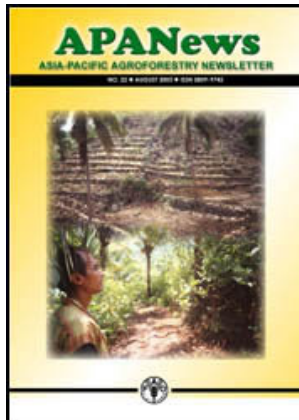




FAO CORPORATE DOCUMENT REPOSITORY

Originated by: Regional Office for  
Asia and the PacificTitle: [APANews - The Asia-Pacific Agroforestry Newsletter, No. 22, August 2003...](#)

**APANews**  
**ASIA-PACIFIC**  
**AGROFORESTRY**  
**NEWSLETTER**

**AGROFORESTRY****NO. 22 AUGUST 2003****Table of Contents**

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**OUR ADDRESS.** FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; Web site: <http://www.fao.org> and <http://www.fao.or.th>, E-mail [fao-rap@fao.org](mailto:fao-rap@fao.org).

**PRODUCTION.** Patrick Durst and Philip McKenzie (Editorial Consultants), Leah Arboleda and Eileen Calaycay-Cardona (Editors), Rowena Cabahug, Perseveranda Tubig, Reinelen Reyes and Consolacion Lampa (Production Assistants)

**COVER PHOTO.** Former radio technician turned farmer Benjamin Molit of Cebu, Visayas, Philippines, and his family, was able to transform a rocky and unproductive two hectare land to a self-sufficient agroforestry farm. (Photos courtesy of the UPLB Institute of Agroforestry)

**PRINTER.** Craftsman Press Co., 487/42 Soi Wattanasilp, Rajprarob Road, Maddasan, Rajthevee, Bangkok 104500 Thailand; Tel (66-2) 2533009; Fax (66-2) 6500684

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## AGROFORESTRY RESEARCH

### Using *Dalbergia sissoo* in agroforestry systems in India

A.S. Gill ([asgill@iqfri.up.nic.in](mailto:asgill@iqfri.up.nic.in))

*Dalbergia sissoo*, locally known in India as shisham or sissoo, is a multipurpose nitrogen-fixing tree species. It is distributed throughout the sub-Himalayan tracks, from the Indus River to Assam, and in the Himalayan Valley up to around 900 to 1 500 m.

Shisham is a valuable source of timber, medicine and fodder (containing 24 percent crude protein on dry weight basis). Its wood is used for plywood manufacturing, furniture, railway sleepers and building materials. It thrives well on soils ranging from sandy loam to alluvial and in areas with rainfall ranging from 760 to 4 570 mm. In India, the tree is generally planted along roadsides, on field boundaries, in shelterbelts and on degraded lands. The species is also extensively planted in various agroforestry systems.

#### Boundary plantation

In central India, trees are generally planted on the farm boundaries to control the effects of the hostile agroclimatic conditions. For instance, where shisham was planted on the boundary of farmers' wheat fields, grain yields of 3.40 t/ha (average of four years) were registered. This is a relative grain yield of 98.5 percent. In four years, the overall reduction in the grain yield was negligible at only 1.5 percent. This affirms the nitrogen-fixing role of shisham in semi-arid conditions.

#### Shelterbelt plantation

An on-station field trial was conducted in Jhansi for two consecutive years, to ascertain the performance of rainfed food/ fodder crops, with shisham planted as a shelterbelt. The trees were eight years old and a crop rotation of sorghum (fodder)-barley (food) was selected for the trial. The trees were planted in an east-west direction, 4 m apart. The fodder crops were grown under a recommended package of practices. The crops were sown perpendicular to the tree belt (i.e. in north-south direction). The productivity of the crop was reduced significantly near the tree line, but it increased with an increasing distance from the tree line, as expected. Moisture content was high near the trees; and as the distance increased, the moisture content of the soil decreased.

#### Energy/block plantation

Absentee landlords commonly plant trees in close spacing for 5 to 10 years and, later on, harvest them for various purposes. Attempts were made to plant shisham in spacings of 2 m x 2 m and 2 m x 1 m under irrigated and rainfed conditions. During the first year, groundnut (under irrigated conditions) and sesame (under rainfed conditions) were sown in the interspaces, yielding 2.6 t/ha (pod) and 0.57 t/ha, respectively. But in the subsequent years, intercropping was no longer feasible.

#### Rehabilitation of degraded lands

Shisham has proven to be ideal for upgrading degraded lands. It has an extensive root system. Because of its suckers, the tree spreads rapidly. Because of its ability to fix atmospheric nitrogen, it is excellent in improving fertility conditions. It was reported that shisham has also been used to rehabilitate mining areas.

## Planting trees in rice fields and agrisilviculture systems

Farmers have a limited choice of trees that can be planted in rice fields. Commonly, they plant mango, poplar and Singapore cotton; but shisham has been gaining popularity. *The author is the principal scientist of the Indian Grassland and Fodder Research Institute, Jhansi-Gwalior Road, Jhansi, 284 003 India.*

## Agroforestry research and education in India

A.S. Gill ([asgill@iqfri.up.nic.in](mailto:asgill@iqfri.up.nic.in))

Agroforestry plays an important role in India, where trees and forests are critical in ensuring sustained agricultural production, including animal husbandry and in some instances, fisheries.

The country's total land area is about 328.8 million ha, of which, forests occupy 67.7 million ha (20.5 percent). Forestry has a large and indispensable role in improving the country's present and future food security. As such, research and education in agroforestry are deemed necessary to develop, establish or sustain appropriate agroforestry systems in India.

Ancient Indians practiced agroforestry, growing *Prosopis cineraria* in the arid regions and *Acacia* species in the semi-arid regions. Similarly, for many decades now, farmers in the Central Himalayas have been cultivating *Ammomum subulatum* in combination with *Alnus nepalensis*. Various tree-crop combinations have also been cultivated in the Jhoom areas.

However, agroforestry research in India is of recent origin. In 1979, the Indian Council for Agricultural Research (ICAR) organized a national seminar on agroforestry at Imphal. The seminar constituted a task force to suggest the directions and organization for agroforestry research in India. As a result, the All-India-coordinated Research Project on Agroforestry was established. It has centers all over the country, based on the various agroclimatic zones. The National Research Centre for Agroforestry (NRCAF) was established at Jhansi in 1988.

### Agroforestry research

Many of the traditional agroforestry technologies have been described, but few have been studied regarding their biophysical and socioeconomic performances. At present, substantial research resources are being allocated to determine the potential of multipurpose trees (MPTs) and agroforestry technologies in enhancing the productivity and sustainability of various farming systems.

Agroforestry research in India can be categorized as follows:

- **component research** (e.g. multipurpose tree species [MPTS] evaluation and management and nitrogen-fixing tree species); and
- **systems research** (e.g. diagnostic survey, forms of agroforestry systems and agroforestry for wasteland development/management).

Most of the agroforestry researches currently being conducted are on productivity. Not much research is being done on the sustainability and adaptability of agroforestry systems.

Agroforestry field experiments are considerably more complex than researches limited to annual crops. Thus, evaluation in agroforestry is also a complex task. Agroforestry experiments have many different objectives; thus, it is not easy to define one or even a few methods of evaluation.

### Agroforestry systems

Various research institutions in India have developed agroforestry systems in different areas. The following are the most common systems, based on the nature of their components:

1. Agrisilviculture (trees + crops)
2. Boundary plantation (trees on boundary + crops)
3. Block plantation (trees + crops)
4. Energy plantation (trees + crops during initial years)
5. Alley cropping (shrubs + crops)
6. Agrihorticulture (fruit trees + crops)
7. Agrihortisilviculture (trees + fruit trees + crops)

8. Agrisilvipasture (trees + crops + pasture/animals)
9. Hortipasture (fruit trees + pasture/animals)
10. Silvipasture (trees + pasture/ animals)
11. Forage forestry (forage trees + pasture)
12. Shelterbelts (trees +/- crops)
13. Windbreaks (trees +/- crops)
14. Live fence (shrubs/under trees on boundary)
15. Homestead (multiple combinations of trees, fruit trees, etc.)
16. Entomoforestry (trees + sericulture)
17. Aquaforestry (trees + fish)

### **Agroforestry education**

In India, there are 29 state agricultural universities, 1 central agricultural university, 4 deemed agricultural universities, and 1 horticultural university. Agroforestry, as a course, was considered with the establishment of forestry departments in different agricultural universities. The first B. Sc. Forestry program began in 1982, at the Birsa Agricultural University in Ranchi. Thirteen more agricultural universities began offering forestry courses, which included agroforestry, between 1985 and 1986. The Dr. Y.S. Parmar University of Horticulture and Forestry in Solan (HP) offers M. Sc. and Ph.D. degrees in forestry.

Moreover, some institutes also offer summer courses in agroforestry. The All-India-coordinated Research Project on Agroforestry also holds biannual workshops.

Agroforestry has indeed taken off in India, both in research and education. It is hoped that the increased offering of agroforestry courses may eventually lead to the development of agroforestry degrees and strengthened agroforestry education in the country. At the same time, agroforestry education programs may also help address the identified research gaps in agroforestry, not only focusing on its productive capabilities but also its potentials for sustainability and adaptability. *The author is the principal scientist of the Indian Grassland and Fodder Research Institute, Jhansi-Gwalior Road, Jhansi, 284 003 India.*





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## AGROFORESTRY PROMOTION AND DEVELOPMENT

### Understanding silvopastoral systems

Blesilda M. Calub ([bmcalub@hotmail.com](mailto:bmcalub@hotmail.com))

Of the various types of agroforestry, silvopastoral systems are the least studied, even though many such systems exist. An agroforestry practice where trees, animals and pastures are deliberately combined to obtain benefits and services is called a silvopastoral system. The integration of these components can vary both in time and in space.

In forest or fruit tree plantations, animals serve as "live mowers" that check weed growth. They may graze on the pastures grown under the trees or feed directly on tree leaves. Adding animals to tree-based systems intensifies the productivity of the land, through any or a combination of the following:

- additional income from the sale of animals
- improved family nutrition from animal products
- organic matter accretion from manure
  
- better management of the understory vegetation

On the other hand, trees and shrubs can serve the important role of bridging the gap in fodder supply during the critical dry months of the year. Many fodder trees have high contents of crude protein, digestible fibers, macro and micronutrients. Additionally, trees tolerate a wide range of climate, stabilize sloping lands from erosion and rehabilitate degraded grasslands. Soil conditions are improved by contributions from leaf fall and nitrogen fixation by some species.

