Agroforestry and a smarter agriculture

An agroforestry scheme in Peru: Dagame tree, pasture and buffalo. Photo: FAO/A. Brack.

Agroforestry is the use of trees and shrubs in agricultural crop and/or animal production and land management systems. It is estimated that trees occur on 46 percent of all agricultural lands and support 30 percent of all rural populations (Zomer *et. al.* 2009). Trees are used in many traditional and modern farming and rangeland systems. Trees on farms are particularly prevalent in Southeast Asia and Central and South America. Agroforestry systems and practices come in many forms, including improved fallows, taungya (growing annual agricultural crops during the establishment of a forest plantation), home gardens, growing multipurpose trees and shrubs, boundary planting, farm woodlots, orchards, plantation/crop combinations, shelterbelts, windbreaks, conservation hedges, fodder banks, live fences, trees on pasture and tree apiculture (Nair, 1993 and Sinclair, 1999).

The use of trees and shrubs in agricultural systems help to tackle the triple challenge of securing food security, mitigation and reducing the vulnerability and increasing the adaptability of agricultural systems to climate change. Trees in the farming system can help increase farm incomes and can help diversify production and thus spread risk against agricultural production or market failures. This will be increasingly important as impacts of climate change become more pronounced. Trees and shrubs can diminish the effects of extreme weather events, such as heavy rains, droughts and wind storms. They prevent erosion, stabilize soils, raise infiltration rates and halt land degradation. They can enrich biodiversity in the landscape and increase ecosystem stability.

Trees can improve soil fertility and soil moisture through increasing soil organic matter. Nitrogen-fixing leguminous trees and shrubs can be especially important to soil fertility where there is limited access to mineral fertilizers. Improved soil fertility tends to increase agricultural productivity and may allow more flexibility in the types of crops that can be grown. For example agroforestry

systems in Africa have increased maize yields by 1.3 and 1.6 t per hectare per year (Sileshi et al. 2008). Fodder trees have been traditionally used by farmers and pastoralists on extensive systems but fodder shrubs such as *calliandra* and *leucaena* are now being used in more intensive systems, increasing production and reducing the need for external feeds (Franzel, *et al.*, 2003). Agroforestry systems for fodder are also profitable in developed countries. For example, in the northern agricultural region of western Australia, using tagasaste (*Chamaecytisus proliferus*) has increased returns to farmers whose cattle formerly grazed on annual grasses and legumes (Abadi *et al.,* 2003).

Agroforestry systems are important sources of timber and fuelwood throughout the world in both developing and developed countries. For example, intercropping of trees and crops is practiced on 3 million hectares in China (Sen, 1991) and in the United Kingdom, a range of timber/cereal and timber/pasture systems has been profitable to farmers (McAdam *et al.* 1999). Trees produced on farm are major sources of timber in Asia (e.g. China, India, Pakistan), East Africa (e.g. Tanzania) and Southern Africa (e.g Zambia), Increasing wood production on farms can take pressure off forests, which would otherwise result in their degradation.

Agroforestry systems tend to sequester much greater quantities of carbon than agricultural systems without trees. Planting trees in agricultural lands is relatively efficient and cost effective compared to other mitigation strategies, and provides a range of co-benefits important for improved farm family livelihoods and climate change adaptation. There are several examples of private companies supporting agroforestry in exchange for carbon benefits.

Agroforestry is therefore important both for climate change mitigation as well as for adaptation through reducing vulnerability, diversifying income sources, improving livelihoods and building the capacity of smallholders to adapt to climate change. However, agroforestry in many regions is still constrained by local customs, institutions and national policies. There is an urgent need for capacity building, extension and research programmes to screen and to match species with the right ecological zones and agricultural practices. There is a need to support and develop private public sector partnerships to develop and distribute agroforestry germplasm, as there is for the crops sector.

Source:

Taken from: FAO (2010). "[Climate-Smart" Agriculture Policies, Practices and Financing for Food Security, Adaptation and Mitigation.](#) 2010. FAO, Rome.

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Other resources:

World Agroforestry Centre

Agroforestry systems- FAO website

International Union for Conservation of Nature

Agroforestry net

USDA National Agroforestry Center

Agroforestry at Agriculture and Agri-food Canada

World Conservation Approaches and Technologies