezes, the average being two frosts a year.

Soils in the area are sandy, red-yellow podzols derived from Triassic and upper Permian red sandstones. Most of the soils are acidic sandy loams with a variable clay fraction and pH in the range of 4.2 to 6.5. Soils used for agriculture are more acidic, have a lower percent of organic matter content, and are more extensively leached than corresponding soils under forest cover. Bedrock depth ranges from 15 to 25 meters.

A tall, humid, semi-deciduous forest forms the climax vegetation of the Guayaybi region. Scattered emergent trees such as lapacho *(Tabebuia ipe)*, yvyra-pyta *(Peltophorum dubium)* and kurupaykuru *(Anadenanthera macrocarpa)* rise above a layer of co-dominant species characterized by guatambu *(Balfourodendron riedelianum)*, laurel *(Ocotea* sp.*)* and yvyra-pepe *(Holocalyx balansae)*. The understory is dense and woody.

Twenty-five percent of the Guayaybi area is covered with natural forests; the rest has been cleared for agriculture. In the 1960s, selective cuts were made removing only the most valuable species, such as lapacho, peterevy *(Cordia trichotoma)*, yvyra-ro *(Pterogyne nitens)* and cedro *(Cedrela tubiflora)*. The remaining forest contains species with little or no market value. For this reason, the cutover forest is not highly valued and there are few wood-based industries in the area.

Land Use/Economy

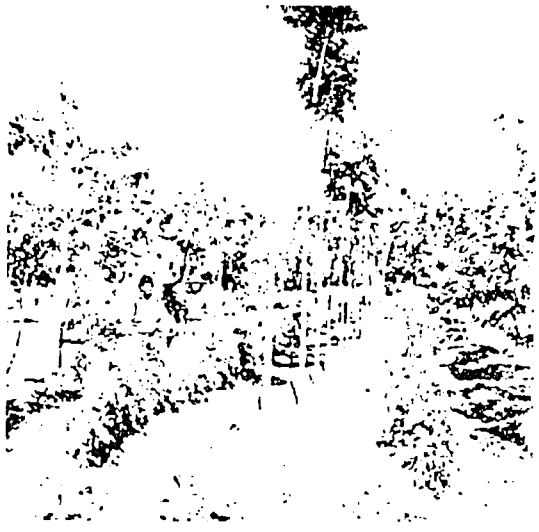
Paraguay is primarily a rural country with approximately 75 percent of its population employed in the agricultural sector. The majority of these people are considered small farmers with land holdings of 20 hectares or less. They practice subsistence farming often including a cash crop to meet their needs for cash as well as agricultural and animal products.

Farmers in Paraguay have traditionally practiced shifting cultivation where they slash and burn a portion of the forest to expose 'virgin' soil. These clearings are cultivated for four or more years until the soil fertility is depleted. The clearings are then abandoned and the farmers move on to clear more forest. The abandoned clearings are left to revegetate naturally and after 10 to 20 years again regain sufficient fertility to support agriculture.

The Guayaybi region was permanently settled by farmers of mixed Spanish-Guarani descent within the past 30 years. They moved here from older, less fertile, and more crowded regions of the country under a national settlement plan. Farmers are clearing their average 10-20 hectares of land at a rate of 0.5 to 1 hectare per farm family per year (Evans and Romboldt 1984) to plant cotton and tobacco. The soil is worked using oxen or by hand; there is no mechanized farming in this region. These nutrient demanding crops grow well for two to four years until the soil fertility declines. Then maize *(Zea mays)*, peanuts *(Arachis hypogea)*, beans *(Phaseolus vulgaris)* or bananas *(Musa* sp.*)* are planted, primarily for home consumption. As the soil fertility continues to decline, cassava *(Manihot* sp.*)* is planted and serves as the staple crop. Fertilizers are expensive or not readily available and, as a rule, are not used by small farmers. Older, nutrient-depleted soils are left as pasture for the few cattle that each family owns. The family's pigs and chickens are sometimes fed table scraps and maize but are generally allowed to fend for themselves. The cattle, grazing on abandoned farm lands, gain weight slowly on forages high in roughage, low in protein and insufficient in quantity. Milk yields are low. Chickens yield small amounts of meat and eggs. The cattle and pigs are both

Maize with 14-month-old *Melia azedarach* and an Ortiz daughter.