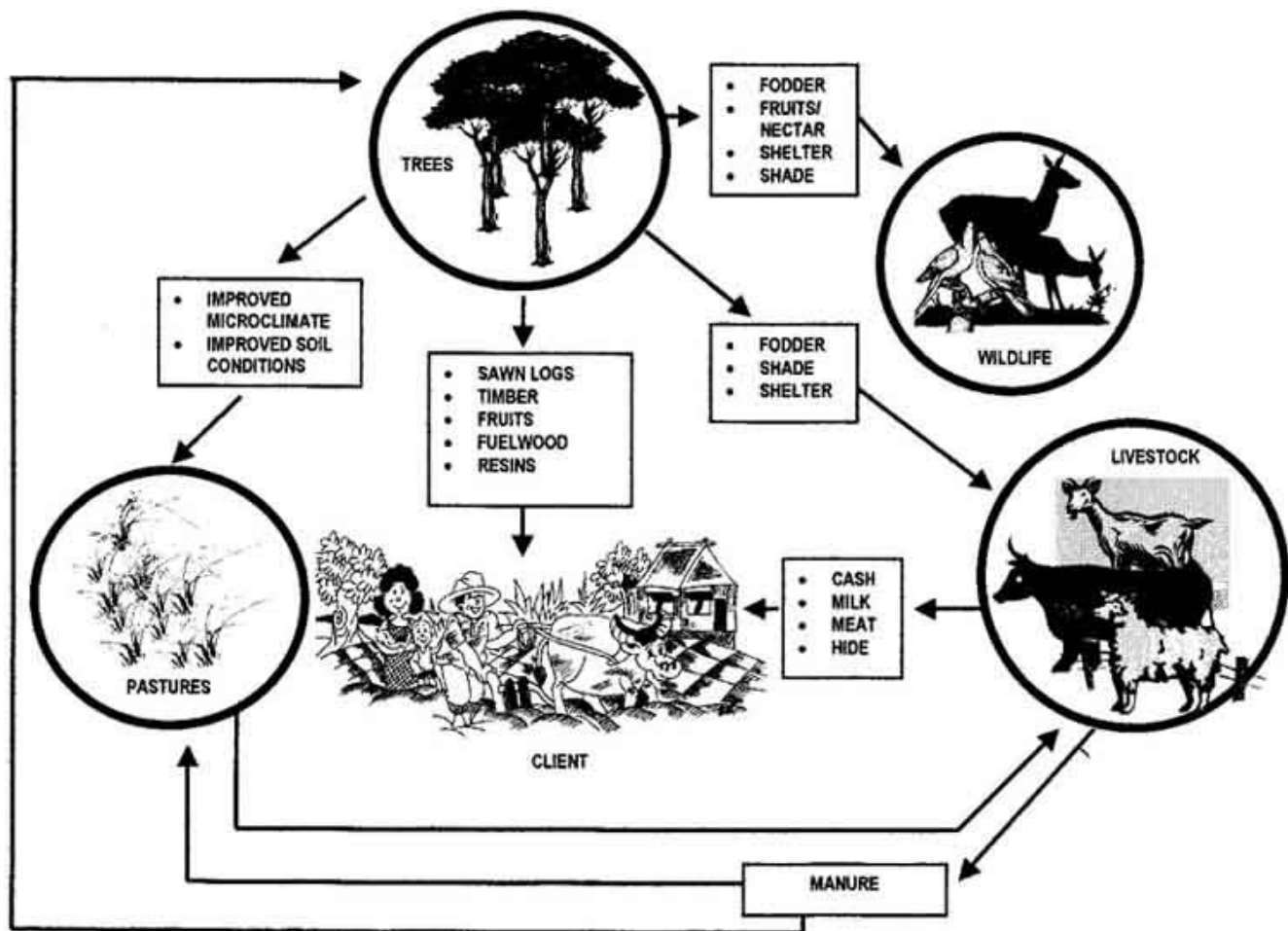
### Types of silvopastoral systems

Different systems exist depending on the system objectives, client preferences and management practices. Likewise, tree species, animals, pastures, soil, climate, other vegetation, land-use patterns and planting configurations also contribute to the development of a variety of systems. Some common types and examples of silvopastoral systems are as follows:

#### **a. Fodder bank systems**

Trees are planted as close as 1m x 1m and are cut regularly to induce maximum herbage production. In Batangas, in Southern Luzon, Philippines, the cut herbage is usually carried to animal feeding stalls. In southwest Queensland, Australia, sheep or goats are brought to the plots and allowed to forage on the cut branches of naturally-growing mulga trees (*Acacia aneura*). The system is called fodder bank, which provides reserve fodder when it is in short supply, usually in the summer months.

#### **Model of a silvipastoral system**



A **protein bank** is a type of fodder bank which intentionally chooses trees, shrubs and pasture legumes with high protein-containing leaf biomass. Commonly used species include ipil-ipil (*Leucaena leucocephala*), kakawate (*Gliricidia sepium*), desmodium (*Desmodium rensonii*), centro (*Centrosema pubescens*) and kudzu (*Pueraria phaseoloides*).

The **three-strata forage system** is another type of fodder bank developed in Indonesia. It involves the planting of forages, shrubs and trees to form three canopy layers or strata in a unit of land. Pasture grasses, vines and herbs occupy the lower strata; shrubs occupy the middle strata and trees occupy the upper strata. The combination of grasses and trees can ensure year-round supply of fodder.

#### ***b. Live fence or boundary systems***

Single or double rows of fodder trees are planted along farm boundaries. The trees have the dual purpose of providing fodder and serving as live fence posts. If intended to enclose animals, the trees are usually planted densely, as in hedges, to prevent animals from getting out. In Palawan, Philippines some farmers use the thorny camachile (*Pithecellobium dulce*) to confine goats and prevent them from straying into crop plots. In some parts of Africa, thorny species are planted as thick hedges to fence off livestock from wild animals.

***A fodder bank of Trema orientalis trees and Setaria sphacelata pasture grass.***



### **c. Hedgerow intercropping systems**

Fodder trees, mostly ipil-ipil, are planted as hedges in single, double or triple rows. The spaces in between hedgerows are planted with pasture grasses. Such systems are found on some private farms in Queensland. As in fodder banks, herbage may be cut and carried to animal feeding stalls. The more common practice is to let the animals forage on the cut tree branches and pasture grasses.

On sloping lands, hedgerows can be planted along contours for the added benefit of controlling soil erosion. This is exemplified by SALT II (simple agro-livestock technology) which is being promoted in Mindanao, Philippines.

### **d. Tree plantation + animal grazing systems**

The understory of tree plantations is utilized as grazing area for cattle, sheep and goats. The plantation may be of forest trees, fruit trees, coconuts, oil palms or rubber. The Nasipit Lumber Company in Agusan, Mindanao, Philippines allows cattle to graze freely on improved pasture grasses planted under trees of lumbang (*Aleuritis molucana*). In parts of Sri Lanka, as well as in Bicol, Quezon and Batangas, Philippines cattle and goats graze on indigenous forages growing under coconut plantations. In Malaysia, sheep, goats and poultry are found grazing under oil palm and rubber plantations. Some authors include bee keeping in citrus orchards as another form of silvopastoral system.

### **e. Indigenous cut-and-carry systems**

As the name implies, the fodder is cut and carried to animal stalls. Farmers of Batangas, a traditional livestock-growing province in the Philippines, have long been practicing this. Ipil-ipil and kakawate are the most preferred fodder tree species. However, after the psyllid infestation on ipil-ipil, farmers shifted back to their traditional practice of using indigenous fodder trees and shrubs (IFTS). The more important IFTS include anabiong (*Trema orientalis*), binunga (*Macaranga tanarius*), kalios (*Streblus asper*) and dalunot (*Pipturus arbrescens*). In Nepal, *Artocarpus* and *Ficus* species are commonly used.

### **f. Wildlife silvopastures**

Silvopastoral systems are not only confined to livestock or domesticated animals. The United States Department of Agriculture (USDA) National Agroforestry Center promotes silvopastures to ensure forage, shelter, habitat and "travel lanes" for a number of different types of wildlife such as herbivores, birds and bats.

In this system, tree species combinations and planting configurations are chosen to meet the habitat requirements of specialized wildlife species. Standing dead trees are purposely left to serve as homes or nests for small wildlife and cavity dwellers. Growth of a diversity of the understory grasses and herbs needed by wildlife is favored through management of the upper story trees. Travel lanes or corridors are purposely created to allow movement of certain wildlife to and from several silvopasture habitats to avoid isolation. Travel lanes also direct the access of wildlife to wetlands or water sources.

## Some challenges and realities

### a. Which tree species?

A major dilemma in planning a mixed production scheme such as a silvopastoral system is finding the "right" tree to meet the needs of the system and the client. Which trees can withstand regular defoliation? How much edible biomass can be produced by a particular fodder tree? What is the nutrient composition? How about anti-nutritive factors?

### b. Which pasture species?

Which of the existing improved pasture grasses can be appropriately combined with trees? At what proportions and configurations can they be interplanted? How would the presence of trees affect their growth, regrowth and nutrient contents? Which pasture species can grow in particular soil and climatic conditions? What about pasture legumes? How can the poor productivity of native *Imperata*, *Themeda* or *Chrysopogon* grasslands be made more productive by silvopastoral systems?

### c. What animal species to integrate?

The compound stomach of ruminants enables them to convert plant materials into animal proteins, thus making them highly suitable for integration into silvopastoral systems. Ruminants include cattle, carabaos, goats and sheep. The horse, though not a ruminant, is also important in silvopastoral systems, especially in hilly areas where they provide draft power for transporting farm inputs and products.

The decision of what animal species to integrate into smallholder systems is related to the question, "Who takes care of the animals?" Men prefer large animals like cattle and buffalo, while housewives and children prefer small animals like goats and sheep.

### d. What is the appropriate carrying capacity of particular silvopastures?

This is where basic research is needed. How many animals can be supported by a given tree + pasture stand over a given period? How much edible herbage can a particular tree species produce? How often can trees be cut regularly to meet animal demand for fodder but not overharvest them? How many fodder trees should be planted to be able to support a given number of animals? What is the appropriate planting configuration to maximize tree herbage yields? For plantation systems, what is the appropriate plant spacing to allow understory pasture grasses to grow? At what age of the tree plantation can animals be allowed to graze without endangering the trees?

