

An Agroforestry Guide for Field Practitioners



Ministry of Land and
Environmental Protection(MoLEP)
DPR Korea



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra



World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

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An Agroforestry Guide for Field Practitioners

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Foreword

Over the past several decades, DPR Korea has suffered from extensive land degradation leading to the loss of livelihoods causing increased food insecurity. To restore degraded sloping land, the Ministry of Land and Environmental Protection of DPR of Korea (MoLEP), the Swiss Agency for Development and Cooperation (SDC) and the World Agroforestry Centre (ICRAF), have been promoting the multi-purpose use of trees to transform landscapes and livelihoods using a participatory approach.

The emergence of agroforestry as a sloping land management practice in DPR Korea highlights the growth of technology innovations together with user group processes. A user-friendly, bottom-up participatory process is facilitated by technicians and forest rangers and explores new opportunities for the development of locally appropriate technology through interactive learning processes.

This manual provides both proved concepts and good practices for field practitioners to integrate agroforestry into land restoration in general and sloping land management in particular in the DPR Korea. The examples documented in this book are based on a ten-year Sloping Land Management (SLM) project in DPR Korea. We will continue to enhance the capacity of field technicians, user groups and other governmental agencies to work together developing new knowledge, innovations and practices for agroforestry in sloping land management.



Weiersmueller Martin

Director of Cooperation

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Programme office Pyongyang, DPR Korea

1 Introduction

1.1 Agroforestry guide for what?

Agroforestry is a traditional practice of integrating trees with crops and/or animals. Agroforestry is gaining increasing recognition as a way to restore degraded sloping lands, to contribute to food security and for economic development in DPR Korea.

Agroforestry can greatly help to transform landscapes where trees are a keystone of productivity and thus deliver multiple benefits for humans and ecosystems.

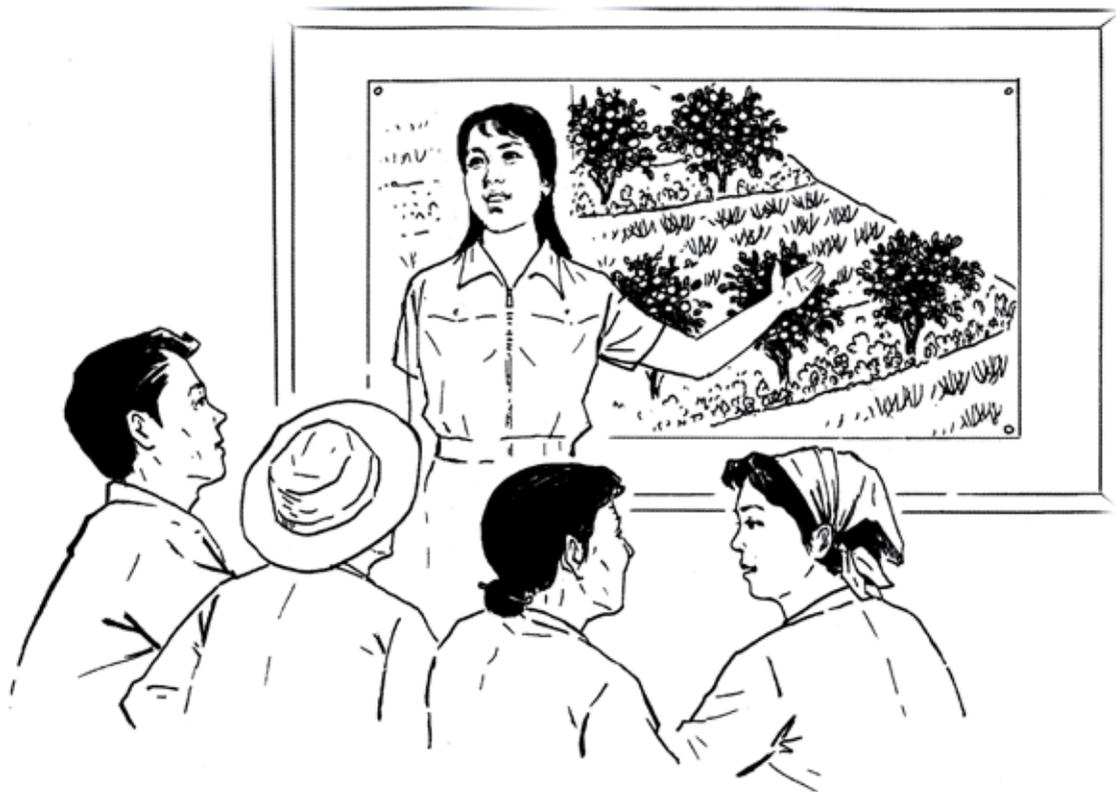
This guide contains a set of technical illustrations that provide practical, user-friendly information for planning a variety of agroforestry practices. It is particularly concerned with field-level interventions for sloping land management, an issue of concern in DPR Korea.



The future of the sloping land

1.2 Agroforestry guide for whom?

This guide is written for forest rangers, county forest board members and agroforestry extension workers. Each illustration introduces a set of principles and planning procedures on how agroforestry planning can proceed for the restoration of degraded sloping lands and for the incorporation of trees into agricultural landscapes.



Guidebook users

1.3 How to use this guide?

This guide does not provide ready-made recipes, but offers advice on how to integrate trees and agroforestry practices into land restoration in general, and in sloping land management in particular, in DPR Korea. Its aim is to help extension workers and farmers formulate their own knowledge, innovations and practices for the specific conditions they face.

The guide also takes stock of good practice and success stories from locally and abroad, as well as lessons learnt from failures.

The guide is designed as an entry point primarily for field practitioners. In cases where agroforestry is completely absent in current field practices, it may be used to initiate a participatory planning process for the incorporation of trees in farms and sloping lands. The purpose is to assist in sustainable economic development and environmental protection in DPR Korea.



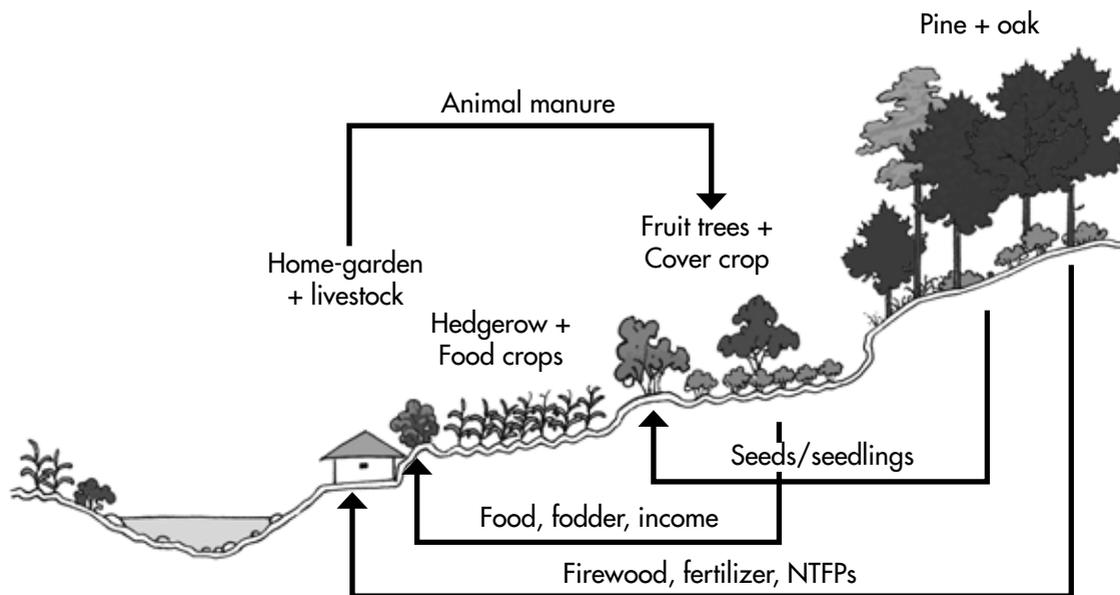
A guidebook for agroforestry practitioners

1.4 What is agroforestry?

Agroforestry is the combination of *agriculture* and *forestry*; rather than treating these as separate options for land use, it brings both together, recognizing and promoting tree use on farms.

Agroforestry can be defined as: *The integration of trees in farming systems and their management in rural landscapes to enhance productivity, profitability, diversity and ecosystem sustainability.*

While the number of trees in natural forests is steadily declining, the number of trees on farmland is increasing. In many parts of the tropics, agroforestry is providing essential products and services that can help relieve the pressure on the natural forest domain.

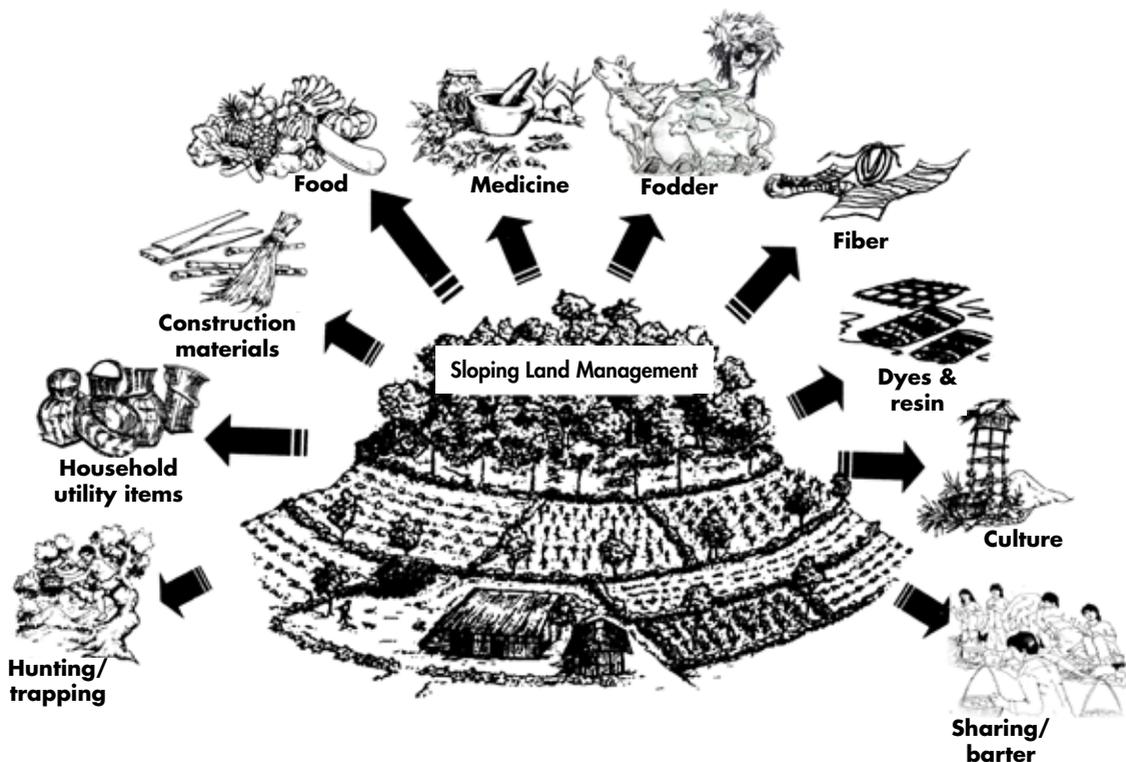


Agroforestry system for sloping land management

1.5 Why agroforestry?

1.5.1 To produce

For Korean farmers, well managed agroforestry systems on sloping lands provide food, fiber, fodder, fruit, construction materials, medicine, honey, dyes and resin/gum, among other products. They also provide cultural and household utility items, bush meat from hunting and trapping, and products for sharing and barter among community member. Planted trees can also improve soil fertility and therefore support the production of staple crops and enhance food security in this way.