Agroforestry in Paraguay/Patrick Evans



Local farmers, who later took seed and information

sold during difficult times or for emergency cash.

In 1977, an FAO consultant estimated that in 1945, eastern Paraguay had 68,000 square kilometers of forested land. By 1975, that figure had been reduced to 42,000 square kilometers, a 39 percent reduction in 30 years. The primary cause of land clearing is for agriculture. Usually, the forest is selectively cut (sometimes only six to eight trees per hectare) by government contractors or others who gain the rights to harvest an area. Small farmers enter on the logging roads. With increasing population pressure and dwindling forest areas, farmers are abandoning the traditional shifting cultivation and remaining more or less permanently settled. This results in shortened fallow periods, loss of soil fertility, and decreased crop yields. The current farming practices do not appear to be ecologically sustainable. More and more farmers are abandoning their non productive farms and seeking hard-to-find employment in the capital city of Asuncion.

Forestry Extension Program

A study by the FAO in 1969 helped to bring the accelerating rate of deforestation and subsequent loss of top soil and soil fertility to the government's attention (Wadsworth 1969). In 1973, the Paraguayan government created a national forest service to address these problems through a national reforestation program. The new forest service developed a 10-year reforestation plan in 1975 with the goal of planting 90,000 hectares (Leyton 1976). The program never approached its stated goals due to a lack of funding and institutional support. The area reforested over the first five years of the program was estimated at roughly 5,000 hectares or less than 25% of the stated goal (Earhart 1981). Funding was cut and the program was virtually abandoned after the fifth year.

In 1980, the Paraguayan Forest Service asked the U.S. Peace Corps for assistance. An agreement establishing a forestry extension program was drawn up between the forest service, the Paraguayan Agricultural Extension Service, the Swiss Technical Mission, and the U.S. Peace Corps. The objective was to establish 20 small nurseries located throughout eastern Paraguay, to meet the needs of local communities. All four agencies helped in the selection of sites to serve as the 'nuclei' for initiation of extension programs. For each site, the Agricultural Extension Service provided land for the nursery where possible, and the forest service supplied Swiss-trained Paraguayan forestry technicians. These resources were augmented by a Peace Corps forestry volunteer to help establish the nursery and forestry extension nucleus. Because appropriate scientific data on forestry practices and extension guidelines were virtually nonexistent, the first task was to develop forestry innovations which would be adopted by the local people.

Problem/Needs Identification

The Government of Paraguay selected the Guayaybi area as a site of the Forestry Extension Program because of decreasing supplies of wood products, potential fuelwood shortages, and loss of soil fertility. Guidelines were vague. They called for establishment of a forest tree nursery, experimentation with local and introduced tree species, and reforestation efforts with local farmers.

Farmers of this region rarely planted trees and tended to view the forest as an obstacle to farming. A Peace Corps volunteer and a Paraguayan forestry technician (henceforth called the 'extension team') were assigned the task of developing forestry innovations adoptable by local farmers. The extension team was to establish rapport with local farmers, develop an agroforestry innovation, and motivate farmers to adopt the system.

The extension team's first step was to gain the trust of the community members by living in the community and participating in local cultural events. A tree nursery was established after consulting the farmers and their wives as to the types of wood most favored for posts, poles, construction materials, and fuelwood. Local farmers were asked to identify their needs or problems. Decreasing crop yields and increasing distances to walk to collect fuelwood were stated problems. The farmers' main concern, however, was cash income.