These are but some of the questions only a few have answers so far.

Silvopastoral systems provide an option for obtaining additional income and services from the tree + livestock + pasture integration. In some cases, there are also direct benefits for wildlife conservation. However, before such advantages can be realized, a clearer understanding of the system is needed in order to manipulate the components for optimum gains. Basic questions have to be answered.

However, the work does not have to be done by researchers alone. Many farmers have indigenous knowledge of effective tree + livestock + pasture schemes, which when combined with scientific research, can increase the current knowledge on silvopastoral systems. The objectives will assess how and why it works, to determine options for improvement and to promote the system to a wider set of stakeholders. *The author is a university researcher at the Farming Systems and Soil Resources Institute, University of the Philippines Los Baños, College, 4031 Laguna, Philippines.*

*References: (1) Biggelaar DC. 1996. Farmer experimentation and innovation. A case study of knowledge generation process in Agroforestry systems in Rwanda. Community Forestry Case Study Series No. 12. FAO. Rome; (2) Calub BM and RD Lasco. 1999. Indigenous trees and shrubs as fodder in the drought-prone areas of Batangas. Proceedings of the 36<sup>th</sup> Annual Convention of the Philippine Society of Animal Science. Manila, Philippines; (3) Gordon JC, WR Bentley, SM Nor and HM Noor. 1990. A handbook on the management of agroforestry research. Winrock International, USA and South Asia Books, USA; (4) Gutteridge RC and HM Shelton. 1994. Forage tree legumes in tropical agriculture. CAB International. Wallingford, UK; (5) Johnson RJ, MM Beck and JR Brandle. Undated. Windbreaks and wildlife. University of Nebraska Extension EC 91-1771-B. Author's Note: The term silvopastoral system (with an*

"o") is used in most American literature. It is referred to as *silvipastoral system* (with an "i") in European publications.

## Practicing agroforestry in the Mt. Makiling Forest Reserve, Philippines

Josefina T. Dizon ([dizon@laguna.net](mailto:dizon@laguna.net))

The Mt. Makiling Forest Reserve (MFR), with an area of 4,224 ha, is 65 km south of Manila, Philippines. It serves as an outdoor laboratory for forestry education and science; a watershed; a recreational/ ecotourism area; and a historical landmark.

But as in many upland areas in the Philippines, migrant farmers have occupied the MFR. Through the years, these upland farmers have established their farms through agroforestry. MFR farmers have been raising woody perennials, mostly fruit trees, in combination with agricultural crops.

An interview among 93 households, (which represent some 60 percent of the population) in Barangay Bagong Silang, an established community inside MFR, was conducted to

- identify the different species planted for food, fuelwood, fodder, timber and medicine
- investigate the silvicultural practices applied to these species
- identify factors affecting the use of these agroforestry species
  
- determine local beliefs, customs and traditions affecting the production and use of these species

### The community

Barangay Bagong Silang is located some 4 km away from the town proper of Los Baños. It has a total land area of 451.11 ha. It has moderate to gentle slopes of about 30 percent, with elevations of 200 to 400 m above sea level. The relatively low elevation and gentle terrain have made the area an attractive place to farm and settle. The area has a Type 1 climate with two pronounced seasons, wet from May to December and dry from January to April. Rainfall averages 2 400 mm annually and temperatures range from 25°C to 27°C. The soil is generally of the Macolod clay-loam type, the texture of which is predominantly loam to silt loam.

About 150 households, with an average family size of five, are distributed in three *sitios* (villages) in Nagtalaok, Puting Lupa and Wakwa. An existing road links the barangay to the market centers in Los Baños and Bay, Laguna.





*Gliricidia sepium* is most often used as fuelwood by farmers in the Mt. Makiling Forest Reserve, Philippines.

Bagong Silang is approximately 3 km away from the nearest road, via foot trails. Hence, horses are used to carry products to the nearest accessible road where regular jeepneys ply the route.

Farming is the primary occupation. Many of the farmers have been cultivating their farms for about 30 years. The average farm size is 2.54 ha.

### Species used

The survey identified 22 species that farmers plant in their agroforestry farms. Of these, 20 were fruit/food trees. The species planted in Bagong Silang for food include

*Lansium domesticum*, *Citrus nobilis*, *Nephellium lappaceum*, *Artocarpus heterophyllus*, *Persea americana*, *Mangifera indica*, *Annona squamosa*, *Annona muricata*, *Sandoricum koetjape*, *Chrysophyllum cainito*, *Psidium guajava*, *Averrhoa carambola*, *Manilkra zapota*, *Citrus maximus*, *Pouteria campechiana*, *Tamarindus indica*, *Theobroma cacao*, *Coffea* sp., *Citrus madurensis* and *Cocos nucifera*. Only *Gliricidia sepium* and *Leucaena leucocephala* were the nonfood trees utilized by the farmers. Of the 14 identified uses of these species, food, fuelwood and medicine were most important.

### Silvicultural techniques

**Source of planting materials.** The study shows that the farmers rely heavily on raising their own seedlings. They bought economically important species like *Citrus* sp. and *N. lappaceum* from nurseries in Los Baños or Batangas. Farmers preferred grafted seedlings since they fruit much earlier than those raised from seeds. A few species were reported to be naturally growing on some farms.

Uses of agroforestry species planted.

SPECIES	NO. OF USERS	USES	AVE. NO./FARM
<i>Coffea</i> sp.	87	food (1), fuelwood (2), charcoal, medicine, post	541
<i>Cocos nucifera</i>	83	food (1), fuelwood (2), hard broom, charcoal, timber, roofing material, vinegar, handicraft, walling material, copra, insect repellent	151

<i>Lansium domesticum</i>	82	food (1), fuelwood (2), medicine, charcoal, insect repellent, post, timber	179
<i>Citrus nobilis</i>	77	food (1), fuelwood (2), medicine, charcoal, handicraft	349
<i>Gliricidia sepium</i>	58	fuelwood (1), post (2), charcoal, timber, insect repellent, fodder	70
<i>Persea americana</i>	43	food (1), fuelwood (2), medicine, charcoal, post	46
<i>Theobroma cacao</i>	41	food (1), fuelwood (2), medicine, charcoal	64
<i>Nephellium lappaceum</i>	40	food (1), fuelwood (2), charcoal, medicine	59
<i>Artocarpus heterophyllus</i>	39	food (1), fuelwood (2), medicine, charcoal, insect repellent, timber, handicraft	75
<i>Mangifera indica</i>	37	food (1), fuelwood (2), medicine, timber, charcoal	12
<i>Annona muricata</i>	22	food (1), fuelwood (2), medicine, charcoal	44
<i>Annona squamosa</i>	18	food (1), fuelwood (2), medicine, charcoal	56
<i>Citrus madurensis</i>	17	food (1), fuelwood (2), medicine, charcoal	102
<i>Sandoricum koetjape</i>	16	food, fuelwood, medicine, charcoal, post	6
<i>Psidium guajava</i>	13	food (1), fuelwood (2), medicine, charcoal	6
<i>Chrysophyllum cainito</i>	8	food (1), fuelwood (2), medicine, charcoal, timber	5
<i>Citrus maximus</i>	4	food (1), fuelwood (2), medicine, charcoal	8
<i>Leucaena leucocephala</i>	8	fuelwood (1), post, charcoal, medicine, fodder	92
<i>Manilkra zapota</i>	3	food (1), fuelwood (2)	3
<i>P. campechiana</i>	3	food (1), fuelwood (2), charcoal	20
<i>Averrhoa carambola</i>	1	food, fuelwood	1
<i>Tamarindus indica</i>	1	food, fuelwood, medicine	5

Note: (1) and (2) are priority species.

**Method of establishment.** The majority of the species were established in the farms through the transplanting of seedlings. A few, like *A. heterophyllus*, *M. indica*, *Coffea* sp. and *P. americana*, were directly seeded. Farmers planted wildlings of species such as *C. nucifera* and *Coffea* sp. *G. sepium* was basically established through direct planting of cuttings. Some farmers reported that they did not need to plant species like *P. americana*, *C. nucifera*, *Coffea* sp., *P. guajava*, *A. heterophyllus*, *G. sepium*, *S. koetjape* and *C. cainito* as these grow naturally in the area.

**Location of planting.** The dominant cropping pattern in the area was mixed/mosaic planting, that is, the species were randomly mixed with other tree crops. Another system that was widely used was multistorey homegardens. Other farmers planted agroforestry species with shade-tolerant annual crops such as *Zingiber officinale* and *Colocasia esculenta*.

Since the species planted were hardy trees, farmers also planted them in the gullies and on steep slopes for soil stabilization. *G. sepium* was the most common species planted along the farm borders.

**Spacing.** In general, the farmers did not observe any regular spacing pattern for the different species as they were planted randomly in a mixed/mosaic fashion. Their spacings ranged from 1 m x 1 m to 20 m x 20 m, depending on the tree crop. The majority of the species had spacings of 3 m x 3 m and 4 m x 4 m.

**Care and maintenance.** For all tree crops, cleaning and brushing were the most common monthly care and maintenance activities. Some species like *Coffea* sp., *Citrus* sp. and *G. sepium* were pruned once or twice a year to enhance the productivity of the trees.

Not many farmers fertilized their tree crops. If they did, they did it once or twice a year and was limited to selected crops like *C. nobilis*, *C. madurensis*, *L. domesticum* and *N. lappaceum*. Only selected crop trees were sprayed with insecticides. Ring weeding was often done for newly established seedlings. Pollarding was only done for *G. sepium*, which was the most common species used for posts.

### **Associated beliefs, customs and traditions**

Some farmers observed a few beliefs and customs, especially when they planted trees. They usually planted during a full moon. Other practices included planting with accompanying rice grains, filling the mouth with porridge while planting, planting with an upward hand position, planting with a full stomach and asking permission from the gods and goddesses of the forest before planting.

### **Summary and recommendations**

There is a need to disseminate information to farmers regarding other potential uses of the trees that they plant. In addition, there is a need to quantify the amount of fuelwood obtained from the forest farms to determine the percentage contribution of these species to household fuelwood consumption.

With regard to the medicinal uses, there should be an extensive study on the medicinal properties of these species, the ailments they cure, and the preparation methods and dosages to use.