Products from sloping land management

1.5.2 To protect

Sloping lands are vulnerable to a number of risks and hazards. Intense monsoon rain can trigger landslides and flash floods and lead to soil erosion. Trees on slopes can help to prevent these effects, replenish soils and provide other environmental services. For example, a combination of grass strips, shrubs and trees in contour hedgerows on slopes can significantly reduce soil erosion. In addition, droughts can significantly reduce agricultural production, but agroforestry trees can help redistribute water in soil to provide annual crops with greater water availability, and provide shade to prevent water loss.

More than 80% of the DPR Korea consists of mountains and upland slopes with statutory forestlands accounting for 72.5% of all land. The rugged terrain of the country limits agricultural cultivation to around 17% of its land area.. The country had a population of 24 million people in 2008 with an average population density of 195 per km². With 36% of the population considered to be rural, the population density in the countryside is on average 468 persons per km² of available agricultural land. The result is high land use pressure.

DPR Korea suffered from food and energy shortages and large-scale deforestation in the 1990s, which began a process of rural land conservation reform. In order to reverse degradation, increase yields and generate more income from mountains and hills, the Sloping Land Management (SLM) project was introduced by the Ministry of Land and Environmental Protection (MoLEP) in the early 2000s.



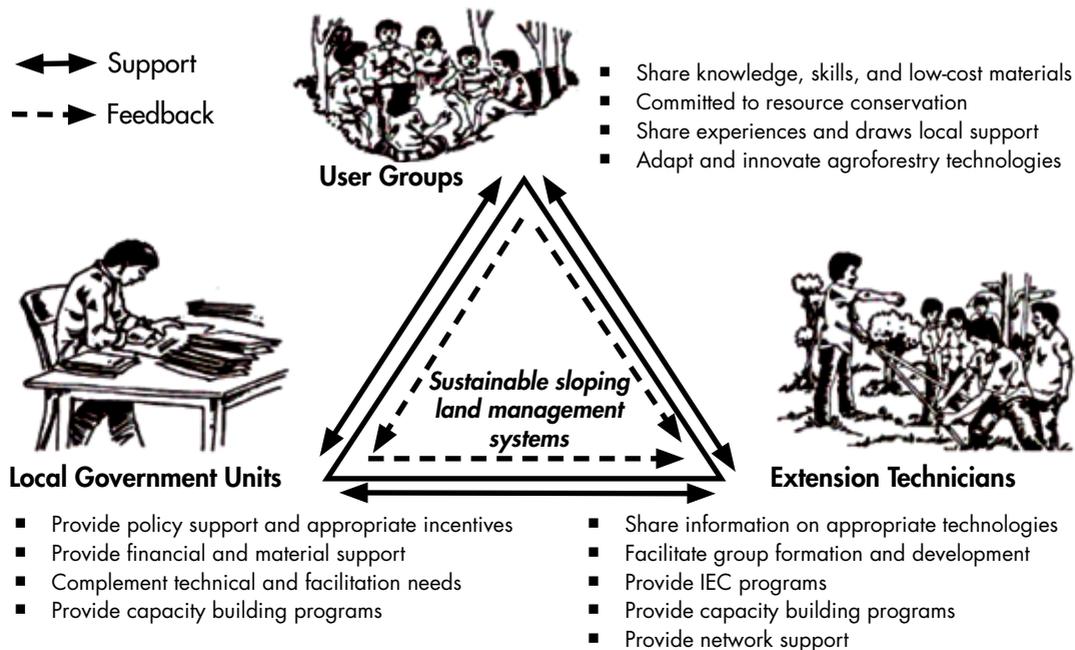
Agroforestry: a broad-scale answer to sloping land issue

1.6 Why agroforestry extension?

The main purpose of agroforestry extension is to help people to examine problems which are affecting their lives and the landscapes they inhabit to consider if these problems may be solved, or at least alleviated, by using agroforestry techniques, within the range of their skills and financial resources.

The contribution of agroforestry extension is initially to facilitate discussion and the definition of needs, and to indicate a variety of possible courses of action from which local people can select those most suited to their particular situation.

The fundamental aim should be to assist people to take appropriate measures for themselves. The objective is to allow communities to develop a genuinely critical view of their own situation and to have a realistic insight into their ability to take the necessary steps to implement useful change.



A strong 3-way partnership: the triadic approach

2

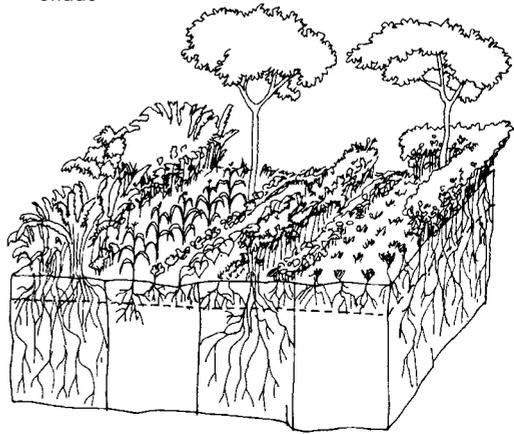
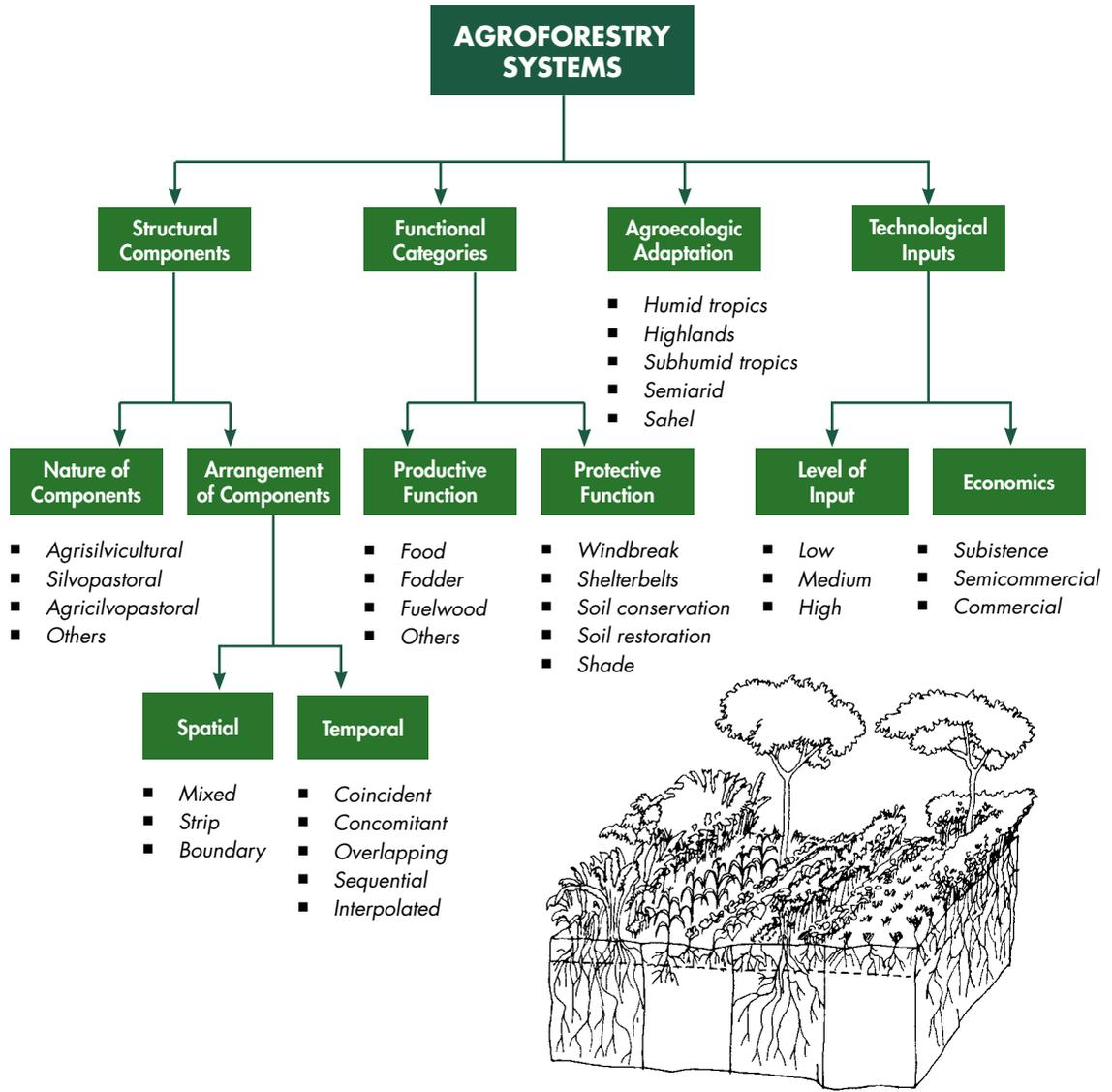
Agroforestry Practices

Features of Agroforestry System

2.1 Classification agroforestry

Agroforestry systems may be classified based on the following criteria:

- **On a structural basis:** this refers to the composition of the system and the arrangement of it in space and time. Adding woody species into different niches (different parts of farms and the agricultural landscape) can increase diversity, sustainability and productivity.
- **On a functional basis:** this refers to the role or use of the tree component, such as timber, fruit, fodder, medicine. Typically, the inclusion of trees increases the number of products generated by the system, which then acts as a safety net for farmers. Services such as the use of trees as windbreaks and to prevent soil erosion may also be important in addition to tree products.
- **On a socioeconomic basis:** this refers to the purpose of the system with regard to human livelihoods, usually broken down into subsistence, commercial, and/or intermediate production systems. Agroforestry may be promoted to meet specific social goals such as poverty alleviation and food security.
- **On an ecological basis:** this refers to the suitability of the agroforestry system for a given environment. Thus there are different types of agroforestry for tropical, temperate and arid environments that take into account the environmental, ecological and biological conditions of each area.

