

# Multifunctional biodiversity in Latin American traditional agriculture

**T**raditional agroecosystems, based on the cultivation of a diversity of crops and varieties have allowed traditional farmers to maximise harvest security using low levels of technology and with limited environmental impact. Many Latin American agroecosystems are small-scale, geographically discontinuous,

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and occupy a variety of ecological niches. Richly diverse, site-specific farming systems are well adapted to local conditions.

Plant diversity, generally in the form of polycultures and agroforestry patterns, characterises traditional farming systems. Planting several species and varieties of crops in a minimum risk strategy stabilises yields in the long term, ensures dietary diversity, and maximises returns. Traditional multiple cropping systems provide 20% of the world food supply (Francis 1986). In Latin American tropics, most crops are grown in polycultures and produce a higher combined yield than under monoculture conditions (Francis 1986). Yield variability in cereal/legume polycultures is also low.

Many traditional agroecosystems are located in centres of crop diversity and contain populations of variable and adapted landraces as well as wild relatives of crops. Traditional agroecosystems constitute in-situ repositories of genetic diversity (Altieri & Merrick 1987). Considerable documentation exists on systems where farmers, planting multiple varieties of each crop, provide both intraspecific and interspecific diversity and enhance harvest security.

Tropical agroecosystems consisting of agricultural and fallow fields, complex homegardens, and agroforestry plots often contain more than 100 plant species per field. Most diverse homegardens are in reality a collection of domesticated and semi-domesticated plants where perennials like fruit trees are conspicuous features. Homegardens are similar to a tropical forest, with diverse species and a layered configuration.

## Agroecosystems and nature

Most studies of traditional agriculture focus on the productive units where crops are grown. This ignores the fact that many farmers utilise, maintain and preserve are-

as of natural ecosystems (forests, hillsides, lakes, grasslands, streams, swamps) which provide valuable food supplements, construction materials, medicines, organic fertilisers, fuels, and religious items. Crop production units and adjacent ecosystems form a continuum where plant gathering, fishing, and crop production take place.

Many peasant societies consider agriculture to be part of a larger system of land use. For the P'urhepecha Indians of Lake Patzcuaro, Mexico, for example, gathering is part of a complex subsistence pattern based on the multiple use of natural resources (Caballero and Mapes, 1985). They use more than 224 species of wild native and naturalised vascular plants for food, medicine and fuel. Similarly, the Jicaque Indians, (Central Honduras) use over 45 local plant species for their domestic needs. They use slash and burn techniques to grow maize and cultivated fields are widely spaced throughout the forest. While travelling between fields, the Jicaque collect edible wild plants (Lentz, 1986).

## Links

When agricultural development takes place in a natural environment, it tends to result in a heterogeneous mosaic of varying types of habitat patches. The bulk of the land is intensely managed and frequently disturbed for agricultural production. However, borders and strips between fields, roadsides, and adjacent natural areas is intensely managed while wetlands, riparian corridors, and hillsides are left in a relatively natural state.

Coffee farmers in Latin America typically integrate many different fruit, fuel and fodder trees into their farms. These give shade and provide a habitat for birds and animals. In Mexico, shade coffee plantations support some 180 species of bird. Some of these are important in pest control and seed dispersal.

Where traditional farming predominates, the minimal use of industrial inputs has produced varied, highly heterogeneous landscapes - possibly more heterogeneous than would exist naturally. In such environments, patches of natural and semi-natural ecosystem included in the landscape can become an agroecosystem resource and help preserve the integrity of natural ecosystems. Many small-scale agroecosystems are designed and managed to be friendlier to native species.

## Conclusions

Learning how to combine environmental and productive functions in managing agriculture will require the input of agroecologists, ethnoscientists, conservation biologists, and landscape ecologists. Unless ecologically sound management practices are adopted multifunctional agriculture will be impossible.

By adopting a multiple-use strategy, indigenous farmers manage a continuum of agricultural and natural systems and ensure multifunctional agriculture. Recent research into diversified cropping systems based on intercropping and agroforestry has revealed new evidence to show that these systems are more sustainable and more resource conserving (Vandermeer, 1995). Data also shows that plant biodiversity has a positive effect on the stabilisation of agroecosystem processes.

NGO-led agroecological field projects have demonstrated that traditional crop and animal combinations can often be adapted to increase productivity when the biological structure of the farm is improved and labour and local resources are used efficiently (Altieri, 1995). In fact, most agroecological technologies can improve traditional agricultural yields and enhance general agrobiodiversity.

Basing a rural development strategy on traditional farming, ethnobotanical knowledge and elements of modern agroecology assures continued use and maintenance of valuable agrobiodiversity. It also allows for the diversification of agricultural areas ensuring a variety of ecological services vital for food security, natural resource conservation, economic viability, climate amelioration, cultural preservation, and community empowerment. Many grassroots rural development programmes in Latin America now aim at maintaining and enhancing biodiversity in traditional agroecosystems. The challenge is to promote policies and institutional partnerships that allow an up-scaling of ecologically based agriculture so that its multifunctional impacts can be spread across the rural landscapes of Latin America.

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