Most farmers raised their own seedlings, but they also bought asexually produced seedlings of *Citrus* sp. and *N. lappaceum*. Since farmers preferred grafted and budded seedlings, they need to be taught these propagation techniques. *The author is an assistant professor at the Institute of Community Education, College of Public Affairs, University of the Philippines Los Baños, College, 4031 Laguna, Philippines.*

### **Participatory agroforestry: the Perur, India experience**

*Dr. S.R. Subramanian and Dr. Kezevino Aram ([shanti@eth.net](mailto:shanti@eth.net))*

The process of development, in any society, should ideally be viewed and assessed in terms of what it does for an average individual. It also has to be seen in terms of the benefits and opportunities that it generates for people and how these are eventually distributed between men and women, the well-off and deprived, and across regions. It becomes necessary, therefore, to have a framework and to evolve strategies that forge and strengthen development and provide better opportunities for people.

A project geared toward this end was the Participatory Agroforestry for Poverty Alleviation and Environmental Restoration in Perur Block, a part of Coimbatore District, in the southern Indian state of Tamil Nadu. It was a spin-off from the Shanti Ashram poverty reduction workshop. The workshop was an exercise in microlevel planning, and it helped identify a number of strategies for poverty alleviation. One such strategy was the linking of the expertise of the Institute of Forest Genetics and Tree Breeding (IFGTB) and the need for diversification, expressed by the Perur Block farmers.

Participants were from the United Nations (UN) agencies, led by the then United Nations Development Programme (UNDP) resident coordinator, Mr. Hans Von Sponeck; vice-chancellors of three Coimbatore-based universities; and representatives of state governments and community-based organizations. The executive agencies of the project were UNDP and the Ministry of Environment and Forests (MOEF). The Shanti Ashram, a grassroots organization, was the implementing agency.

Perur Block has 26 villages with a population of over 120 000. Shanti Ashram has initiated a number of integrated rural development programs in the villages of Perur Block over the past decade. The Ashrams' participatory approach of working at a block level has generated useful information and knowledge.

The project aimed to train 250 men and 250 women farmers of Perur Block on agroforestry; form youth and women's groups to sustain the project; and develop and train participatory research appraisal (PRA) teams. The 26 villages were grouped into nine clusters with three villages each. One field worker was in charge of each cluster.

The key dimensions of the methodology adopted were as follows:

- capacity building z development of local expertise in putting together a village-level land-use plan
- promotion of agroforestry through training, providing high-quality planting materials and setting up model farms
- establishment of nurseries and sapling distribution outlets, and a tree growers association

In effect, Mahatma Gandhi's vision of *sarvodaya* inspires the work of the Ashram. Gandhi said that a population with an ancient rural tradition must find its own model of integrated rural development.

### **Highlights of the project**

Although the project initially set out to train only a small number of farmers, almost the entire farming community of Perur eventually joined in. Over 600 farmers participated. One-third of them were small- and medium-scale farmers.

The coming together of a highly specialized institution like the IFGTB and a specialized grassroots organization like Shanti Ashram created not only a framework for the transfer of technology, but also a process of mutual appraisal and education. With the publication of a series of educational materials in Tamil, continuing education and dissemination of experiences were guaranteed.

Other highlights of the project included the following:

- The farmers were exposed to the need for agroforestry, the species suited for various agroclimatic conditions, agroforestry models, intercropping, and the economics of agroforestry, through seminars. Scientists of Tamil Nadu Agricultural University, IFGTB, Department of Agriculture and Shanti Ashram interacted with the villagers.
- Simultaneous PRA exercises were carried out in all 26 villages. The land available for tree planting and the tree species required were identified. The farmers visited other farmers' fields devoted to agroforestry.
- Around 200 school children from ten schools formed a Green Brigade. They were trained in agroforestry and environmental protection. They became extension agents responsible for creating the demand for tree seedlings. Other organizations helped in procuring, raising, stocking and distributing the seedlings in the villages.
- Farmers learned much from their interactions with scientists of IFGTB and workers of Shanti Ashram, particularly on ensuring the proper growth and sustainability of the planted trees.
- Ten village-level nurseries were established, complete with fences, water facilities and storage. IFGTB trained the interested villagers on nursery management and care. This generated employment in the villages, apart from supplying quality seedlings locally at a lower cost.

## Sustainability

What is most important in such experiments is the sustainability and replicability of the project with respect to technical, financial and institutional feasibilities. Ten model farms were established in farmers' lots with various combinations of trees, fruit trees, fodder and other crops. Nine tree growers' associations were also formed and trained.

Indeed, what emerged from these activities was the quadrangular model of microplanning where first, the village communities participated; second, the voluntary organizations like Shanti Ashram helped; and third, the government's development agencies facilitated the process of informed development, supported by the expertise of technical institutions like IFGTB. This quadrangular model of planning, implementation and evaluation visibly reduced poverty in Perur.





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## OPINION

### Exploring the synergy of agroforestry and ecotourism

Charles P. Castro ([charlz1951@yahoo.com](mailto:charlz1951@yahoo.com))

Agroforestry apostles, especially those looking for new worlds to conquer in pursuit of their mission to "transform lives and landscapes," would do well to consider the prospects and options, let alone the fresh winds of change, that ecotourism has to offer.

To put it bluntly, it's high time to upgrade agroforestry by opening its doors to the energizing effect of ecotourism.

Whether we like it or not, ecotourism has become a growth area to contend with, not only in the environment and natural resource sector, to which agroforestry belongs, but also in other sectors of society.

Why ecotourism? In the words of the World Travel and Tourism Council: "Tourism is the world's largest industry, bigger than autos, steel, electronics or agriculture; generates more than US\$3.5 trillion of world output; employs 127 million men and women; accounts for 13 percent of consumer spending, the largest expenditure after food; will double by year 2005 with constructive government policies; and is committed to grow with the environment."

A dissection of ecotourism's repercussions on agroforestry, would show that as a whole, ecotourism's concerns (environmental conservation, economic development, the wellbeing of people, a high-quality experience for the visitors, sensitivity to traditional culture, understanding flora and fauna, and preservation of the natural world) are not alien to those who work in agroforestry.

I am not suggesting that ecotourism and agroforestry should marry. But it is in ecotourism where agroforestry can find new meaning, new uses, new allies, new horizons, new relevance and, yes, new reasons for being.

Insofar as synergy, effectiveness and sustainability are concerned, the two fields have a number of unifying features and areas of compatibility that we can use to make our choices.

For instance, ecotourism, when properly conceived and carried out, can become a powerful instrument for taking care of nature while providing beneficial impacts to local populations and favorable repercussions for educational programs.

Could we say the same thing for agroforestry farms? The answer depends on how the agroforestry farms are designed and managed. If they are laid out and stewarded to also enhance their aesthetic and soul-enriching qualities, rather than being focused only on their capacity to produce food, wood, and protect the soil, the answer would be yes.

Even as they can grow independent of the other, ecotourism and agroforestry can be symbiotic partners. In fact, they can be better off if ecotourism serves as the delivery system, while agroforestry acts as the content provider.

Agroforestry farmers could go into collaborative arrangements with ecotourism destinations (eco-destinations) where they could provide fresh fruits, vegetables, fish and meat products, fuelwood, cut flowers, ornamentals and construction materials to these establishments.

Agroforestry farmers can even be tapped for landscaping, site maintenance, soil erosion

control, and other ecosystem restoration or land-care needs of the tourism facilities.

What do the farmers get in return? Among other things, a sure market and fair prices for their goods and services, keeping them from falling prey to middlemen and to other exploitative market systems.

***The Philippines' potentials for becoming an ecotourism paradise are as many and as varied as there are hills and valleys and communities in its 7 100 islands.***



In other words, making agroforestry work with ecotourism can lead to a vibrant win-win situation for both fields. In the end, the larger community will benefit as both parties work to make their eco-destinations ecologically healthy, clean, aesthetically appealing, with distinct elements of biodiversity and wilderness. With proper care, these destinations can serve their tourism purposes well within their carrying capacities.

Agroforestry can be an object of ecotourism itself. This means that agroforestry farms (or complexes) can be converted into ecotourism destinations themselves.

Yes, agroforestry can itself be a strong tourist attraction depending on what nature-based recreation features it can offer to tourists. Immediately, what comes to mind as an illustrative case is the indigenous agroforestry system (called *pinugo*) of the terrace-building Ifugaos. Also a strong candidate is the agroforestry learning complex of the Mindanao Baptist Rural Life Center in Davao del Sur, best known for its SALT (sloping agricultural land technology) systems.

A few resort and real estate developers in the Philippines have recently adopted the idea of converting certain hills of Tagaytay and Batangas, south of Manila, to cater to the needs of urban people in search of quiet and soothing scenery as well as organic food and the rare experience of becoming weekend farmers. Modern society's cravings for things close to nature --the turf of ecotourism -- provides a fertile ground for the growth of an even more robust and fruitful agroforestry. If consciously adhered to or merged with agroforestry, organic farming would further boost the ecotourism-agroforestry partnership.

The thoughts outlined in this article are but a few of the possibilities that agroforestry-based ecotourism (or let's call it "ecotourism-focused agroforestry") could go into. All right, it may take heaven and earth for some of us to depart from tradition, transform the current agroforestry paradigm, and let it cross-pollinate with ecotourism. In fact, we have yet to see the academe and even the research and development (R&D) sector seriously pay attention to ecotourism as an exciting route toward what we all wish to achieve for our people, our economy, our environment and natural resources.

But let's not give up. If it is of any comfort, the same lukewarm reception was given to agroforestry not so long ago. The guys in agriculture and the forestry hardliners then were not seeing eye-to-eye as to how to make their fields converge. But, as you know, things have

changed through the years.

What we need now is a little push from the powers that be in the private sector and key researchers, including those at the World Agroforestry Centre or ICRAF. Or maybe, all that we need are researchers articulately and convincingly proclaiming to the world that agroforestry cum ecotourism is wise and wonderful. There had been numerous cases of meek voices suddenly gathering momentum given the right exposure in scholarly publications and in conferences. Again, the *muyong* or *pinugo* system of the Ifugaos comes to mind. This agroforestry system was first made public to the academic world by the anthropologist Harold Conklin, and much later, was articulated by the environmental journalist Ramon Dacawi and forest researcher Sharon Codamon.

A few more issues need airing. Where are the areas available for ecotourism-focused agroforestry? Who will practice it? Who will be the target clients?

