World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

A submission to the UNFCCC Subsidiary Body for Scientific and Technological Advice on issues related to agriculture

Subject: Climate-Smart Agriculture

Mandate: Article 70 of Decision FCCC/AWGLCA/2011/L.4

The World Agroforestry Centre (ICRAF) thanks the Conference of the Parties (CoP) for the opportunity to share views in the context of agriculture to be exchanged at the 36th session of the SBSTA and the CoP adopting a decision on this matter at its 18th session.

ICRAF would like to propose that agroforestry be considered a cornerstone technology of climate-smart agriculture. ICRAF also proposes that agroforestry be mentioned in the context of all future text making reference to agricultural practices that sustainably increase productivity, resilience (adaptation) and reduction/removal of greenhouse gases (mitigation) while enhancing the achievement of national food security and development goals.

Key points	**Implications**
It is possible to have higher yields, more carbon in the soil and biomass and greater resilience to droughts and temperature stress if trees are integrated into agricultural production landscapes through locally appropriate forms of agroforestry that modify local climate	The current juxtaposition of "agriculture" and "forestry" as separate policy domains in land use issues is unnecessary and not helpful. Integrated "land-based approaches" are needed
There are key opportunities to make this happen by a combination of: • Providing an enabling legal and political environment • Improving market accessibility and markets for ecosystem services • Involving farmers and pastoralists in the planning process • Improving access to knowledge and germplasm • Improving land and tree tenure • Overcoming income losses during introduction • Improving access to farm implements and capital	National scale identification of bottlenecks and priorities is needed

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Trees in Climate-Smart Agricultural Systems

An agriculture that is climate smart

FAO defines climate-smart agriculture as an agriculture[1] that *sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (mitigation) while enhancing the achievement of national food security and development goals*[i]. The World Bank along with FAO, IFAD, WFP, UNEP and the CGIAR promote climate-smart agriculture, pointing to the potential of a "triple win" where farmers and pastoralists who are under the greatest threat from climate change could also play a major role in addressing it[ii]. This would increase yields (poverty reduction and food security), make yields more resilient in the face of weather extremes and slow onset climatic changes (adaptation), and make the farm a solution to climate change rather than being part of the problem (mitigation).

IPCC[iii] reports that 13.5% of global greenhouse emissions can be attributed to agriculture and another 17.4% are related to forest conversion. FAO states that a transformed agriculture can contribute to climate change mitigation. However, climate change poses many threats to agricultural production, and a more productive and resilient agriculture will require better management of natural resources, such as land, water, soil and genetic resources including through those practices with effective mitigation potential as identified in the IPCC 4th Assessment Report[iv] such as restoring organic soils, cropland management, grazing land management and rehabilitation of degraded soils. The integration of agroforestry can play a major role in improving the capacity of both intensive and extensive systems to increase mitigation and adaptation effectiveness, while achieving food security and income generation goals.

Making agriculture climate-smart

The transition to a climate-smart agriculture is being widely debated at present and there is a growing global recognition a transformation of agriculture is needed. However, the absolute need to feed a population of over 9 billion by 2050 remains, and it is important that the aspirations of climate-smart agriculture to increase yields and food availability are not subjugated to climate priorities.

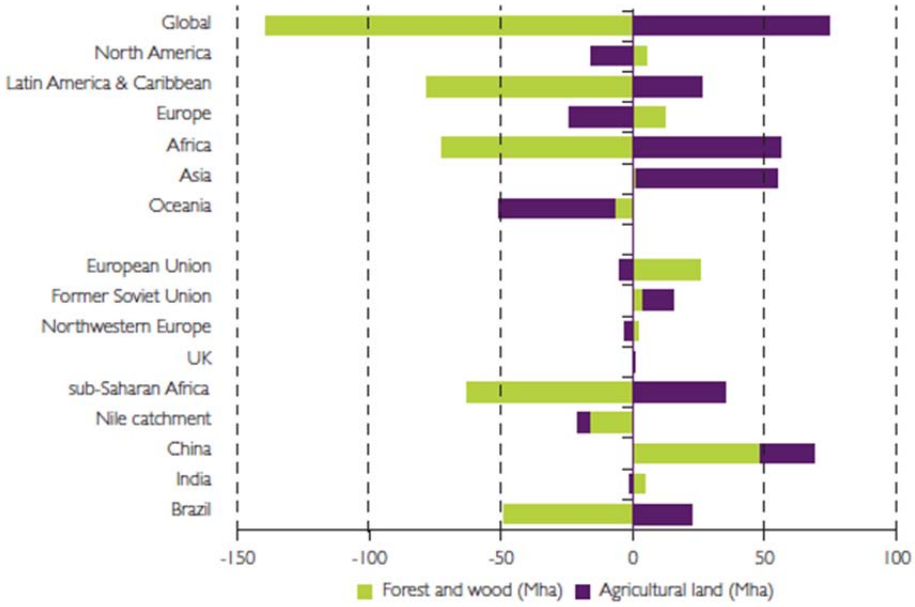
An immediate implication is that there may well be a tension between the expansion of cropland to meet growing food demands which will increase greenhouse gas emission and the maintenance of other land uses such as forests that maintain ecosystem services including sequestration and emissions avoidance. Globally, agricultural land has expanded by about 75 million hectares since 1990. An important part of this expansion can be associated with a loss of almost 140 million

[1] The FAO definition of agriculture is inclusive of forestry and fisheries.

hectares of forests and woodlands (Figure 1). This change in land use has been a major contributor to greenhouse gas emissions. Reforestation and further avoidance of deforestation (for example, through REDD) should be part of a global strategy to compensate for land use change for agriculture.