Innovation Development

The extension team hoped to design a forestry system or innovation that would be consistent with W. Firey's (1960) theory on resource systems—a sustainable resource system that is ecologically possible, ethnologically adoptable, and economically beneficial to those involved.

have taken control of the extension program also withdrew support due to the lack of funds and the improbability of the extension program generating revenue for the forest service. The Peace Corps still supports the program but their support too is diminishing due to the lack of interest from the forest service. Only the farmers remain truly interested and supportive of the program (Starr 1986). The earliest agroforestry plantations are now producing seed and some farmers are starting their own small nurseries to expand the plantations on their land. An adoptable, apparently sustainable, land use system has been introduced. The real goal of forestry extensionists is to make themselves redundant: When the project is successful, people can carry on the forestry activities themselves; the foresters are no longer needed (Cernea 1985). The innovation is now in the hands of the people and there is hope that, due to its economic potential, it will spread and reach more and more of the small farmers who may benefit from its adoption.

Areas of Concern in Designing Agroforestry Innovations

Client and Institutional Success Criteria
Clearly defined and realistic goals are important to the design process:

- Expressed needs/goals of clients
- Donor/governmental concerns
- Rate of adoption
- Sustainability of programs with or without assistance
- Economic and cultural impacts

Characteristics of Target Population and Environment
What are the cultural constraints, education, financial status, markets, as well as the nature of soils, climate, existing crop systems?

Nature of the Innovation
Is the innovation appropriate and adaptable to the needs of the target population? How complex is it in physical, biological, or other terms? What risk is created for the farmer, the lending institution, the extension agency and others? Can the innovation be readily demonstrated and tried on a limited basis?

Diffusion
The process of selling an idea is complex and normally requires various communication and motivational steps. Institutions may be required to provide technical direction and to minimize risk for those involved. Participation of the target population in planning the program is often a key factor in successful innovation development and diffusion.

Conclusion: Refine the Model to Minimize the Role of Government Agencies

The forestry extension team, working directly with the farmers, was successful in designing an adoptable agroforestry innovation in Paraguay. The innovation was ecologically adapted to the region and appeared to have good potential for economic gain. It was readily adopted by the farmer who perceived it to have a relative economic advantage over their traditional land use systems. The agroforestry system was compatible with their agricultural practice and helped to meet their needs for wood products and fodder. The new system was simple to understand and easy to try on a limited basis so as to minimize risk. Also, the tree species used were fast growing which impressed the farmers and made the plantations highly visible to others. This *observability* of functioning agroforestry systems plus the belief in the potential for economic gain were the key factors in the rapid adoption of agroforestry as a new land use system in the Guayaybi Region of eastern Paraguay.

To promote the widespread adoption of successful innovations, a good institutional and organizational structure is required. This does not always exist in less developed countries. In the Paraguayan case study, an adoptable agroforestry innovation was developed and introduced, but the infrastructure to sustain it is failing due to a variety of reasons unrelated to the innovation itself. To avoid this problem, designers of agroforestry systems should strive to develop adoptable systems which are self-supporting and minimize the need for a continuing support system. This can be achieved by promoting economically gainful systems and then instilling in the target population the necessary skills and knowledge for establishing development of the system. In other words, successful designers of agroforestry systems will work themselves out of a job in any given region.

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AMERICA BUILDS ON WOOD
TREES. AMERICA'S RENEWABLE RESOURCE

tion. The *relative advantage* of agroforestry was presented as a cost/benefit analysis comparing present farming practices with agroforestry. The potential for economic gain from agroforestry was highlighted and the return on labor and capital stressed. The *compatibility* of agroforestry with existing farming practices impressed the farmers. They could continue to cultivate their land while producing trees which would supply them with wood products for home use and sale. *Complexity* presented no problem as the system was understandable and similar to existing farming systems. Guidelines for subsequent management such as prunings, thinnings, and harvesting were presented and understood by the farmers. *Trailability* was encouraged as the extension team hoped to reach as many farmers as possible with their limited supply of trees. The tree nursery was producing only 20,000 trees per year. Farmers were encouraged to plant only 0.25 hectare the first year and expand the planted area in subsequent years if they so desired. This presented minimal risk to farmers with small holdings of arable land. Still the *observability* was the key selling point as the farmers, while walking among the trees, could readily observe the rapid growth rates and the compatibility of the trees with interplanted crops.