How do we mix agroforestry's scientific possibilities, along with ecotourism's intents and purposes, with what the local stakeholders (especially the people who would be engaged to try the idea) need or are culturally prepared to handle?

***More and more tourists will find excitement and adventure in viewing the features, potentials and capabilities of the different agroforestry systems, and may even try for themselves the ordinary things that farmers do, such as tree-planting, weeding, looking for pests, and tending crops and farm animals.***



As long as we keep in mind to keep agroforestry-cum-ecotourism areas within the vision of improving the quality of life of the host community, providing a high-quality experience for the visitors and maintaining the quality of the environment, we cannot go wrong.

Now, if only our friends in institutions such as ICRAF, still undeniably the foremost authority on agroforestry, gave this little idea some thought.

*The author is a technical specialist for training, extension and technology transfer of the Community-Based Resource Management Project, Department of Finance, Manila, Philippines.*

## **Some things that agroforestry can do alongside ecotourism**

*Charles P. Castro ([charlz1951@yahoo.com](mailto:charlz1951@yahoo.com))*

### **Growing food items for tourists**

Local and foreign tourists alike prefer organically grown and "mountain-fresh" fruits and chemical-free foodstuff over those sold at exorbitant prices in city malls. Agroforestry farms can grow potential high-value crops such as papaya, banana, durian, lanzones, pomelo, rambutan, mango and mangosteen. Growing livestock can also be a viable component. If symbiotic linkages could be established between agroforestry farmers and ecotourism operators, adherents to the causes of both fields could be recruited.

### **Producing building and decorative materials for tourist facilities**

Agroforestry entrepreneurs could cash in on the tremendous need of tourism and resort operators for materials such as bamboo, palm leaves, small poles, vines and rattan to construct cottages, slat floors and picnic huts. The prospects are bright for agroforestry farmers to include ornamental plants, orchids and cut flowers among their crops. Indeed, it would help if agroforesters could possibly graduate from their food-and-wood production systems and diversify a bit to cater to the needs of tourism establishments for such things that seem little, but have big roles to play in the overall scenario of developing a culture of tourism and nature care.

### **Rehabilitating degraded systems**

Agroforestry can rehabilitate blighted landscapes caused by past land-use activities such as quarrying, mining, logging, squatting and grazing. Contour farming restores soil fertility and arrests soil erosion. To let them commune with nature, tourists can have hands-on opportunities to feel the earth and join ecosystem restoration activities. They can plant seedlings and "adopt" these. Doing so can be a good reason for them to return to the area even if only to check on the status of the trees they planted. This is one way agroforestry planners could show their counterparts in the tourism industry that the earth's wounds could be healed; that agroforestry could bring about economically productive, technically effective, and yet aesthetically attractive ways of resurrecting or reinvigorating the health of degraded landscapes. From there, the road to recruiting agroforestry patrons and applying the method in other sites is not a long one.

### **Stabilizing upstream areas**

As a soil and water conservation technology, agroforestry can help keep downstream eco-destinations worry-free, so to speak, insofar as water supply and the stability of mountain streams are concerned. Tourism managers cannot afford to isolate their tourist attractions from other ecosystems, especially those situated in the headwaters or upslope of the points of interest. What poetic inspiration could one waterfall give to the artistically inclined sojourner if instead of refreshing crystal-clear waters, one would see a coffee-colored thing? What good therapy could a mountain stream give to families out on a picnic if the kids could not even dare to dip their feet on muddy waters? What good would natural swimming pools be if in summer, when they are needed most, the pools would be devoid of the cool and refreshing water that they are supposed to have? These concerns are easily within the territory of well-meaning practitioners of agroforestry.

### **Creating habitat and feeding areas for wildlife**

Agroforestry can play a role in keeping the wildlife component of eco-destinations alive and active by providing them alternative refuges, food sources and even nesting sites. The farms could even be good reason for migratory birds to make the locality their stopover - or to linger in the area longer. The idea of agroforestry farms being wildlife feeders-cum-buffer zones for eco-destinations is not a bad one. But this requires that agroforestry sites be so planned and managed to make them attractive to the wildlife themselves. One technique is to develop viable, robust and tolerant forests of timber-producing as well as fruit-bearing trees, capable of coping flexibly with pests and diseases, including weather or climatic fluctuations such as the El Niño phenomenon.





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## AGROFORESTRY EDUCATION AND TRAINING

### **PAFERN: collectively charting the path for agroforestry development and promotion in the Philippines**

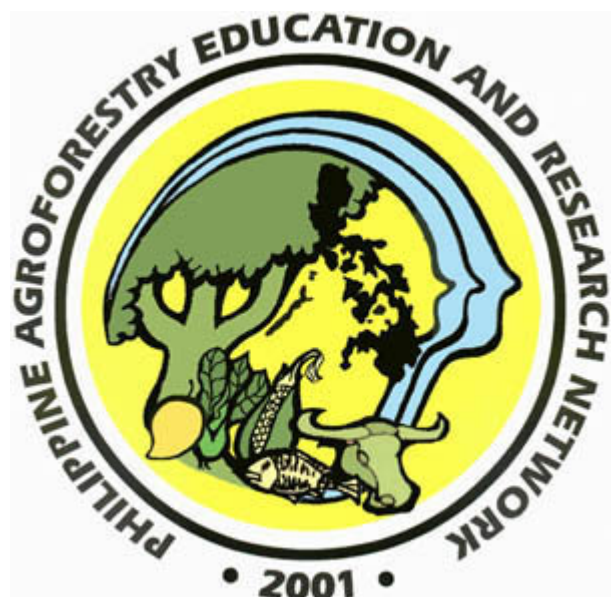
*Leila D. Landicho and Leah P. Arboleda ([iaf@laguna.net](mailto:iaf@laguna.net))*

Agroforestry has been widely practiced in the Philippines. It has been recognized as the main production technology in community-based forest management and a major strategy in the rehabilitation and sustainable development of the uplands. Yet, agroforestry still remains an area of intensive debate, development and recognition as a separate field from agriculture and forestry.

For agroforestry to be developed and promoted as a distinct discipline, there is a need to generate agroforesters, undertake research and development and extend whatever outputs for the benefit of as many sectors as possible. There is also the need for stronger and improved networking efforts, information sharing, exchange of technical expertise, curriculum development, participatory research and extension, institutional and staff capability building and resource mobilization. These were the reasons why the 31 agroforestry schools in the country bonded together and formed the Philippine Agroforestry Education and Research Network (PAFERN), first as an informal coalition in 1998, and then as a formal organization in 2001. Its goal -- to collectively work at advancing the science and practice of agroforestry by improving and strengthening the status of agroforestry education, research and extension in the country.

#### **PAFERN's representation**

PAFERN's logo represents the network's goal of agroforestry and collective action. The logo was designed by Dr. Virgilio T. Villancio, Leila D. Landicho, and Leah P. Arboleda of the Institute of Agroforestry at the University of the Philippines Los Baños (UPLB), and Dr. Wenceslao T. Tianero Sr. of the Northern Mindanao State Institute of Science and Technology. The logo presents the various components of agroforestry: the carabao and fish signify the animal component; the corn, mango and pechay signify the agricultural crop component; and the tree signifies the forest component. The three branches of the tree represent the three working bodies of PAFERN: the general assembly, the board and the national secretariat.



The three black lines with blue backgrounds represent the silhouettes of people looking forward. These signify (1) the three island groups (Luzon, Visayas and Mindanao) where the agroforestry schools are distributed; (2) the critical role of people (faculty, students, researchers, farmers and others), regardless of gender and age, in realizing the network's vision, mission, goals and objectives; (3) the need to always look forward and be conscious of issues, concerns and challenges; and (4) the importance of water in agroforestry as indicated by the blue background color.

***The PAFERN Board facilitates and oversees the overall implementation of Network activities. It consists of the Chairperson and two representatives of the member-institutions in each of the country's island group - Luzon, Visayas and Mindanao.***



The map of the Philippines occupies the center of the logo, signifying the country in which the network belongs. The yellow circle surrounding all the elements represents the sun and the hope that the status of agroforestry education, research and extension will be improved, strengthened and its efforts sustained through the collective action of the member-institutions. Finally, the name of the network and the year when it was formally organized surrounds all the elements of the logo, giving it a wholistic appearance.

### **Amidst problems and challenges**

It has been a rough start for PAFERN, as it faced financial constraints and the government's bureaucratic structures and systems. Nevertheless, the synergy and commitment of the member-institutions and the support of the Southeast Asian Network for Agroforestry

Education (SEANAPE) have helped the network surpass its first year of operations.

It was able to implement two national trainings of agroforestry teachers; conduct an institutional capability and needs assessment study in the areas of agroforestry instruction, research, extension and production among PAFERN members; support four state colleges and universities in establishing on-campus agroforestry demonstration farms; provide thesis support to undergraduate agroforestry students; disseminate information materials; conduct board meetings; and convene the general assembly.

As the network works toward self-sufficiency, it continues to implement activities in coordination with the Commission on Higher Education/Technical Panel for Agriculture Education. Among these target activities are (1) offering of standardized agroforestry curricular programs; (2) enhancing the technical capability of agroforestry faculty; (3) building institutional capacities in agroforestry research and extension; (4) upgrading library collections and teaching materials; (5) establishing a monitoring system for the placement of agroforestry graduates; (6) providing these support; (7) lobbying for the professionalization of agroforestry in the Philippines; and (8) providing venues for information exchange.

Amidst problems and challenges, PAFERN will continue to implement activities relevant to its pledge of charting the path toward intensified agroforestry promotion and development in the country. And because agroforestry calls for collaboration between and among sectors and disciplines, efforts are underway to widen the network's membership to include non-government organizations (NGOs), people's organizations and other research institutions.