Another and equally important approach should be through the introduction and expansion of tree-based agricultural systems. Agroforestry has the capacity to meet many of the aspirations of climate-smart agriculture. Trees on farms and in landscapes help to improve food security. Fruits and leaves contribute to human nutrition and fodder from trees feeds livestock. Appropriate trees, if well managed in crop fields can also improve the fertility and organic matter content of the soils and increase crop yields. Timber and fuelwood are harvests that can be used or sold, fuelwood still being the most important source of cooking fuel in many rural communities. Trees on farms and in extensive grazing lands also contribute to a broad range of ecosystem services that landscapes provide, such as improving biodiversity, soil health and water conservation. Trees also contribute to mitigation, as they sequester carbon in above and below ground biomass. In summary, trees are part of sustainable intensification approaches as well as within extensive systems produce numerous products including food, medicines, fencing, timber and fuel. Agroforestry can rapidly help to make agriculture climate-smart.

Figure 1. Absolute change in forest/wood and agricultural areas from 1990 to 2007 (Mha)



Source: The Government Office for Science[v]

Challenges

There are, however, a number of technical challenges to the introduction and expansion of agroforestry. Many are associated with misperceptions concerning the interactions between trees and crops, and most can be solved through demonstration and training. Many of the obstacles to wider use of agroforestry are related to policies. Agricultural policies often entirely ignore trees on farms, so agricultural authorities do not develop incentives for tree cultivation or include agroforestry in extension and other guidance. For example, until recently farmers in the European Union were not eligible for Common Agricultural Policy subsidies for cereals if they grew their grains in association with trees, and more recent policy that is favourable to agroforestry has been weakly implemented to date[vi]. And in the USA, agroforestry has not been well recognized, although a June 2011 announcement of an Agroforestry Plan by the U.S. Department of Agriculture expects to strategically use programs such as farm and conservation assistance, forest landowner assistance, extension, education and outreach, and many other services to promote agroforestry.

Another major challenge, in particular for resource-poor farmers in developing countries is that trees are perennial crops that are comparatively slow to grow. This means that farmers need to invest scarce resources in tree establishment and management, and do not begin to see benefits for a number of years[vii]. Policies are needed to provide incentives for investment in advance of benefit.

Thus, there is little incentive as yet for farmers to generate the many societal environmental services that are possible through agroforestry. Trees on farms are often governed by over-reaching forestry legislation that treats all trees as though they are in forests, and punishes farmers for managing trees on their land[viii].

Recommendations

Agroforestry, like any single coping strategy, will not prove to be the silver bullet to climate change adaptation, mitigation and food security. However, agroforestry practices do have substantial potential to help smallholder farmers and pastoralists improve their well-being and the environmental sustainability of their farms and landscapes. By adopting the recommendations outlined below, we believe that agroforestry can be a cornerstone of climate-smart agriculture and contribute, as a part of larger development initiatives, to helping those who depend upon on agriculture for their livelihoods to better adapt to future climate change[ix]:

Provide an enabling legal and political environment with an overarching national plan, appropriate institutions and effective and transparent governance structures that coordinate between sectoral responsibilities and across national to local institutions.

Improve market accessibility and development of markets for ecosystem services to enhance income-generating opportunities provided by agroforestry. This can be done through improving infrastructure or more locally through establishing cooperatives that pool resources to access markets.

Involve farmers and pastoralists in the project-planning process. Those who depend upon agriculture for their livelihoods should be empowered to ensure that development efforts target what is most relevant to local communities and contexts to accomplish agreed goals in the most effective way.

Improve access to knowledge and germplasm. This has been shown to significantly improve farmers' willingness to plant or cultivate more trees for multiple purposes. Farmer to farmer dissemination and educational visits provide potential alternative mechanisms and increase adoption rates.

Improve land and tree tenure. This can have a significant effect on farmers' willingness to invest in their land and improve productivity. Reducing state regulation of farmer management, harvesting and selling of trees on their own farms is an important reform needed in many countries.

Overcome the barriers of high opportunity costs to land. This is a key requirement for successful implementation of climate-smart agriculture in developing countries and to-date it has been given little attention. Many improved management practices provide benefits to farmers only after considerable periods of time. This can be prohibitive for poor households because investing in new practices requires labour and incurs costs that must be borne before the benefits can be reaped. Payments for carbon sequestration may be an appropriate way of covering the time lag between investing in climate-smart practices and obtaining the environmental and economic benefits.

Improve access to farm implements and capital. Credits, loans and other forms of access to capital can significantly reduce farmer vulnerability, particularly in combination with insurance schemes that protect against income losses arising from weather extremes.

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[i] http://www.fao.org/climatechange/climatesmart/en/
[ii] http://climatechange.worldbank.org/content/climate-smart-agriculture
[iii] IPCC, 2007. Climate Change 2007: Synthesis Report.
[iv] IPCC, 2007. *Ibid.*
[v] The Government Office for Science (2011). The Future of Food and Farming: challenges and choices for future sustainability. Pub. Government of the United Kingdom.
[vi] Rigueiro-Rodríguez, A., J. McAdam, M.R Mosquera-Losada (Eds.) (2009). Agroforestry in Europe. Pub. Springer
[vii] Neufeldt H, Kristjanson P, Thorlakson T, Gassner A, Norton-Griffiths M, Place F, Langford K, 2011. ICRAF Policy Brief No 12: Making climate-smart agriculture work for the poor. World Agroforestry Centre, Nairobi, Kenya
[viii] Garrity, D.P., F.K. Akinnnifesti, O.C. Ajayi, S.G. Weldesemayat, J.G Mowo, A. Kalingarine, M. larwanou and J.Balaya (2010). *Evergreen Agriculture: a robust approach to sustainable food security in Africa*. Food Security 2:197-214
[ix] Neufeldt et al., 2011. *Ibid.*