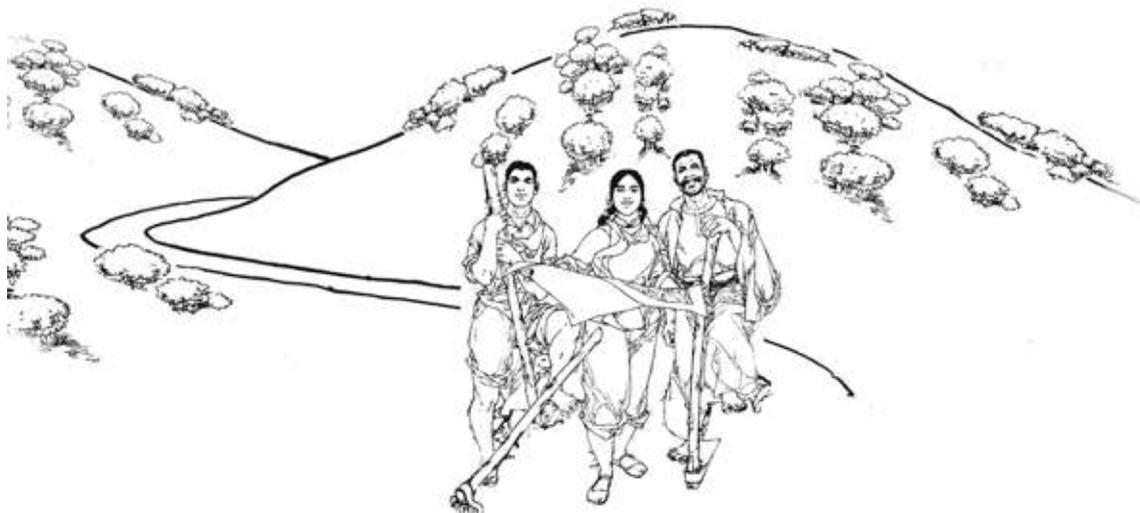


Classification of agroforestry systems

2.2 Factors that influence agroforestry development

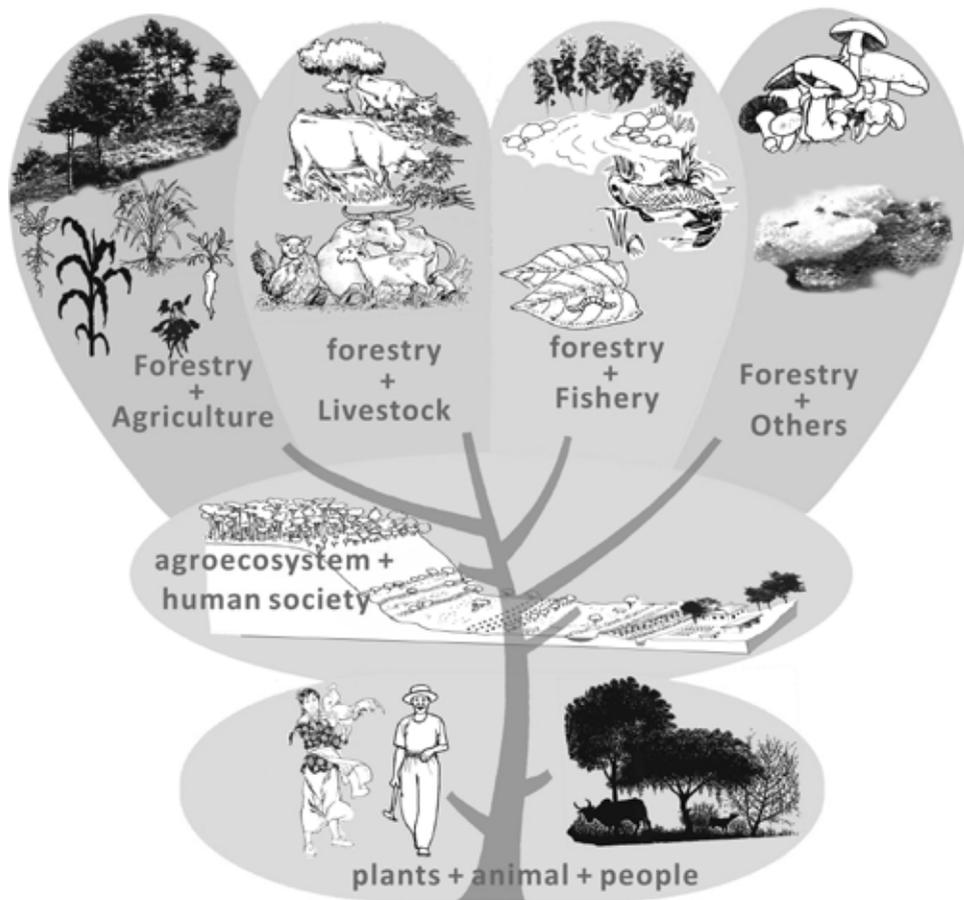
A 'one-model-fits-all' approach does not work for agroforestry because of the diverse biophysical and socioeconomic conditions under which systems can be developed. Factors that influence users' decisions and the selection of particular practices include:

- Government policies and incentives, and rules and regulations, on agriculture and forestry
- The tenure of land, crops and trees, which determine whether it is worthwhile for farmers to plant trees and who benefits
- Technical support and extension services for the supply of inputs (including seed, fertilizer, information on tree management, etc.) and for market delivery (including methods and information on value addition, markets, etc.)
- Access to markets, including distance to different markets, road infrastructure, the ability to undertake sales through cooperatives and the possibility of engaging in barter trade.
- The user group profile, including particular needs from agroforestry (food, cash, medicine, etc.), specific skills and traditional practices, labor availability, the level of education, and peoples' aspirations and expectations
- Biophysical conditions, including climate, soil type, slope, soil and water availability, etc.



2.3 Working together between sectors and institutions

As agroforestry represents the integration of forestry and practices including crop production, pastureland management, animal husbandry, fish farming and a range of other agricultural enterprises, multi-agency collaboration is the key to success.

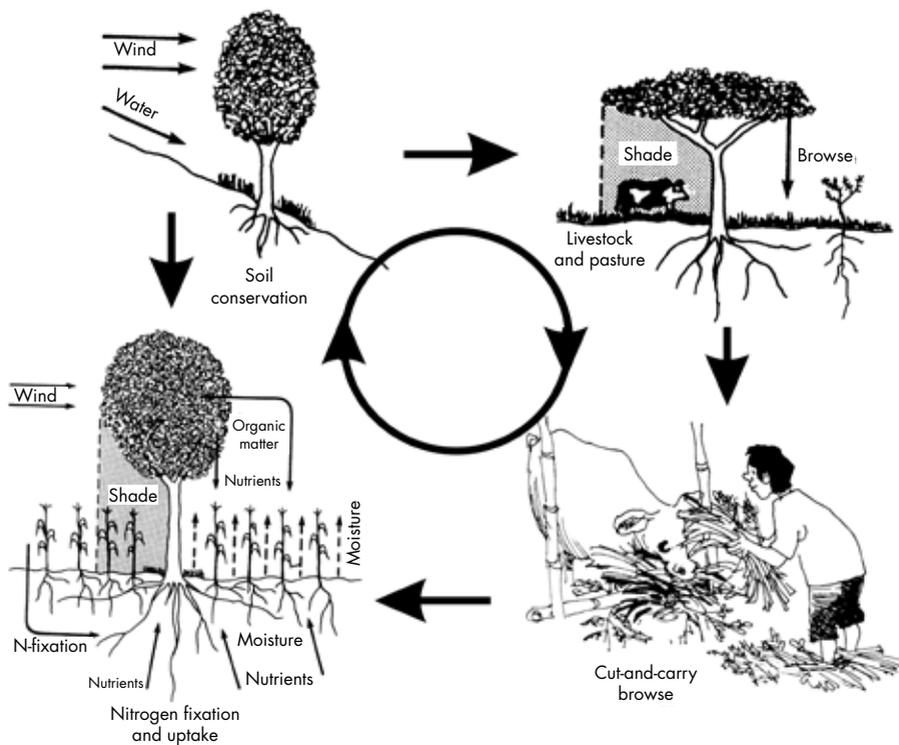


Agroforestry is an integrated dynamic system

2.4 Agroforestry production components

These include different elements whose presence can be complementary and reinforcing if managed in the right way:

- Trees for fruit, fodder, fuel wood, timber and other products, and for services such as soil fertility replenishment. Trees normally remain in the landscape for a number of years with a rotation length perhaps in decades.
- Annual crops such as grains, tubers, roots, vegetables, mushrooms and flowers. The rotation for crops is generally much shorter than for trees.
- Animals for draft power, dairy, meat and egg production, and fish, snails and other organisms for eating.

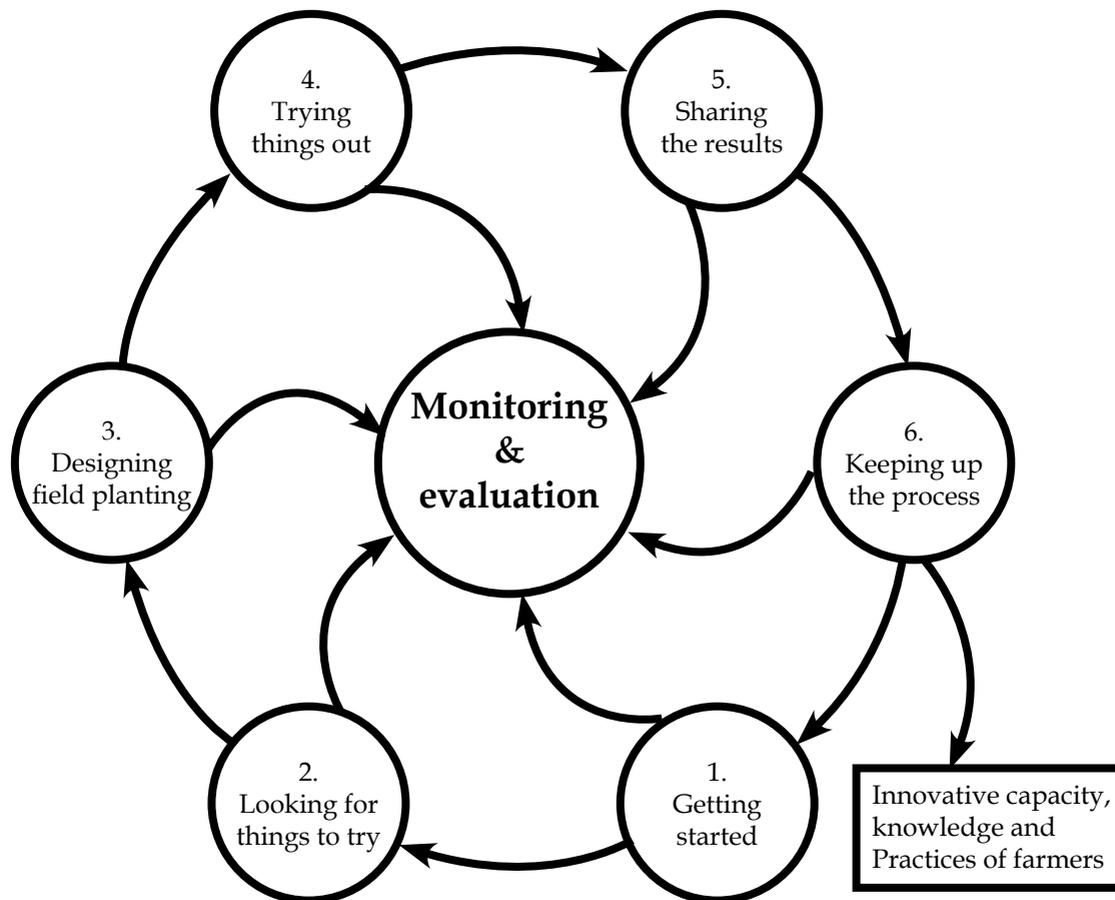


Nutrient cycling in agroforestry system

3

How to Design
Agroforestry
Practices

How to design agroforestry practices



3.1 Getting started: determining the objectives of planting

This stage involves discussions with all local farmer user groups and other stakeholders on the current situation and the potential ecological, socioeconomic and political consequences of intervention. All stakeholders should agree upon the overall goal and the objectives of intervention. This stage involves the following steps:

- **Organizing farmers into user groups:** usually, ten farmers are organized into one group and each group then selects their own group leader or representative that can work with a project team.
- **Designating the land area for planting:** the user group negotiates with the county forest board for the designation of land (in this particular case, degraded sloping areas) where intervention will take place. Normally, one hectare will be designated to a user group. Soil conditions, road accessibility and water availability are often the principal concerns of user groups.
- **Agreeing management principles:** the basic ecological principles for restoration need to be agreed by and between user groups, for example, the level of tree cover to aim for, the basics of contour farming, and other soil and water conservation measures.



Organizing focus group meeting

3.2 Looking for things to try: an assessment of current practices

The project team works with local user groups in a participatory rural appraisal exercise (explained further below) to collect and share information and determine current management practices. The exercise includes inventorying local knowledge, innovations and practices, and listing useful agroforestry species (native and exotic trees, and other species). Methods used in appraisal may include transect walks, mapping of land use and land use change, matrix scoring of species and cultivation practices, and ranking to identify the most promising agroforestry species for planting and the most appropriate management practices to adopt when doing so.



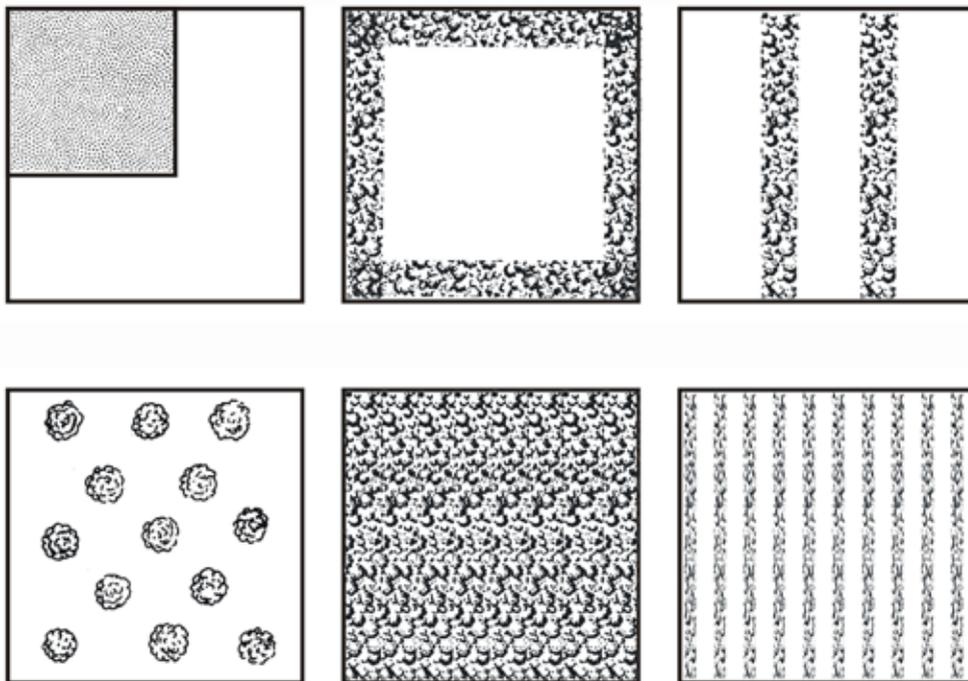
Assessment of local knowledge for agroforestry development

3.3 Designing field planting

The organizational structure of agroforestry planting depends upon:

- The livelihood system: decision makers can be user groups or households, based on their needs and resources
- Land use categories: the types of land available for current and future use, depending on soil type, water availability, slope, etc.
- Particular practices: agroforestry includes a broad range of practices where various trees are used for different production and protection purposes, determining how to plant
- Groups of agroforestry practices in space (at the landscape and/or watershed level) and time

Different sketch maps of the planned layout can be drawn before field implementation.



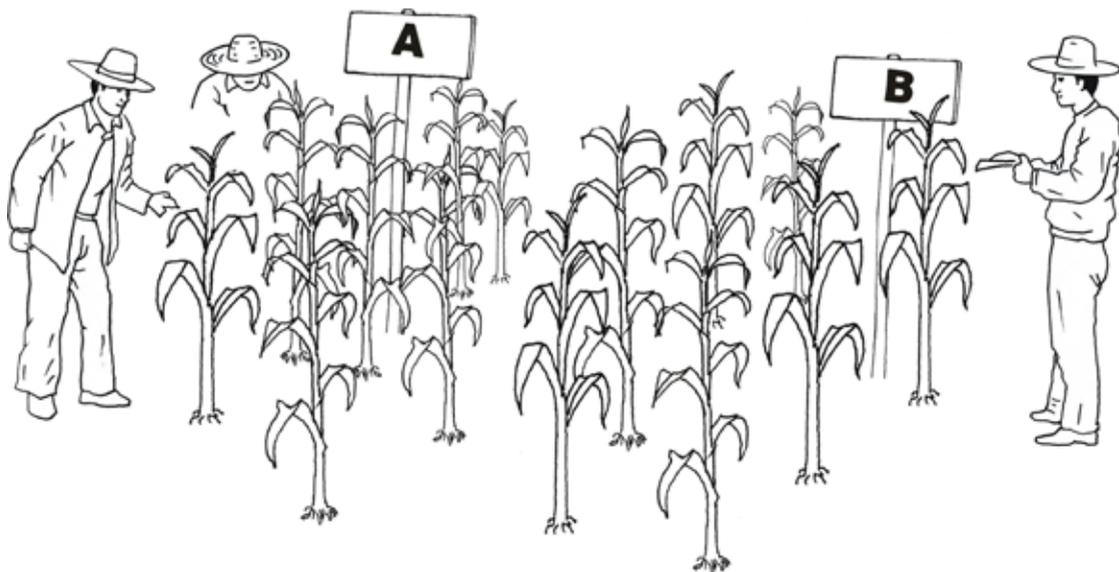
The tree-crop interface under different arrangement of tree cover.

3.4 Trying things out: implementing chosen approaches

Together with user groups, the project team develops annual action plans for tree planting. With technical support from the project team, user groups then carry out field activities including land clearance, terracing, nursery establishment and production of tree seedlings, tree planting, annual crop and grass-strip cultivation, etc..

User groups document and monitor the performance of tree species in different production circumstances with the support of the project team. This provides for a mutual learning process of what works. Farmers and user groups are thus involved in generating economically and environmentally sound technologies for land use.

During field implementation, material support, including fertilizer, tools and fencing will be provided by the project.



Field experiment on different trials

3.5 Sharing the results: spreading good practice

Neighboring user groups can share experiences through group meetings and farmer-to-farmer visits. Visual materials including posters, photos, games and field demonstrations can be produced by local user groups and project team members to share important information on tree species and management practices.



Visualization for sharing result is best way to learn each other

3.6 Keeping up the process

User groups can work with their neighbors, with extension agents and with agroforestry researchers to continue the process of participatory agroforestry development. This includes scaling-up good agroforestry practices, bringing in new knowledge and planting materials, testing new methods and designing agroforestry experiments, and organizing farmer-to-farmer exchanges.



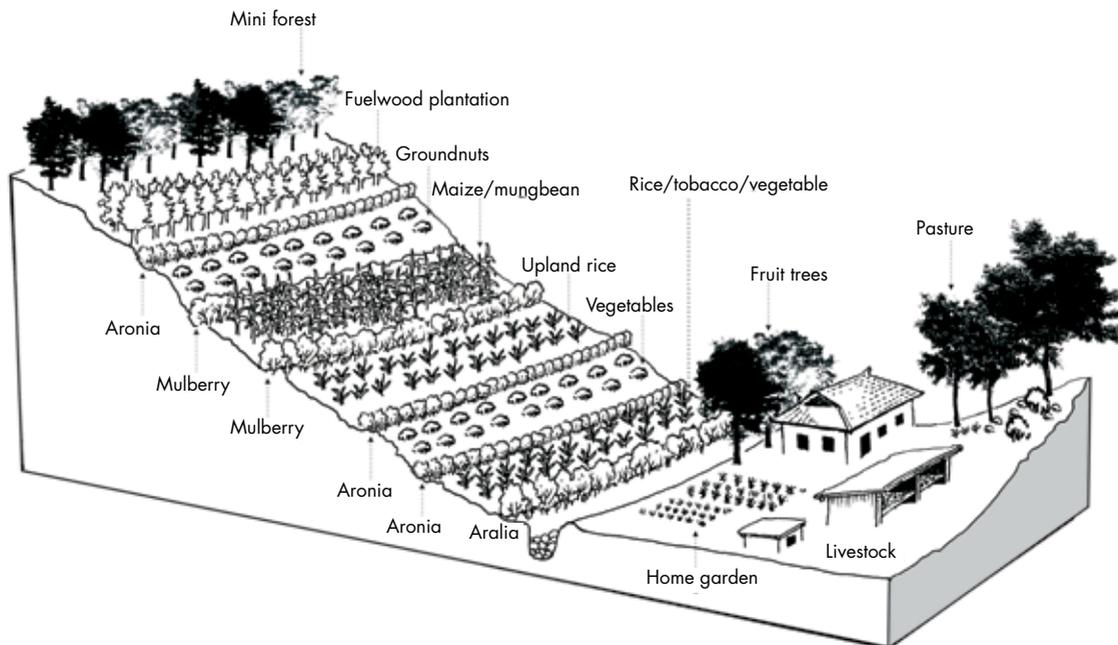
Regular user group meeting

4

Managing the
Agroforestry
System

4.1 Crop diversification

One of the most important aspects of agroforestry is diversification. Benefits include a wider range of food products to eat and sell, improved nutrition, and the ability to spread risk in production due to varying weather including floods, drought, etc.. Since different species occupy different spaces in the system, their production can be complementary (overall yields are greater for the system as a whole than if one species only was present) and even synergistic (total yields are greater than the sum of the individual components if they were grown separately). Diversification can also reduce the risk of pest attack. These benefits are not however automatic – it all depends on what range of trees, crops and animals are brought together.