For more information, contact the PAFERN Secretariat, c/o Institute of Agroforestry, 2/F Tamesis Hall, College of Forestry and Natural Resources, University of the Philippines Los Baños, PO Box 35023, Tel +63 049 5362657/5363657, Fax +63 049 5363809 and E-mail [iaf@laguna.net](mailto:iaf@laguna.net). *The authors are university research associates of the Institute of Agroforestry, University of the Philippines Los Baños, College, Laguna 4031, Philippines.*





*Through the support of the Southeast Asian Network for Agroforestry Education, PAFERN held the National Trainings of Agroforestry Teachers in 2001 and 2002 in its effort to strengthen the capabilities of agroforestry teachers and increase the pool of agroforesters in the country.*

## **Philippines Organizes First National Agroforestry Congress**

*Leah P. Arboleda and Leila D. Landicho ([iaf@laguna.net](mailto:iaf@laguna.net))*

Filipino agroforestry professionals and practitioners are invited to the First National Agroforestry Congress to be held 19 to 20 November 2003 at Leyte State University, Baybay, Leyte, Philippines. With the theme "convergence for agroforestry development in the Philippines," the congress will enable participants to share experiences and recent development in agroforestry, identify issues and concerns, and formulate strategies and plans to institutionalize agroforestry development programs in the country. The congress will also serve as the venue for the presentation of the proposed National Agroforestry Development Program (NAFDP) - a national agenda that aims at institutionalizing the science and practice of agroforestry in the Philippines. NAFDP hopes to cut across policy advocacy, education, research and development, and aims at formulating legislative acts, establishing agroforestry centers, and creating mechanisms to harmonize programs and activities of existing agroforestry organizations and networks.

Interested parties may submit their paper presentations with focus on: (1) agroforestry education, (2) agroforestry research and technology development, (3) agroforestry extension for rural development, and (4) policy advocacy and institutional issues in agroforestry. These will also be the major topics in the plenary sessions and workshops.


Poster presentations, meanwhile, will highlight (1) outstanding agroforestry projects of NGOs, people's organizations, academic institutions, government agencies and local government units; and (2) outstanding practices of agroforestry farmers. The first 25 cases of agroforestry farmers that will be accepted for poster presentations will be provided modest support that will enable the participation of the farmer and the documenter to the congress.

Abstracts for paper and poster presentations should be submitted to the Congress Secretariat on or before 30 September. Acceptance of presentations will be announced on or before 15 October and full papers should be submitted on or before 30 October 2003. Participating institutions are also enjoined to display institutional exhibits and educational and promotional materials during the congress.

A resolution or declaration will be the major output of the congress. It will consist of the issues and concerns tackled and the decisions undertaken during the congress. The resolution or declaration will serve as the policy instrument that will help facilitate the work towards institutionalizing agroforestry development programs in the Philippines.

Congress registration is at PhP2 500 (~US\$45) which covers food, congress kit and souvenir. Participants will shoulder transportation costs to and from congress venue, accommodation,

and food if they wish to stay beyond the congress duration.

For more information, please contact the Congress Secretariat, National Agroforestry Congress, c/o Institute of Agroforestry, 2/F CFNR Administration Building, University of the Philippines Los Baños, PO Box 35023, College, Laguna, Philippines, Tel  +63 049 5363657 , Fax +63 049 5363809 and E-mail [iaf@laguna.net](mailto:iaf@laguna.net).

## Agroforestry training courses for 2003

*Leah P. Arboleda ([iaf@laguna.net](mailto:iaf@laguna.net))*

The Institute of Agroforestry (IAF) of the University of the Philippines Los Baños announces its new series of training courses for 2003:

- Planning and Management of Agroforestry Projects (PMAP) -22 June to 5 July
- Sustainable Agriculture through Agroforestry Initiatives of People (SAGIP) in the Uplands - 20 July to 2 August
- Agroforestry Production Practices and Management (AG-PRO) - 17 to 30 August
- Agroforestry Post-Production Systems (AG-POST) - 14 to 27 September
  
- Participatory Technology Development for Agroforestry (PT-DAF) - 12 to 25 October

This new series was the result of the review and evaluation of IAF's training management team from its periodic training impact and needs assessment and training follow-up activities. Project managers, supervisors, researchers, field technicians, farmer/community leaders and other development workers from non-government organizations (NGOs), government agencies, local government units, academic and research institutions, people's organizations and other concerned local and international institutions can participate. Preferably, they should have at least two years experience in community-based development projects.

For more information, contact: The Director, Attention: The Training Coordinator, Institute of Agroforestry, 2/F Tamesis Hall, College of Forestry and Natural Resources, University of the Philippines Los Baños, PO Box 35023, College, 4031 Laguna, Philippines through Tel +63 049 5362657/ 5363657, FAX +63 049 5363809 or E-mail [iaf@laguna.net](mailto:iaf@laguna.net).

## Agroforesters invited to First World Congress of Agroforestry in Orlando, Florida, USA

*P.K. Nair ([pknair@ufl.edu](mailto:pknair@ufl.edu))*



From 27 June to 2 July 2004, agroforestry researchers, high-ranking government officials, practitioners, extension agents and students from various parts of the world will gather in Orlando, Florida, USA, for the First World Congress of Agroforestry to share knowledge, experiences and ideas, and collectively develop strategies for research, education and training in agroforestry.

With the overall theme "Working together for sustainable land-use systems," the congress is organized around five major topics -- (1) improvement of rural livelihoods, (2) enhancement of the environment and landscape, (3) policy, social and institutional issues, (4) agroforestry science and education, and (5) agroforestry: the next 25 years. These topics will be highlighted in five plenary lectures by outstanding world leaders in research and development of natural resources, eight subplenary symposia, 20+ concurrent sessions, two poster sessions, mid-congress field trips, and three optional items: a pre-congress workshop, a pre-and a post-congress tour.

Significant outputs from the congress will include a compendium of about 30 peer-reviewed, state-of-the-art reviews on various aspects of agroforestry research and development; a book of abstracts on all the presentations; a *Congress Declaration*, which will be a policy document aimed at high-level policy and decision makers in government and donor communities; and several special issues of thematic journals (post-congress) consisting of selected presentations.

The University of Florida (UF) Institute of Food and Agricultural Sciences (IFAS) will host the congress. Public and private institutions around the world will sponsor it. It's Global Organizing Committee is chaired by Dr. P. K. Nair, professor of UF/IFAS together with Dr. Dennis Garrity, director-general of the World Agroforestry Centre (ICRAF); Dr. Greg Ruark, director of the National Agroforestry Center, US Forest Service; and Dr. Howard Shapiro,

vice-president of Mars, Inc., as co-chairs. The committee also has 17 other leading professionals from around the world as members.

All interested individuals and institutions are enjoined to submit abstracts of voluntary contributions for oral and poster presentations until 30 September 2003. You may also visit the congress web site at <http://conference.ifas.ufl.edu/wca/> for more information or contact Dr. P.K. Nair, distinguished professor and congress chair for Technical Program and Sponsorship, and director of the Center for Subtropical Agroforestry, SFRC, University of Florida/IFAS, PO Box 110410 Gainesville, FL 32611-0410, USA through Tel:  - **1-352-846-0880** , Fax: 1-352-846-1277, and E-mail: [pknair@ufl.edu](mailto:pknair@ufl.edu), or Ms. Mandy P. Stage, congress coordinator, Office of Conferences & Institutes, University of Florida/IFAS, PO Box 110750, Gainesville, FL 32611-0750 through Tel:  - **1-352-392-5930** , Fax: 1-352-392-9734 and E-mail: [mrpadgett@ifas.ufl.edu](mailto:mrpadgett@ifas.ufl.edu)






Photos courtesy of University of Missouri, Center for Agroforestry obtained with permission from congress organizers at <http://conference.ifas.ufl.edu/wca/>.

### ICRAF invites agroforesters to tree domestication training

The World Agroforestry Centre (ICRAF) is inviting scientists and senior technicians from its collaborating national research and development institutions to the Short Training Workshop on Tree Domestication to be held 17 to 22 November 2003 at ICRAF Headquarters in Nairobi, Kenya.


The term "tree domestication" has replaced "tree improvement" in agroforestry to cover a broader definition of "bringing trees into greater cultivation through appropriate identification, production, management and adoption of desirable trees." According to the announcement, tree domestication activities have yet to be integrated into strategies that consider user needs, environment, species characteristics, marketing and dissemination. Thus, the workshop aims to share new concepts and experiences in tree domestication through lectures, discussions, exercises, demonstrations, and field visits tackling the following modules: (1) introduction to tree domestication, (2) priority setting and domestication strategies, (3) product market analysis and enterprise development, (4) germplasm procurement, production and distribution, (5) tree propagation and management, (6) tree evaluation and improvement, (7) tree information and databases, and (8) participant tree domestication strategies.

Through grants from the United Kingdom Department of International Development (DFID) and the Netherlands' Government (DGIS-SII), ICRAF will be supporting the air travel, the course venue, and other travel-related expenses of 15 participants. A limited number of self-sponsored participants can be accepted at a fee of US\$1 150 to cover tuition, training materials and local transport. For those interested, contact Jan Beniést, course coordinator, Training Unit, World Agroforestry Centre, PO Box 30677, Nairobi, Kenya, Tel  + (254-20) 524 152 , Fax + (254-20) 524 001, and E-mail: [j.beniést@cgiar.org](mailto:j.beniést@cgiar.org).

### ISCO 2004 to be held in Australia

The Australian Society of Soil Science, Inc. (ASSI) invites those involved in soil and water conservation around the world to the 13<sup>th</sup> International Soil Conservation Organization Conference (ISCO) to be held 4 to 9 July 2004 at the Brisbane Convention and Exhibition Centre, Brisbane, Australia.

From its press release, participants are encouraged to "share (1) information, knowledge and experience on conserving soil and water resources across ecosystems and culture, over time and space, in agricultural, built and natural environments; (2) solutions in creating learning and sharing environment to make science work for the people and improve communication; and (3) strategies to apply these solutions that operate across social, environmental, and political boundaries, and empower people and communities."

Paper and poster presentations may cover activities from research to facilitation, modeling to measurement, science, policy and practice. Look for further announcements or contact the Secretariat, ICMS Pty Ltd, 82 Merivale Street, South Bank, Queensland 4101, Australia, through Tel  +61 7 3844 1138 , Fax +61 7 3844 0909 or E-mail [isco2004@icms.com.au](mailto:isco2004@icms.com.au). You can also visit their web site at <http://www.icms.com.au/isco2004>.





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## LETTERS

**Standards for optimum forest cover.** *Is there any minimum standard prescribed by a United Nations (UN) body or any other international organization regarding the "optimum percent area of a country that should be under the forest/tree cover to maintain a healthy environment, and ecological balance?" -- Jagdish Kishwan, New Delhi, India*

It is not possible to set a uniform standard for forest cover across all countries. FAO certainly would not take such position nor would any other responsible UN or international organization. What might be "optimum" in one country may be unreasonable, or even ridiculous, in another. For example, many countries with large areas of desert that may not be able to reasonably achieve even a 5 percent forest cover. Some mountainous countries may find it "optimum" to have a very high forest cover to help protect against soil erosion, landslides, etc. Countries with flat topography may find that a lower percentage of forest cover is "optimum."