Definitions

Characteristics of Innovations Which Influence Rate of Adoption (Rogers 1983)

1. Relative Advantage. The degree to which an innovation is perceived as better than the idea it supercedes. The new idea needs to provide gain in economics, social prestige, convenience, and satisfaction.

2. Compatibility. The degree to which an innovation is perceived as being consistent with past experiences, existing values, and potential needs. It may require the adoption of a new value system prior to the adoption of an incompatible innovation.

3. Complexity. The degree to which an innovation is perceived as difficult to understand and use. The simpler an idea, usually the more easily adopted.

4. Trailability. The degree to which an innovation may be experimented with on a limited basis. Innovations tried on the installment plan are more quickly adopted.

5. Observability. The degree to which the results of an innovation are visible to others. The easier the results are to see, the more likely is adoption.

Most who visited the plantation decided to adopt the innovation. They were impressed with the survival and growth of the trees and believed in the potential economic gain they could provide. The demand for seedlings the second year of the project far exceeded the available supply of 20,000 seedlings. Trees cost the farmers 10 Guaranis each (six cents). *Melia azedarach* was in big demand for its economic potential, but the extension team required that each plantation be established with a leguminous tree component with the aim of multiple production of products and soil enrichment through nitrogen-fixation. In addition to the *Leucaena* sp., the extension team promoted the use of native leguminous trees in combination with the Melia, such as *Enterolobium contortisliquum*, *Pterogyne nitens*, and *Peltophorum dubium* (although the nitrogen-fixing potential of these species was unknown). Twenty-five new plantations were established before the seedling supply was exhausted and the extension team finished the second season with a waiting list of 30 farmers desiring seedlings.

In accordance with Firey's theory, the three optimum conditions of a sustainable natural resource system had been met. The system appeared to be *ecologically possible* for the farmers as they were able to see interplanted trees and the crops growing well on a given piece of land. The system was *ethnologically adoptable* or culturally acceptable as it was consistent with the general farming systems that were in use. Interplanting of trees among their crops required minimal labor input and met their needs for fuelwood and other wood products. The potential for *economic gain* from the sale of wood products is what most interested the farmers and motivated them to adopt this new innovation.

Agencies Need Support Until Farmers Can Take Over

The establishment of a forestry extension program requires adoptable innovations backed with a supportive infrastructure. This case study illustrates a viable forestry innovation that is being readily adopted by the local farmers. The farmers, communicating among themselves, are spreading the innovation, i.e., the demand for agroforestry plantations with *Melia*. The Peace Corps recognized the value of the new innovation and established three additional tree nurseries in the area in 1983-84. The nurseries were all small, producing 10,000 to 20,000 trees per year. By the end of 1986, 125 farmers had a total of 55 hectares devoted to agroforestry plantations (Starr 1986). The numbers would be substantially higher if additional nurseries had existed to supply the demand.

The agencies involved viewed the agroforestry plantations in this region as productive and sustainable. The original plan called for the training of Paraguayan forestry technicians by the Swiss Technical Mission to be employed by the National Forest Service and assigned to work as counterparts to forestry Peace Corps volunteers. The volunteers were to further train the technicians and assist in establishing nurseries and developing forestry extension programs. Eventually, Peace Corps personnel would depart and each site would be managed by the forest service. In late 1983, however, the Swiss Technical Mission director changed and the mission lost interest in the program. The National Forest Service, which was to