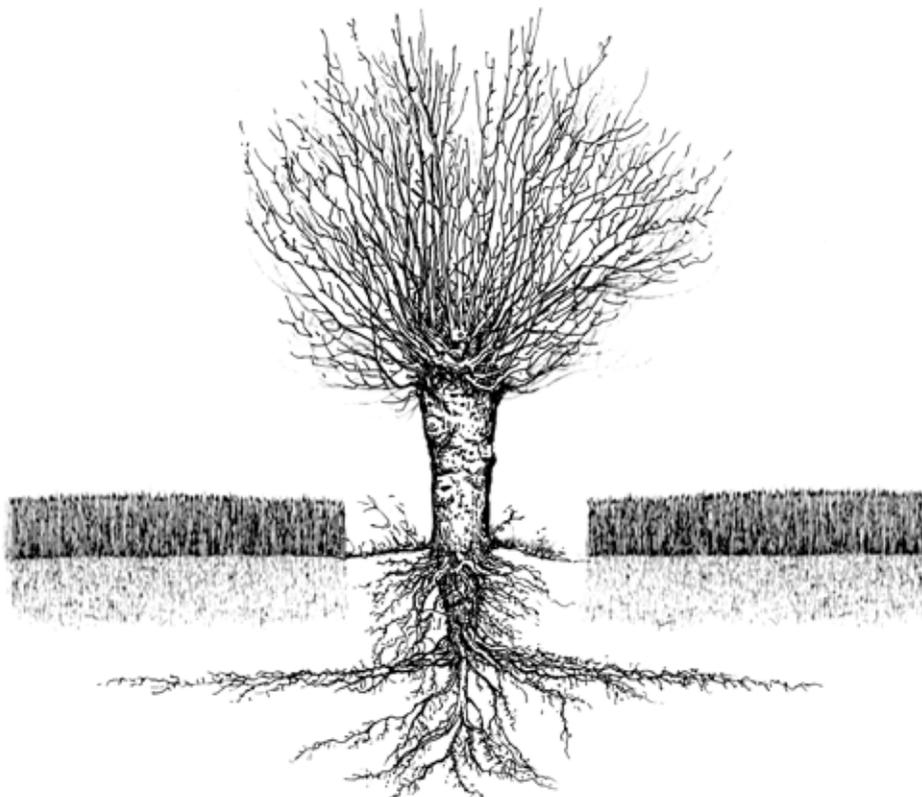


The Sloping Land Transect with agroforestry practices

4.2 Tree-crop interactions

Tree-crop interactions are a key consideration when designing an agroforestry system and a layout for planting. Basis principles include to:

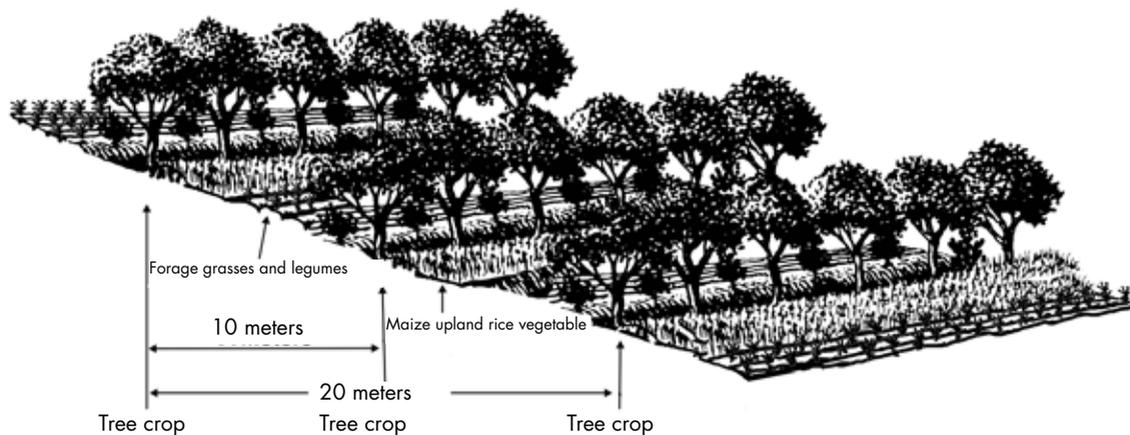
- increase the overall value of the system,
- maximize complementarity,
- decrease or eliminate competition; and
- minimize crop displacement, through appropriate tree management.



Root system of agroforestry species

4.3 Tree choice and planting arrangement

This includes considering the particular space or niche the tree occupies in the farming system, as well as the total number of trees of that species that need to be planted. Getting this right is important to maximize the ecological and socioeconomic benefits from the tree itself and simultaneously to reduce the potential competition with other components of the system such as annual crops. Choosing the right species with the right form and rate of growth is important, as well as considering at what density to plant it and how to subsequently manage it.



Well-established agroforestry system along the slopes

4.4 Using perennial tree crops

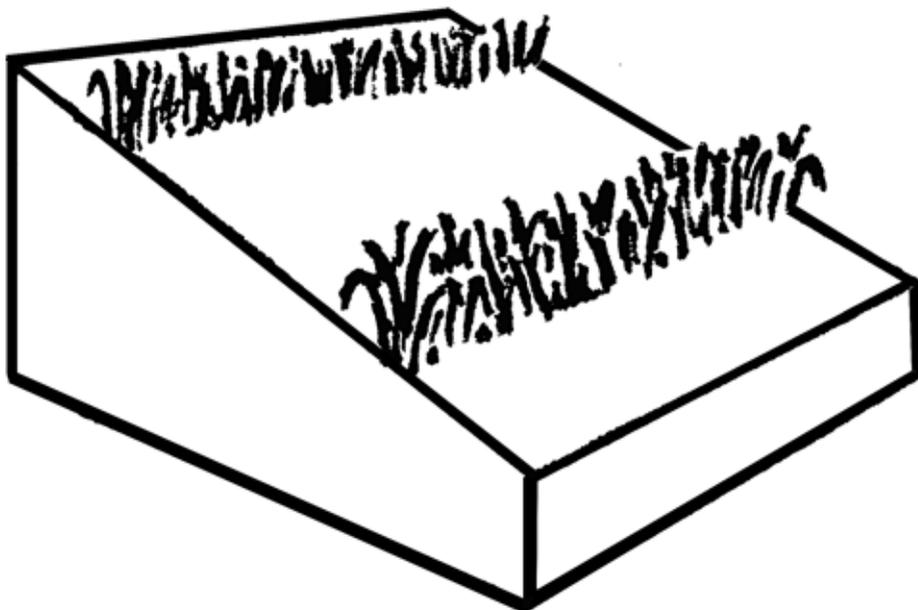
In comparison to annual crops, the use of perennial tree crops is less expensive in terms of inputs: time, seeds, fertilizer, and land. Agroforestry system, which uses perennial plants (both tree, shrub and cover crops), provides food and useful materials for humans (fiber, medicinal, dyes, edible leaves, spices, poles, honey, fuel wood, fodder, mulches, game, sap products, etc.) as well as benefits to the other plants (soil fertility). Thus, a well-managed agroforestry system is self-sustaining and efficient space where, once established, farmers only need prune and harvest, when used perennial crops. Agroforestry is building a layered garden from ground cover to canopy trees that are all useful to user groups with little maintenance.



Perennial crops

4.5 Contour strips

The use of contour strips in agroforestry systems is an effective way to prevent soil erosion in sloping land management. The common agroforestry practice of developing contours strips from trees, grasses and/or other plants is cost effective (with low initial establishment and annual maintenance costs compared to other methods) and provides other important ecological functions such as habitat for birds and insects.



Vegetative contour strips

4.6 Soil and water conservation

Agroforestry landscapes have an important function in improving soil and water conservation. Agroforestry systems can reduce soil erosion caused by wind and water, and prevent the runoff of sediment and potential pollutants into rivers, whilst keeping nutrients such as fertilizer in farmland. Agroforestry systems slow water runoff and enhance infiltration, stabilize soil and reduce river bank erosion.



Soil and water conservation along the landscape

5

Linking
Agroforestry
to Livelihoods

5.1 Mushroom production

Many mushrooms or fungi are deliberately grown within forest or grassland habitats, a practice defined as 'fungi agroforestry'. Facilitation thereof exploits positive ecological interactions, minimizes undesirable interactions and protects or enhances the sustainability of natural ecosystems and the productivity of the land for the people who use them. Many introduced mushrooms can be cultivated by user groups in the field huts and homegarden for income generation.



Mushroom farming has a lot of potential

5.2 Bee-keeping

Bee-keeping not only provides honey but bees pollinate fruit trees, oil plants and other perennial and annual crops. Sometimes, these pollination services can be much more important economically than the honey that is also produced. Productivity and household income can therefore be much enhanced through cultivating and retaining trees in landscapes to provide habitat for bees. When designing agroforestry systems, the use of a range of tree species flowering at different times can provide better forage for bees, therefore enhancing both honey and tree and annual crop production.



Beekeeping supports agricultural productivity and income generation

5.3 Agribusiness activities: the case of mulberry and the silkworm

Mulberry tree was originally domesticated in Asia as forage for feeding silkworms for silk production; this represents an important small-scale agribusiness. Primarily, mulberry is grown in combination with annual crops such as maize, wheat, upland rice, beans, sweet potato and vegetables. There are now three main forms of mulberry agroforestry systems: (1) mulberry is grown in a form of 'alley cropping' on terraces with a 4 to 6 m interval between rows and a 0.2 to 0.4 m interval within rows; (2) mulberry is planted along farm boundaries as a fence, initially at a close spacing of 0.2 to 0.3 m, then later thinning to 0.4 to 0.6 m between trees; and (3) scattered mulberry trees are established among annual and perennial crops to resemble a multi-storey agroforestry system in which mulberry occupies the second layer.



Women's participation in silkworm farming

5.4 Agro-industry from agroforestry: the case of resin

Resin from pine is an example of an agroforestry and forestry product widely used for industrial purposes; for example, resin tapping in many remote villages in China has significantly contributed to local livelihoods. In Korea, resin tapping can be practiced in the production season from June to September. The technique has to be practiced correctly to ensure that tapping does not negatively affect the growth of trees. For example, tapping should be from one side of the tree only using a “v” shape cut, while trees should be tapped only when growth exceeds 20 cm in diameter.