There are also "optimums" for different objectives. A country that has a thriving forest-based economic sector will want to maintain more forest cover than a country without such dependence. You are asking about minimum standards of forest cover "to maintain a healthy environment," but again, I would contend these range greatly from location to location depending on the fragility of the environment, the amount of biodiversity to be protected, etc. - Patrick B. Durst, Senior Forestry Officer, FAO/RAPO

**APANews in Chinese.** *We have a national agroforestry and vetiver network with over 1 000 members. We would like to request more copies of APANews to be distributed more widely in China. At present, we are considering translating APANews into Chinese. We produced Agroforestry Today in Chinese for eight years (1993 to 2000). In the first three years, we got support from ICRAF, but later we generated our own funds. With ICRAF, we also organized an International Workshop on Alternatives to Slash-and-Burn Agriculture in Kunming in 1995 and published the book entitled "Alternatives to slash-and burn agriculture" in both Chinese and English in 1996. By translating APANews into Chinese, we can introduce foreign experience to China (e.g. chestnut/wheat/sweetpotato intercropping) and we can also collect China's experience and extend them to foreign countries. We hope FAO/RAP could kindly provide limited financial support for the production of APANews into Chinese since Chinese people (including scientists) have difficulty reading English books. APANews in Chinese will surely help promote agroforestry research and development in China and the pacific Region. -- Prof. Liyu Xu, China Vetiver Network*

Indeed, it would be a great compliment to our ongoing efforts and a privilege for us if you would translate APANews into Chinese and distribute it to your domestic Chinese network. As you pointed out, this would serve well to inform Chinese agroforestry practitioners of developments in other parts of the region and the world, and open the window to increased collaboration between Chinese agroforestry specialists and others outside the country. I would like to explore options on how FAO might support the translation of APANews. It would be helpful if you could provide us with a simple proposal including costs for translation, production, distribution, and the costs that your institution could provide. - Patrick B. Durst, Senior Forestry Officer, FAO/RAPO

**Erratum in APANews No. 21.** In the article "Important fodder trees in Nepal" on page 18, the name of the native fodder tree should be badhar (*Artocarpus lakoocha*). -

Rameshwar Singh Pande  
([rspande@mail.com.np](mailto:rspande@mail.com.np))

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## USEFUL WEB SITES

The following links, periodicals and web sites were obtained with permission from the editors of The Overstory #115, Craig R. Elevitch and Kim M. Wilkinson. The Overstory is published by Permanent Agriculture Resources, copyright 2003. Updates and additional links, web sites and periodicals were obtained from the web sites of the Department of Agriculture-Western Australia and CARE-International and other contributions.



### LINKS

**Fact Net's** extensive links page: <http://www.winrock.org/forestry/factpub/links.htm>

**ATTRA's** books and proceedings on agroforestry:  
<http://www.attra.org/attra-pub/perma.html#bookshelf>

**CABI Publishing** books, proceedings and other publications:  
<http://www.cabi-publishing.org/focus/agroforestry/Indesx.asp>

**University of Colorado's Communications for a Sustainable Future agroforestry links:**  
<http://csf.colorado.edu/sustainability/plants/trees.html>

**National Agroforestry Center's** links page: <http://www.unl.edu/nac/links.html>

**University of Missouri Center for Agroforestry** links:  
<http://agebb.missouri.edu/umca/links.asp>

**Southeast Asian Network for Agroforestry Education (SEANAFE)** links:  
<http://www.worldagroforestrycentre.org/sea/Seanafe/links.htm>

**Silvoarable Agroforestry For Europe** links:  
[http://www.ensam.inra.fr/safe/english/links\\_2.php](http://www.ensam.inra.fr/safe/english/links_2.php)

**University of Hawai'i at Manoa Forestry Extension** links:  
<http://www2.ctahr.hawaii.edu/forestry/Data/links.html>

**Agriculture Network Information Center** links:  
<http://forestry.lib.umn.edu/agnic/agroforestry.phtml>

**UK Agroforestry Forum** links: <http://www.agroforestry.ac.uk/links.html>


## PERIODICALS

**Agroforestry News** is a periodical published in Australia featuring grassroots farm forestry stories covering field days, case studies, marketing information and technical discussions. Agroforestry News, NRE Port Phillip Region, Locked Bag 3000, Box Hill 3128, Victoria, Australia; Tel +03 9296 4614, Fax 03-9296-4722; E-mail: [tracey.jarvis@nre.vic.gov.au](mailto:tracey.jarvis@nre.vic.gov.au) or [wendy.davies@nre.vic.gov.au](mailto:wendy.davies@nre.vic.gov.au). Web site: [http://www.linchpin.com.au/Agroforestry\\_News/](http://www.linchpin.com.au/Agroforestry_News/)


**Agroforestry Systems Journal** is the premiere scientific journal of Agroforestry. It is available at many university libraries. Kluwer Academic Publishers, Journals Department, PO Box 322, 3300 AH Dordrecht, The Netherlands; Tel:  (+31) 78 639 23 92 ; Fax: (+31) 78 654 64 74; E-mail: [services@wkap.nl](mailto:services@wkap.nl); Web site: <http://www.wkap.nl/journals/afs>

**Forest Ecology and Management** is an international journal concerned with the application of biological, ecological and social knowledge on the management of man-made and natural forests. Elsevier Science, Regional Sales Office, Customer Support Department, PO Box 211, 1000 AE Amsterdam, The Netherlands; Tel:  (+31) 20 485 3757 ; Fax: (+31) 20 485 3432; E-mail: [v.koster@elsevier.com](mailto:v.koster@elsevier.com); Web site: <http://www.elsevier.nl/locate/foreco>

**Forests, Trees and People Newsletter** published by the Forest, Trees and People Programme supports rural populations in developing their forest resources. Published by the Swedish University of Agricultural Sciences (SUAS). Daphne Thuvesson, editor of the English FTP


Newsletter, Swedish University of Agricultural Sciences (SLU), Box 7034, SE-750 07 Uppsala, Sweden; Tel.  +46-18-672317 ; Fax: +46-18-671980; E-mail: [ftp.network@kontakt.slu.se](mailto:ftp.network@kontakt.slu.se); Web site: <http://www-trees.slu.se/>

**Low External Input and Sustainable Agriculture (LEISA) Magazine** covers technical and social options for ecological and sustainable agriculture and has frequent articles on tree-based systems. Centre for Information on Low External Input and Sustainable Agriculture (ILEIA), PO Box 64, 3830 AB Leusden, The Netherlands; Tel:  +31 33 494 30 86 , Fax: +31 33 495 17 79; E-mail: [ileia@ileia.nl](mailto:ileia@ileia.nl); Web site: <http://www.ileia.org/default.asp>

The **Forestry and Society Network** was established in 1992 to collect, disseminate and exchange experiences and relevant information in community forestry. Forestry and Society Network, Chines Academy of Forestry, Wan Shou Shan 100091, Beijing, China. Tel:  + (86 10) 62888530 , Fax: (86 10) 62882371, E-mail: [liweich@public3.bta.net.cn](mailto:liweich@public3.bta.net.cn); Web site: <http://www.cfnetwork.com.cn/>

**Inside Agroforestry**, a newsletter for natural resource professionals. Temperate focus. USDA Forest Service/Natural Resources Conservation Service, East Campus - UNL Lincoln, Nebraska 68583-0822, USA; Tel:  + 402-437-5178 , Fax: 402-437-5712; Web site: <http://www.unl.edu/nac/>

**The Indigenous Knowledge Worldwide** (formerly the Indigenous Knowledge & Development Monitor) focuses on the role that indigenous knowledge can play in participatory approaches to sustainable development, and is a good place for learning and networking. Web site: <http://www.nuffic.nl/ik-pages/ikww/index.html>.

**The International Forestry Review** is a peer-reviewed scientific journal that publishes papers, research notes and book reviews on all aspects of forestry and forest research. Commonwealth Forestry Association, PO Box 142, Bicester OX26 6ZJ, United Kingdom; Tel:  +44 (0) 1865 820935 ; Fax: +44 (0) 1865 820935; E-mail: [cfa@cfa-international.org](mailto:cfa@cfa-international.org); Web site: <http://www.cfa-international.org/publications>

**ISTF News**, published by the International Society of Tropical Foresters (ISTF), is dedicated to providing a communications network for tropical forestry disciplines. International Society of Tropical Foresters, 5400; E-mail [istf.Bethesda@verizon.net](mailto:istf.Bethesda@verizon.net); Web site: <http://www.istf-bethesda.org/>

**The Journal of Sustainable Forestry** elucidates the scientific principles and techniques of controlling, protecting and restoring the regeneration, composition and growth of natural forest vegetation as well as plantations, agroforestry and silvopastoral systems. Journal of Sustainable Forestry, The Haworth Press Inc., 10 Alice St., Binghamton, NY 13904, US; Tel:

🇺🇸 1-800-429-6784 (US/ Canada), 🇺🇸 607-722-5857 (Outside US/Canada); Fax: 1-800-895-0582 (US/Canada), 🇺🇸 607-771-0012 (Outside US/Canada); E-mail: [getinfo@haworthpress.com](mailto:getinfo@haworthpress.com); Web site: <http://www.haworthpress.com/store/TOC.asp?sku=J091>

**Non-wood News** is an information-rich newsletter produced by FAO's Wood and Non-wood Products Utilization Branch, providing readers with current information on nontimber forest products and their contribution to the sustainable development of the world's forest resources. Non-Wood News, Forest Products Division, Forestry Department, FAO, Viale delle Terme di Caracalla 00100 Rome, Italy; Tel: ☎ +39-06-570-52746 ; Fax: +39-06-570-55618; Web site: <http://www.fao.org/forestry/FOP/FOPW/NWFP/newsle-e.stm>

**The Overstory** is a bimonthly e-mail journal covering topics and concepts central to agroforestry practices for agroforestry practitioners, extension agents and researchers. Contact: The Overstory, P.O. Box 428, Holualoa, HI 96725 USA; Tel: 🇺🇸 808-324-4427 ; Fax: 808-324-4129; E-mail: [overstory@agroforestry.net](mailto:overstory@agroforestry.net); Web site: <http://www.agroforestry.net>

**People and Planet** focuses on themes such as sustainable energy, coral reefs and forests. It does an admirable job of linking population and demographic change with natural resources. People & the Planet, Suite 112, Spitfire Studios, 63-71 Collier Street, London N1 9BE, UK; Tel: + 44 -(0)-207-713-8108; Fax: + 44 - (0)-207-713-8109; E-mail: [planet21@netcomuk.co.uk](mailto:planet21@netcomuk.co.uk); Web site: <http://www.peopleandplanet.net>

**World Association of Soil & Water Conservation (WASWC) Newsletter** covers global news and announcements for association members. Soil and Water Conservation Society, 7515 NE Ankeny Rd., Ankeny, Iowa 50021, USA; Tel: 🇺🇸 +1-515-2892331 ext. 18; Fax: +1-515-2891227; E-mail: [memberservices@swcs.org](mailto:memberservices@swcs.org); Web site: <http://www.landhusbandry.cwc.net/abwaswc.htm>





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## NEW PUBLICATIONS

### FORSPA publishes Nepal forestry handbook

*Compiled by Dr. S.M. Amatya and Mr. K.R. Shrestha*

The Forestry Research Support Programme for Asia and the Pacific (FORSPA) has recently published the **Nepal forestry handbook**. Compiled by two eminent Nepal forestry researchers, it brings out in a comprehensive and handy package, substantial background information on the country's natural history, information on its forests, management systems and related topics.

