Lec.9 AGROFORESTRY DIAGNOSIS AND DESIGN

Definition

Agroforestry D & D is a family of procedures for the diagnosis of land management problems and potentials and the design of agroforestry solutions. The ICRAF has developed an approach to assist agroforestry researchers and development fieldworkers to plan and implement effective research and development projects.

Key Features of D & D

i) *Flexibility:* D & D is a flexible discovery of procedure, which can be adopted to fit the needs and resources of different users

ii) *Speed:* D & D has been designed with the option of a 'rapid appraisal' application at the planning stage of a project with In-depth follow-up during project Implementation.

iii) Repetition: D & D is an open-ended learning process. Since initial designs can almost always be improved.The D & D process need not end until further Improvements are no longer necessary.

Basic logic of AF Diagnosis and Design

Basic question	**Key factors to consider**
Prediagnostic stage Which land-use system?	Distinctive combinations of resource technology and land-user objectives.
How does the system work?	Production objectives and strategy subsystems and components.
Diagnostic stage How well does the system work?	Problems in meeting objectives, causal factors, constraints, and intervention points.
Design and evaluation stage How can the system be improved?	Specifications for problem-solving or performance-enhancing interventions.
Planning stage How can the Improved technology be developed and disseminated?	D & D needs, extension needs.

Implementation stage How can the plan of action be adjusted to new information?	Feedback from research trials, independent farmer innovations etc.

Procedures of AF Diagnosis and Design

The procedures of AF D & D are usually done of two types:

1) 'Macro' D & D and 2) 'Micro D & D '

i) MACRO D & D

An agroforestry research programme normally begins with a macro D & D exercise covering an entire ecological zone with I n a country. This consists of a rapid appraisal, based primarily on secondary information complemented by a few selected surveys in the field.
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Macro D & D includes on assessment of existing land use system constraints, agricultural policies and institutional arrangement, current agroforestry practices and the potential for improving productivity and sustainability through agroforestry interventions. The study zone is a broad region chosen for its importance at the national level. Its selection is usually based on the following factors.

- Contribution to food production and the national economy;
- Population area
- Urgency of problems or importance of unexploited potential
- Level of agricultural development and land use intensification

Typically, the D & D team comprises 5 to 1 0 specialists from biophysical and socioeconomic fields including soil science, agronomy, horticulture, animal science, forestry, agricultural economics and rural sociology or anthropology. All team members should have experience in both research and extension work. To ensure that the results of the D & D exercise are taken fully into account, the scientists who carry out the D & D should participate at least in the design and analysis and, better still, also in the implementation of the ensuing research programme.

Macro D&D is usually completed in about three months. This includes two to three days to plan the study and orient the team , two to three weeks to review and synthesis the secondary information , two to three weeks to conduct the field work , and four to sis weeks to analyse the information and prepare the report.

Macro D & D includes a detailed review of past and present agroforestryresearch and development programmes. The fieldwork component of a macro D & D normally consists of a visual appraisal of the study zone with the team sometimes traveling many kilometers in a few days in order to identify the extent pattern and problems of existing land-use systems.Team members interview researchers and extension workers and may conduct a few informal interviews with local land-users.

Macro D & D is usually followed up by a national or regional workshop to analyse the common problems and potentials of land-use systems in the zone to identify agroforestry technologies with potential relevance for the zone as a whole, to identify specific land-use systems as the focus for future research and development efforts and to establish preliminary research requirements.

ii) MICROD & D

A central aspect of macro D & D is the delineation of land-use systems within the chosen ecological zone, leading to the selection of target systems for more detailed analysis by micro D & Ds. A land-use system is defined as a distinctive combination of crops, livestock, trees and other production components.

The primary focus of analysis is the management unit that makes decisions and shares resources, objectives, labour and products. Analysis of a land-use system comprises all the characteristics that affect its management and performance. These characteristics include the following:

- Location: Administrative and political divisions
- Environmental characteristics:
- Socio-economic characteristics
- Land-use:
- Resources/supporting service

-Development activities and policies.

An important aspect of micro D & D is an analysis of the needs, objectives, and constraints of land-users. This step is based on interviews and field surveys.

One major aspect of micro D & D is the analysis of existing knowledge and agroforestry practices. What trees or shrubs are being used with what management procedures, with what objectives and obtaining what yields? Such analysis helps in defining strategies for working with target land-users.

The main objective during the initial D & D exercise is to assess how well the existing system is performing and meeting the needs of the land-users. Any performance gap can be evaluated by comparing present resources and outputs (what the farmers are actually producing) with biophysical potentials (for instance the yields obtained from on-station or on-farm experiments). This assessment must distinguish between problems that can be alleviated and those that cannot. The emphasis is on the problems that can be addressed by agroforestry.

Potential interventions are identified and evaluated in terms of their capacity to relieve the identified constraints. In the first instance, all interventions are considered, not just those related to agroforestry. For example, low soil fertility could be addressed by applying chemical fertilizers or manure or providing mulch from multipurpose trees or other plants. Each alternative is evaluated in terms of its technical potential and its feasibility in terms of resources and capabilities of the land users.

As with macro D & D, the research team for a micro D & D comprises 5 to10 biophysical and social scientists. Again the exercise is usually completed in about three months. However, for the micro D & D, the fieldwork component entails more contact with farmers, often including a formal survey of 50 to 100 individuals with a semi structured questionnaire. In addition, the team may need to allocate considerable time to reviewing ongoing research and extension work in the selected land-use system.

Promising agroforestry technologies may be sketched on the basis of results from micro D & D, but a full evaluation requires information about technology performance under the specific conditions of the land-use system. If a technology is well known and some farmers have already adapted it successfully, then it can be recommended for further extension.

On the other hand, if the technology is new to the area and not well known or if it

represents a major departure from the farmers' 'current practices, a research programme must be designed to test the components and management factors and make sure that the technology is well adapted to the target land-use system.

Criteria of Good Agroforestry Design

A good agroforestry design should fulfill the following criteria:

i) Productivity*:* There are many different ways to improve productivity with agroforestry viz., increased output of tree products, improved yields of associated crops, reduction of cropping system inputs, increased labour efficiency, diversification of production, satisfaction of basic needs and other measures of economic efficiency or achievement of biological potential.

ii) Sustainability: By seeking improvements in the sustainability of production systems, agroforestry can achieve its conservation goals while appealing directly to the motivation of low income farmers , who may not always be interested in conservation for its own sake

iii) Adoptability: No matter how technically elegant or environmentally sound an agroforestry design may be, nothing practical is achieved unless it is adopted by its intended users. This means that the technology has to fit the social as well as environmental characteristics of the land-use system for which it is designed.