Resin tapping is one of income sources

5.5 Fish farming and agroforestry

Fish farming or aquaculture plays a significant role in livelihood development. Aquaculture in agroforestry practices can involve paddy rice cultivation with fish culture and trees, as well as fish ponds in farmland with trees. In many cases, trees support the banks of ponds and rice paddies, and enhance the habitat for fish through providing a windbreak, organic nutrition and supporting the presence of microorganisms.



A combination of water harvest/storage and fishery

5.6 Medicinal plant production in agroforestry systems

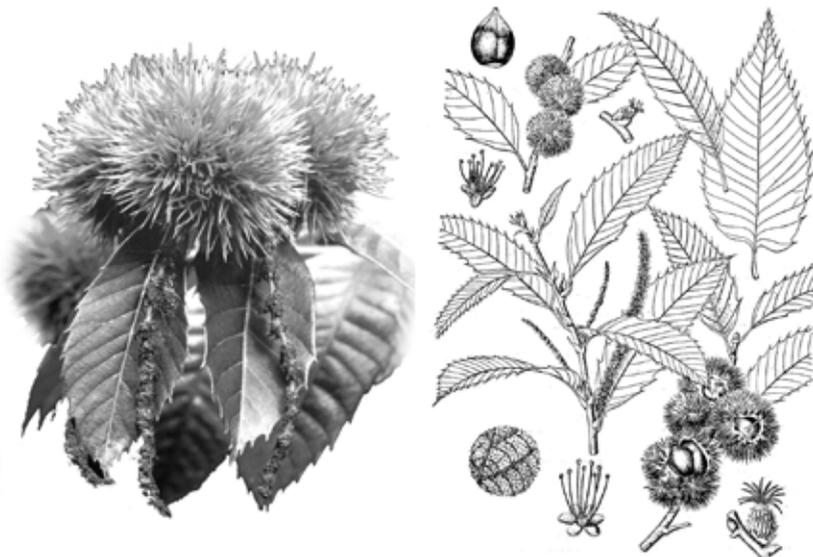
Agroforestry provides important habitat for the cultivation of medical plant products that may be herbs (e.g., ginseng) or trees (e.g., mulberry). Many medicinal products are derived from trees and much traditional health care around the world is supported by their cultivation. The wide cultivation and utilization of medicinal plants in agroforestry contributes to health support systems locally and provides livelihood opportunities through sale locally and more widely.



Medicinal plant harvesting

5.7 Fruits, berries and nuts

Tree on farms produce a wide range of edible products including fruits (pear, apple, apricot, mulberry, etc.) and nuts (pine nuts, walnuts, chestnuts, etc.). Many indigenous fruit and nut trees provide edible products rich in vitamins and other micronutrients and their cultivation should also be considered. By growing a range of species that fruit in different seasons, it is possible to provide important sources of nutrients over a large part of the year, combating malnutrition. In comparison to timber production, the management and harvest of these products may be more environmentally friendly and provide for more sustainable incomes because harvest does not involve cutting the tree. At the same time, the cultivation of fruit and nut trees may be more complementary with growing annual crops and other trees than timber-oriented agroforestry.



Fruit trees support food security and income generation

5.8 Livestock and fodder production

The use of trees and shrubs as animal feed is probably as old as the domestication of animals. Through experience, perhaps through observing their grazing behavior when shifting animals between fields, smallholders have learnt which tree fodders are useful feed for their livestock. A tree species may be used for fodder in some places and for particular animals but not used in other locations and for other stock. What trees are appropriate as fodder depends on the digestive system of the animal. Many tree (and other) legumes provide nutritious animal fodder. Some fodders can be collected and stored for feeding in the winter. As well as food, and just as tree products are used for human medicine, some tree products are important for veterinary treatment.



Livestock enhances soil fertility, food nutrition and income

5.9 adding Value to Agroforestry Products

The value of raw agroforestry products can be added to significantly through the selection of the right tree varieties to grow (providing product of good quality), though proper harvesting and processing, and through appropriate packaging before sale. Often, groups of farmers working together (e.g., collections of user groups) can establish small-scale enterprises or small processing plants more easily than individual farmers can. Working together provides scale and can allow knowledge on processing methods, market requirements, etc., to be accessed more easily. Groups can be supported more easily by extension agents than individual farmers can be.



Food processing for local user groups and farmer's cooperatives

5.10 Value chain and market access

Smallholders in developing countries often find it hard to sell their products in the market for a good profit because of poor infrastructure. The transaction costs in reaching markets are therefore high for small volumes of product, and there is often no guaranteed sale on reaching the market. A lack of power in sale negotiations also means that smallholders tend to be 'price takers' rather than 'price makers'. Grouping together to transact sales is a way to deal with these constraints. Sufficient quantities of product can be delivered to meet the demands of large buyers and bargaining power is increased. It is also easier for groups to obtain information about the real value of their products though one member being responsible for this role and then sharing information with the whole group. Without such income from sales, farmers do not have the capital to develop their farms further through the purchase of inputs such as new crop varieties, fertilizer, pesticides and equipment. Emphasis on ways to improve the 'value chain' for smallholders, such as through establishing seller groups, establishing market information systems, and developing secure means for financial transactions, are very important.



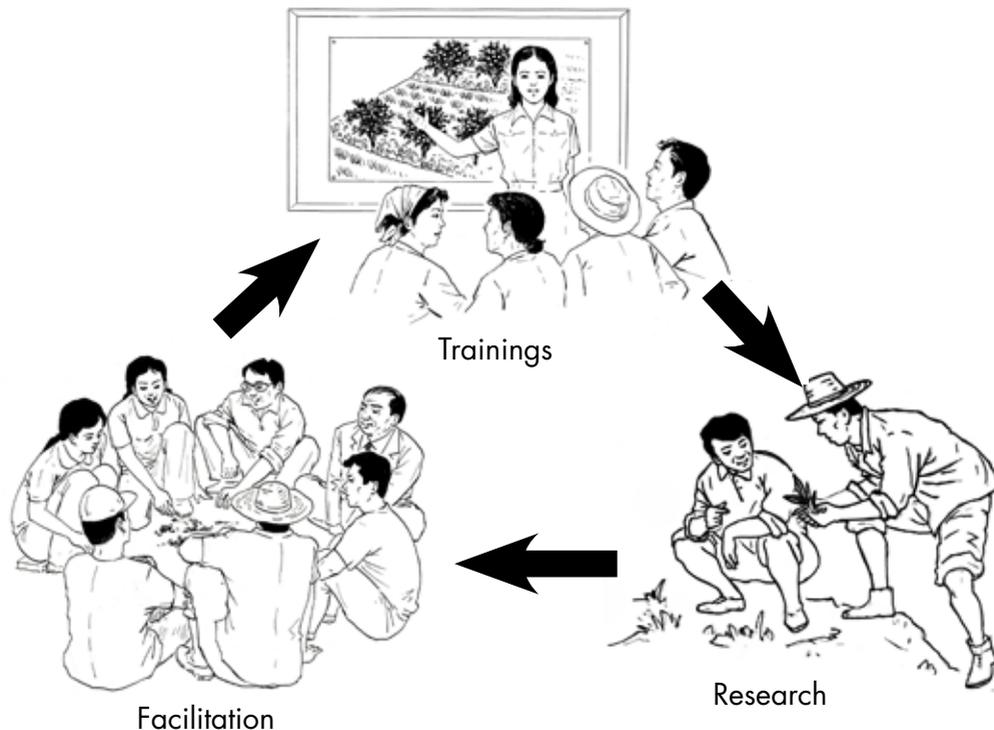
Marketing agroforestry products locally

6

How to Be a Good Extension Technician

6.1 Staff qualification

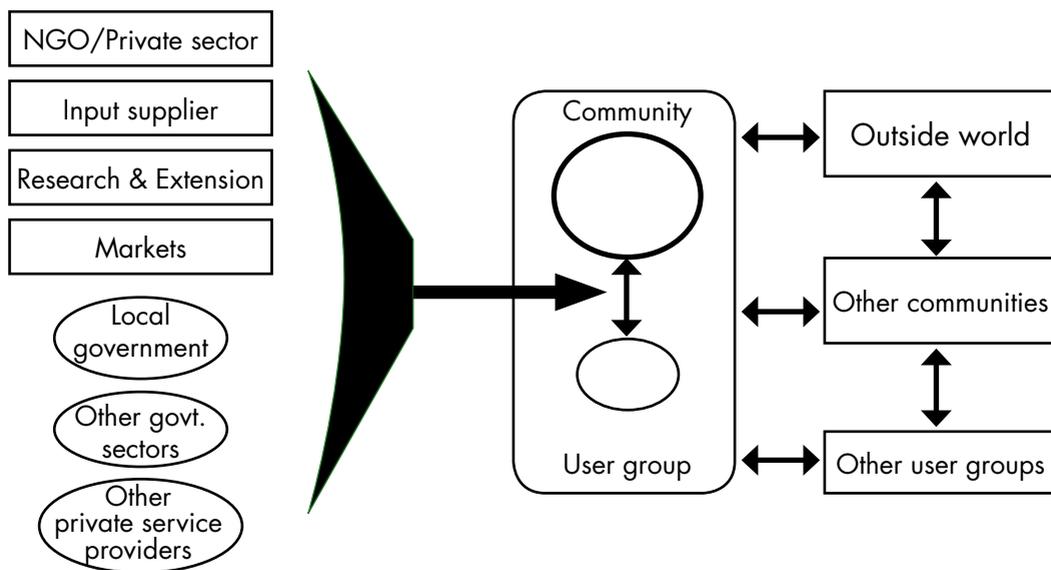
The staff required to implement agroforestry extension projects need different skills from those engaged in general forest protection and production. The technical skills needed for agroforestry can be learnt and most important is for staff to have the right attitude to work with communities in a participatory way.



Agroforestry extension is about facilitation among different actors

6.2 The role of an extension worker

It is now acknowledged that farmers can play a role in determining agricultural development pathways if opportunities for their participation are provided. The role of an extension worker in a participatory agroforestry extension process therefore is to be a facilitator who supports farmers in articulating their needs and brings together farmers, researchers and other stakeholders to develop solutions. For extension to operate effectively, communities need to be organized to collectively negotiate and gather information for their own benefit and extension agents have an important role in ensuring this organization. Then, the extension agent should help coordinate service providers and link them to farmers to implement solutions.



Extension worker: linking service providers to local user groups

6.3 Facilitation skills

To facilitating the agroforestry extension process, the basic attitude and behavior of the extension agent is important. Experienced facilitators obtain better results because they respect certain 'do's' and don't's' in the process.