The book also introduces important techniques such as forest inventory, mensuration, growth and yield and related subjects. Of the 29 chapters, some chapters highlight issues that are of special importance to the country such as agroforestry, community forestry, nonwood forest products and fodder trees. A chapter on wildlife management is also included.

This handbook can double as an excellent introduction to forestry in Nepal. It can serve as an important reference book for forestry researchers, practitioners and students in Nepal. Other interested readers in the region may also benefit from this excellent compilation.

For a copy, please forward your request to Dr. S. Appanah, FORSPA, FAO Regional Office for Asia and the Pacific, Phra Atit Road, Bangkok 10200, Thailand or E-mail [Simmathiri.Appanah@fao.org](mailto:Simmathiri.Appanah@fao.org).



### CABI Publishing announces new books

CABI Publishing announces the following new books through its on-line bookshop:

#### · **Organic agriculture: sustainability, markets and policies**

Published in June 2003 by the Organisation for Economic Cooperation and Development (OECD), this book was produced on the premise that organic agriculture has been recognized as "one of the most rapidly developing market segments in OECD countries," as supported also by policies that have been effected to encourage and promote organic farming. The book examines the contribution of organic agriculture to sustainable development, policy issues and the efforts being made by governments and their effectiveness. It compiles papers presented at the OECD workshop held in September 2002 in Washington DC. The papers showed that "organic agriculture is less stressful on the environment, but that its economic performance is mixed." Furthermore, the papers also concluded that "organic agriculture is disadvantaged by current support policies, and that proliferation of standards and labels may confuse consumers and inhibit trade."

#### · **Food safety: contaminants and toxins**

Released in April 2003, the book compiles diverse topics such as genetically modified (GM) foods, risk management, legislation and regulatory issues. It covers recent developments in

chemistry, biochemistry and physiological effects of toxicants that may affect human health and welfare. This book was produced because of the increasing concern for food safety, the occurrences of food poisoning outbreaks and concerns over GM foods. The book is edited by JPF D'Mello, Scottish Agricultural College, Edinburgh, UK.

#### **· Seeds of concern: the genetic manipulation of plants**

Written by DA Murray, Australian scientist and conservationist, and released in January 2003, the book contributes significantly to the debate on the applications and implications of gene technology from the perspective of a plant biologist. Written for students and general readers in plant and crop sciences and biotechnology, the book addresses questions on the process of producing genetically modified plants, worthwhile breeding goals, control of escaped transferred genes, responsibility of monitoring unexpected effects of gene transfer and acceptability of GM plants to organic growers.

#### **· Trees, crops and soil fertility: concepts and research methods**

Advanced students and researchers in forestry, crop sciences and soil science can now avail themselves of this comprehensive review on the economic and biophysical aspects of soil use and research in agroforestry, with emphasis on nutrient-poor forest and savanna soils. It provides background theories and practical methods on topics such as economics of soil fertility management, cycling of water, nutrients and organic matter, soil structure and soil biological processes. Released in February 2003, the book is applicable to both temperate and tropical regions as it integrates information on soil science, agronomy and forestry. "The book is written with a particular context -soil fertility development under forestry," says Mr. Mike Swift in the book's foreword. The book was edited by G. Schroth of the National Institute for Research in the Amazon, Manaus, Brazil and FL Sinclair of the School of Agricultural and Forest Sciences, University of Wales, Bangor, UK.

#### **· Agriculture, hydrology and water quality**

Released in October 2002, the book examines the role of agriculture in influencing the water quality of rivers, streams, lakes, reservoirs and oceans. It is a collection of state-of-the-art reviews on the global problems of diffusing water pollution from agriculture through chapters on eutrophication, phosphorus, nitrogen, manure, heavy metals, carbon/persistent organic pollutants and soil/siltation problems. The book is divided into three parts: (1) agriculture: potential sources of water pollution, (2) hydrology: the carrier and transport of water pollution and (3) water quality: impacts and case studies from around the world. The book was edited by P. Haygarth and S. Jarvis of the Institute of Grassland and Environmental Research, North Wyke, Devon, UK

#### **· Soil use and management supplement: soil fertility in organically managed soils**

Released in September 2002, the special issue addresses the environmental, human health, economic and production challenges of organic farming as the solution to problems associated with chemical fertilizers and pesticides through soil fertility management. The issue compares soil fertility in soils farmed organically and conventionally. It also examines whether the current concept of soil fertility covers both these types of farming. Topics include nature and practice of organic farming with emphasis on the management practices of organic growers in improving soil fertility, comprehensive review of recent researchers on key components of soil fertility, comparative study of nitrate leaching from organic and conventional farms and a review of findings on nutrient pools and nutrient transformations to answer the question of whether the current concept of soil fertility is still adequate.

For more information, visit their web site at <http://www.cabi-publishing.org/Bookshop/>

*New publications compiled by Leah P. Arboleda unless specified.*

### **ICRAF offers book on property rights and collective action for natural resources management**

The World Agroforestry Centre (ICRAF) offers the **Innovation in natural resources management: the role of property rights and collective action in developing countries** to researchers, policy analysts and students. The book describes how "property rights and collective action in developing countries mediate the adoption of technologies by farmers and groups." Edited by Ruth Meinzen-Dick, Anna Knox, Frank Place and Brent Swallow, this book was produced to address the expansion of international agricultural research from the

development of annual crop technologies for individual farms to that of long-term natural resource management techniques. It covers entire landscapes, property rights of farmers to resources to facilitate the adoption of technologies or practices with a "long lag time between investment and returns." It also tackles the role of collective action in the adoption of technologies that span multiple farms. Authors of the book focus on the reciprocal relationships between community institutions and technologies, role of property rights in conflicts between crop and livestock production systems, collective action across landscapes, and conceptual frameworks, method and "best bet" practices to guide future research. For more details, visit their web site at <http://www.worldagroforestrycentre.org/>

#### **The Forest Shop announces new agroforestry book**

Forestry management professionals could make use of the **Agroforestry in sustainable agricultural systems** to better understand the newest strategies of sustainably growing and maintaining commercial tree species. Written by L. Buck, J. Lassoie and E. Fernandez, the book emphasizes the less reliance on agrochemical inputs and mechanical interventions to commercial tree production and yet, still attain profitability. For more information, visit The Forest Shop web site at <http://www.forestshop.com/>





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## New titles from FAO

The Food and Agriculture Organization (FAO) of the United Nations has released the following new titles that may be of interest to agroforesters in the region.



The **Trees outside forests: towards better awareness** is the latest release of FAO's Conservation Guides. The guide attempts to fill in the information gap on the essential role of trees outside forests, together with forests and other woodlands, in solving problems associated with rural and urban populations. Trees outside forests contribute to the structure of landscapes, generate numerous environment and social services and yield important food products for the domestic needs of the people. The guide synthesizes the concept and role of trees outside forests, analyzes the problems and challenges and outlines efforts toward integration of resources in territorial management policies.



The "latest assessment of the long-term outlook for the world's food supplies, nutrition and agriculture" is presented in **World agriculture: towards 2015/2030**. The report describes supply and demand projections of major agricultural commodities, including the fisheries and forestry sectors. It further examines nutrition and undernourishment and implications for international trade. Furthermore, future supply and demand implications for the natural resource base and how technology can contribute to more sustainable development are discussed. A major finding of the report is the need for immediate corrective actions if the aim of halving the number of undernourished people by 2015, set during the 1996 World Food Summit, is to be met. "Nothing short of a massive effort at improving the overall development

performance will free the developing world of its most pressing food insecurity problems."



Now on its fifth edition, the biennial **State of the world's forests 2003**, provides updated information on the global forest scenario, activities and institutional developments, while highlighting the challenges and opportunities to key issues. Working on the 2003 theme of "partnership in action," the book compiles contributions from FAO, intergovernmental and nongovernment organizations and individuals. The book is divided into two parts. Part I describes the recent developments and critical areas in forest resources; management, conservation and sustainable development of forests; the institutional framework; and the international forest policy dialogue. Part II, on the other hand, contains chapters on forestry and poverty alleviation; role of forests in the sustainable use and management of freshwater resources; sustainable use of forests toward biodiversity conservation; widening gaps and narrowing options in the science and technology of the forest sector; and recent trends in fiscal policies in the forest sector in Africa. The book is a useful reference for policy makers, foresters and other concerned individuals and institutions seeking updated information on the major issues in the forest sector.

Replacing the FAO/WHO publication "Guidelines for developing an effective national food control system," is the latest of FAO's Food and Nutrition Papers, **Assuring food safety and quality: guidelines for strengthening national food control systems**. The paper presents updates on the development and operation of effective national food control programs, and the new trading environment resulting from the World Trade Organization Agreements on Sanitary and Phytosanitary Measures and on Technical Barriers to Trade. Consumer groups, industry and trade organizations, farmer groups and others involved in national policies on this area will benefit from the presentation of strategies to protect public health, prevent fraud and deception, avoid food adulteration and facilitate trade.

More information on these publications are available on-line at <http://www.fao.org/catalog/>.