Do's	Don't's
<ul style="list-style-type: none">● Behave as a guest. Respect people and their privacy● Treat local people as equal partners● Show your interest for local customs● Present yourself and your purpose at the beginning of a meeting● Adapt to the time schedule of your hosts● Be patient and a good listener● Encourage local people to express their idea in their way● Encourage people to draw and map problems visually● Promote group participation and discussion, but do not force people to participate● Seek input from different groups (the old, women, etc.)● Encourage disadvantaged group to speak out and express their interest and ideas● Ask for permission if you want to take photos. Show these to villagers later	<ul style="list-style-type: none">● Do not interview dominant groups only (men tend to dominate)● Do not ignore disadvantaged groups (e.g. the very poor, the disabled)● Do not ask leading questions● Do not dominate discussions● Do not manage people and their time according to your own interests or to an outside time schedule (e.g., rushing to eat with officials)● Do not judge local customs as bad, strange or negative● Do not push people to use particular tools to express their views in order to obtain quick results● Do not damage the local environment but rather treat it with respect● Do not get drunk in the community or otherwise cause offence by being culturally insensitive● Do not forget to show appreciation for peoples' time● Do not 'over promise' on the possible contributions that are possible to solve problems

6.4 Communication skills

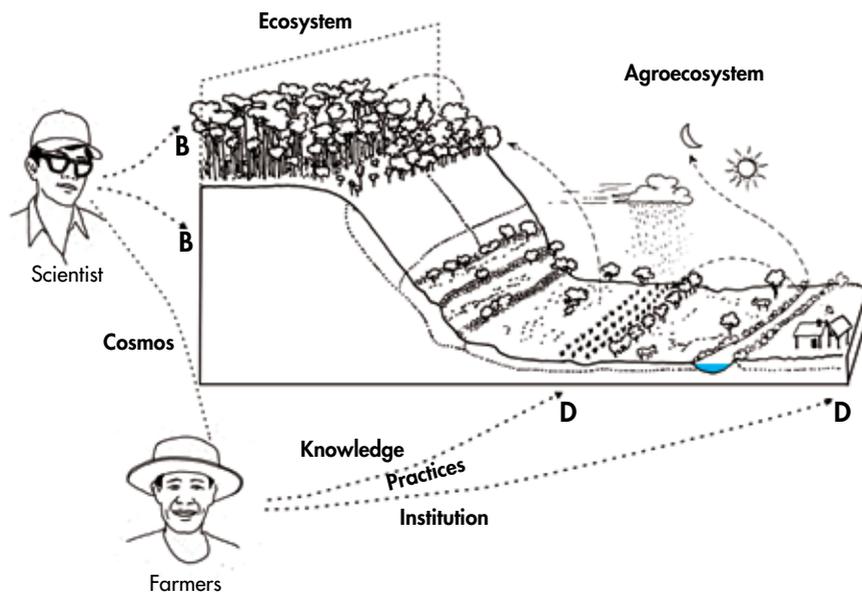
Agroforestry extension work requires the ability to communicate on a number of different levels. It is essential to be able to communicate agroforestry concepts to local people and user groups in ways that they understand. It is also essential to be patient and allow communities to discuss matters at their own pace and to formulate ideas in their own words. It is equally necessary to be able to communicate effectively with colleagues to share experiences and solutions. The ability to communicate with researchers and administrators, and policy and decision makers in government, is also important.



Good communication skill is essential for extension

6.5 Professional knowledge

An extension agent needs to acquire a working knowledge of possible agroforestry practices and to keep these updated through continual learning as new practices are developed. Finance planning, budget handling and activity planning are also required skills. A successful extension agent must be orientated to “think small” and to appreciate the value of projects and planting activities that are not always large in scale. It is also necessary to understand where compromises in ‘ideal’ practice (e.g., in tree spacing and management techniques as well as in the timing of activities) can be made and where not (generally, there is a need to be flexible, but in some cases it may be important to be particular). Compromise is necessary when farmers are struggling to find the time to carry out a range of activities and may only be able to devote minimal effort to the growing of trees. In many areas the knowledge of current practices in rural life may not yet be fully understood and this knowledge has to be collected by extension agents as they go about their work. Extension agents need training in methods to collect such information and how to talk with local people.



Linking local knowledge and scientific knowledge systems

6.6 The participatory extension approach

Scientists have often worked on the problems they perceive farmers face and then have wondered why farmers have not adopted their recommended solutions. Researchers, like extension agents all along, then realized that a different approach was required to drive adoption, and that farmers needed to be involved in problem solving. Thus began wider implementation of a participatory extension approach in which farmers are asked what they want and researchers accordingly help develop potential solutions which are then brought back to farmers for testing and the selection of different options.

The introduction of the participatory extension approach in the last decades represented the reversal of the traditional 'top down' agricultural research and extension pathway. It requires an equitable partnership between rural people, researchers and extension workers, and recognizes the importance of rural communities as actors in the entire process. Methods and terms adopted under this approach that are found in the literature include participatory action research (PAR), farmer participatory research (FPR), participatory technology development (PTD), participatory rural appraisal (PRA; mentioned above and see also more below) and farmer field schools (FFS). All of these methods share elements of participatory research and extension.



Farmers researchers, and extensionists must all contribute their specific knowledge, skills and experiment jointly

6.7 Participatory rural appraisal

Dozens of different participatory techniques and tools have been described in a variety of publications and have been the subject of training courses around the world. These techniques are concerned with group dynamics (e.g., how people interact, learn and implement), sampling issues (e.g., methods for wealth ranking and social mapping), interview approaches (e.g., focus group discussions, the roles of structured, semi-structured and 'open' interviews) and methods of visualization (Venn diagrams, matrix scoring, the use of timelines, pictures, symbols, maps, etc.). To ensure that people are not excluded from participation, these techniques avoid writing where possible, relying instead on tools of oral and visual communication.



Participatory land use planning

6.8 Participatory technology development

Participatory technical development is a vital method of the participatory extension approach to develop new and adapted technologies contextualized for local use.



Participatory research on sloping land management

6.9 Capacity building of user groups

Capacity building is a core process of participatory extension. The different ways to enhance the capacity of user groups include (some of these are discussed below in the following parts of this manual):

- Business training and enterprise development
- Technical training and back-stopping in farm management, seedling production and product processing
- Exposing user groups to successful practices, such as through demonstration plots and cross-site visits
- “One-on-one” mutual support between farmers
- Farmer field schools: learning new methods in a group setting
- Farmers’ fairs and competitions to encourage innovation and wider interest in the community
- The networking of user groups to learn from other groups

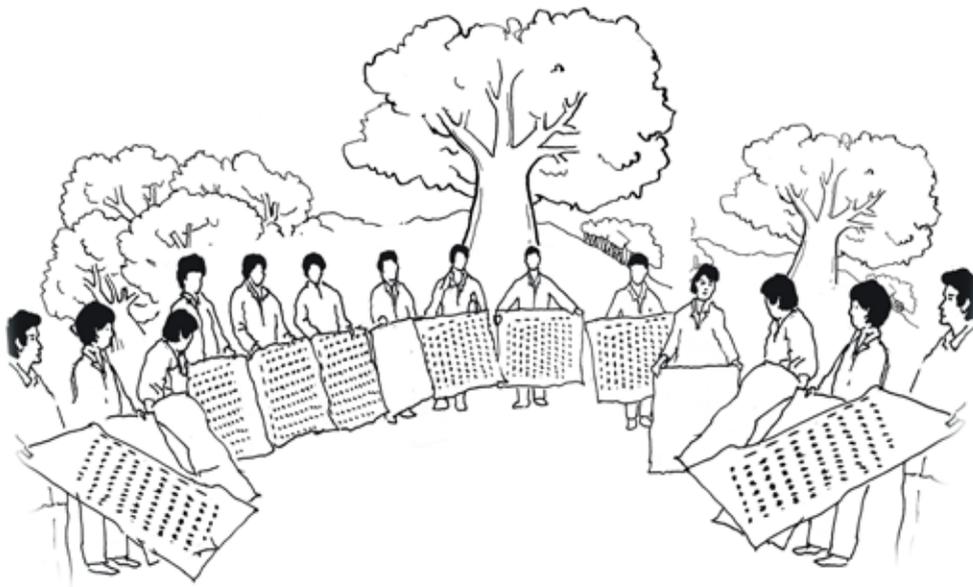


Working together in the field is the best way to build capacity

6.10 Documenting activities

Documentation is important for monitoring, evaluation and impact assessment of the participatory extension approach. It should record the entire process and include:

- The development of an evaluation plan
- Participatory monitoring with farmers
- Documentation and reporting
- Regular meetings of stakeholders (monthly, quarterly, annually, depending on the different stakeholders involved)
- Impact assessments on land productivity, the environment, incomes, health status, social cohesion in the community, etc.



Organizing user group to share their information and results

6.11 Scaling-up activities

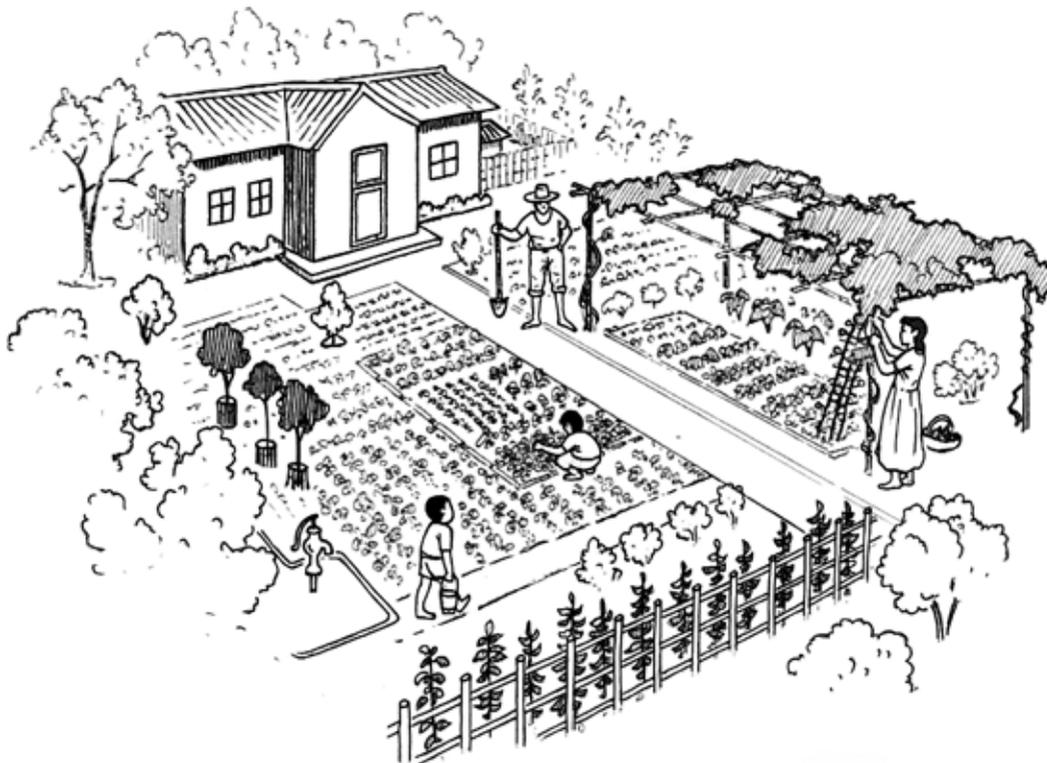
Agroforestry extension requires the scaling-up of success at specific sites to a wider scale. This means understanding what is different and what is the same at the wider scale, to determine what core practices that need to be widely adopted are. For expansion, the extension worker needs to be ready to: 1) document good practice at the pilot site, 2) establish new user groups in the extended area, 3) network user groups in different geographical area; and 4) conduct vocational training in the extended area.



Sharing success and good practices to other user groups

6.12 Organizing extension for technology transfer and exchange

Carrying out technology transfer and exchange can involve a wide range of methods. In addition to conventional 'teacher-student' training, the participatory extension approach requires interactive knowledge transfer and exchange. Some approaches to this are discussed below.



A home garden demonstration

6.13 Establish on-farm demonstrations

On-farm demonstrations can show what a tree looks like and how it fits in the farm landscape, the products it provides, and how to manage it. Demonstrations give confidence to farmers that an activity is possible and useful. Demonstrations are therefore a motivation to farmers to replicate activities in their own fields and on a wider scale. A field training centre will be connected to demonstration plots.



Establishing model user groups/leaders

6.14 Participatory training

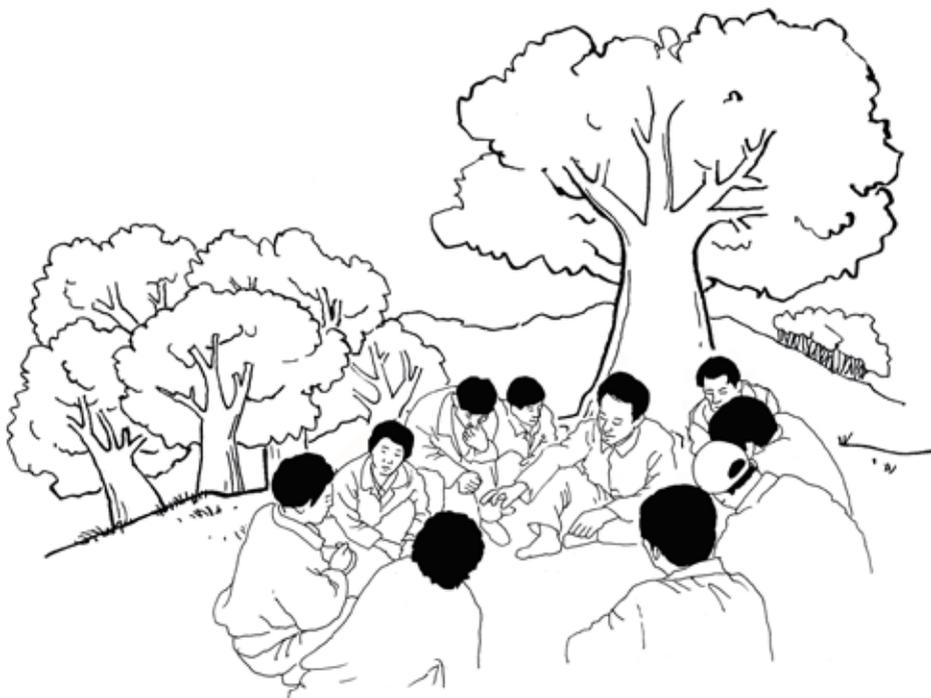
Participatory training for farmers should always be according to farmers' demand, and should always contain practical exercises so that farmers can learn from experience and not only from being talked to. Participatory training therefore differs from 'traditional' training.

Traditional training v.s. participatory training

Traditional training	Participatory training
<ul style="list-style-type: none">● Trainer's role is to tell students what they need to know.	<ul style="list-style-type: none">● Trainer's role is to ask questions, and to facilitate discussions.
<ul style="list-style-type: none">● Trainer is more knowledgeable and experienced than students.	<ul style="list-style-type: none">● Both trainers and trainees are knowledgeable and experienced.
<ul style="list-style-type: none">● Trainer shares her/his knowledge with the students by lecturing	<ul style="list-style-type: none">● Everyone must reflect on her/his own, then share their ideas, experiences, and expertise.
<ul style="list-style-type: none">● Farmers are passive, just listening and taking notes.	<ul style="list-style-type: none">● Trainees are active and analytical, asking questions and exploring alternatives.
<ul style="list-style-type: none">● Farmers learn the right answer from their teachers	<ul style="list-style-type: none">● Trainees develop their own answers. Indeed, there may be many different answers.

6.15 Cross-site visits

Cross-site visits can be organized at many different levels, for example between villages of the same districts or between villages of two different districts if these are not too far apart. It all depends on the model of adoption and the rate of spread of a technology. One day should be enough for a cross-site visit if it is well prepared in advance. Visits provide an important platform for farmer-to-farmer exchanges and time should always be given for farmer-farmer discussions and a question and answer session. In visits, the practical knowledge for particular practices can be learnt in a way that is not possible in formal training.



Cross-farmer/user group visit

6.16 Study tours

In some cases, it is not easy to convince farmers about new things. Of the usefulness of planting a new variety of a fruit tree, for example, or of adopting a new management technique that they have never seen or practiced before. Study tours to villages where farmers apply new technology successfully may broaden the experiences of farmers and open up minds.



A dynamic user group in sloping land management

6.17 Facilitate the development of particular interest groups

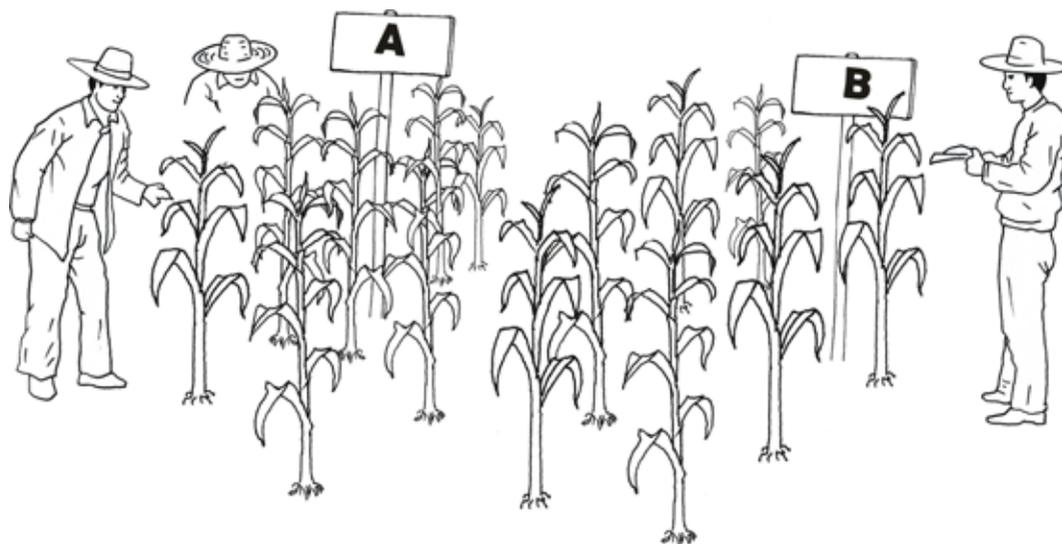
Apart from farmer user groups, it is useful to establish groups that bring together people with particular specialized interests, such as in tree nursery care, beekeeping, healthcare and product processing. These specialized groups can support their members in their activities and also assist more general farmer user groups. The agroforestry extension worker should facilitate the establishment of these interest groups and help them in their training and linkages with other stakeholders.



Establishing interest group for joint learning

6.18 Organizing extension for knowledge innovation and development

Another important component of agroforestry extension is to gain information that allows innovation and the further development of technologies; in other words, to be part of a research process. Agroforestry extension workers may therefore be involved in helping farmers manage on-farm tree trials that provide new information on useful material (germplasm) for planting and on how to manage it, including local innovations in management.



Participatory research is a continuing process

6.19 Agroforestry trials

When conducting an agroforestry trial, it is important to keep in mind the following objectives:

- ***Finding sustainable solutions for improving yields and farmers' incomes:*** a trial is a research process with farmers that is designed to find better practices than those used currently. This involves testing a range of different possible options against controls
- ***Collecting information on local farmers' practices:*** a trial may involve the observation of typical practices in farmers' plot to determine which are the technical constraints in production
- ***Enabling the sharing of local knowledge:*** agroforestry trials should recognize the role of local knowledge in management, collect this knowledge and stress its value, in order to engage farmers in the agroforestry development process. Trials should facilitate farmers' discussions on management issues and observe the adaptation of a technology in a local context.

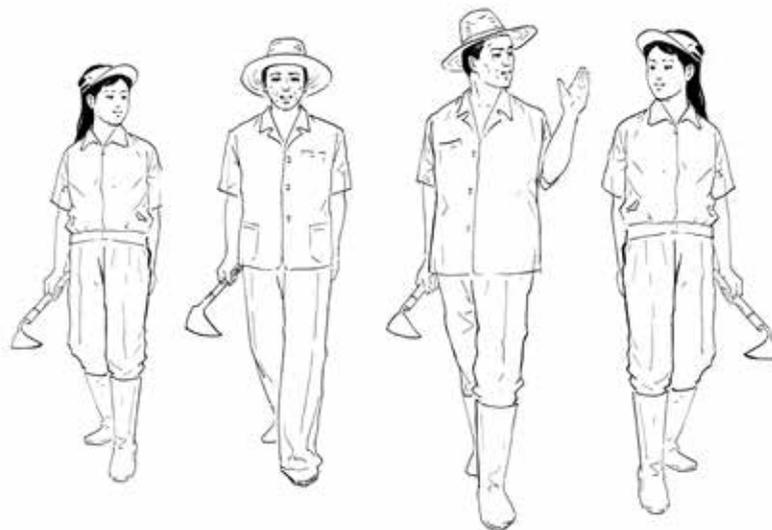


A good farmer-farmer collaboration and competition creates innovation

6.20 Steps for implementing agroforestry trials

There are several steps involved in carrying out agroforestry trials with the participation of local farmers:

- Organize a village meeting to clear the objectives of the trial, identify those who will be involved, choose the site or sites, and determine existing local knowledge and practices
- Meet with selected farmers to clarify the specific tasks and timeline of the trial, and explore their knowledge and expertise and determine where any training is required
- Design the trial together with farmers, based on their needs and requirements in terms of land, labor, the aspects of experimentation that interest them, etc.
- Establish the trial, using seedlings raised in local nurseries if possible, working with farmers to ensure establishment guidelines are met
- Jointly monitoring the trials (extension agents and farmers), making any needed observations and measurements
- Plan and implement a field conference to discuss the results of the trial, indicating success and failure and recommendations for management. The entire village should be invited for the wise dissemination of results.



Farmers server as both agroforestry researchers and practitioners



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