Agriculture and Environment:
Climate Change Challenges and Policy Options

Attaining global food security by 2015 is a major challenge to many developing countries. *Expansion of agricultural production to meet this challenge is most likely to lead to marked conversion of forest and rangeland ecosystems. Combined with overextraction of water, increases in the impacts of natural disasters and the resultant loss of biodiversity, ecosystem functioning and resilience will be degraded as will the services they provide. While intensification and diversification of agriculture is key to securing food, the absence of clear understanding of its impacts on the environment could lead to both immediate and long-term consequences that directly impact on the livelihoods of the poor.*

Climate change will only multiply these impacts by, among other things, shifting the geographical pattern of agricultural land as well as intensifying the variability and unreliability of rainfall and contributing to desertification. Mainstreaming an ecosystems management approach into national agricultural and economic development plans is critically important to address the long-term sustainability of agriculture in the face of climate change.

AGRICULTURAL WATER USE

With climate change, water scarcity is already serious in many places and will become a much larger issue in the future. Water withdrawals for irrigation account for approximately 70% of global water withdrawals. We are however quickly approaching the limit to growth of irrigation with constraints imposed by returns to investments and trade-offs against salinity. Meeting the MDG on hunger will require doubling of water use by crops by 2050[1]. Not only is irrigation unlikely to achieve this -- even with improvements in efficiency -- other sectors will also see an increase in water use having potentially devastating effects on ecosystem functioning without a more holistic management system.

Sustainable environmental governance of water resources through integrated water resources management (IWRM) will ensure that the utilization of water resources are economically and technically efficient and take into account equitable sharing and ecosystem functioning. UNEP and its partners (e.g., the Global Water Partnership) has been promoting IWRM worldwide working through national and regional authorities.[2]

Policy Recommendations

- Countries must continue to develop IWRM plans to ensure all sectors – including ecosystem needs – are taken into account in water resources management. Water efficiency should be a key component of IWRM.
- IWRM planning and implementation must develop climate change scenarios to ensure that adaptation needs are taken into account. Relevant adaptation measures include rainwater harvesting for agricultural needs and for groundwater recharge.

IMPACTS OF AGRICULTURAL LAND USE CHANGE ON ENVIRONMENT

Agriculture interlinks a number of environmental changes including biodiversity loss, and land and water degradation. Agriculture is also highly dependent on predictable climatic conditions as well as ecosystems services such as, genetic resources; water regulation; soil formation; pest regulation; nutrient cycling and primary production. Agricultural land use change can also reduce carbon sequestration.

Even with competing climate change adaptation interests, the impact of biofuels on agrobiodiversity[3] is a critical issue for sustainable development. Biofuels have the potential to enhance national energy security as well as economic growth. However, in the absence of a holistic approach they have

[1] Comprehensive Assessment of Water Management in Agriculture. 2007. *Water for Food,Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. London: Earthscan, and Colombo: International Water Management Institute
[2] www.unep.org/freshwater
[3] UNEP/CBD/COP/9/26

already led to increased competition for land and water, deforestation, contributed to loss of habitat and biodiversity, and increased food prices.[4]

Policy Recommendations

- Agricultural land, forests and other ecosystems must be appropriately valued, not only for food and timber, but for the multiple services they have the potential to provide. The development of markets for environmental services – *payments for ecosystem services* – has the potential to bring these concepts into development planning and should be promoted. New and emerging areas, such as reducing emissions from deforestation and forest degradation (REDD), may also hold promise for agriculture when looking at linked areas such as biodiversity conservation, agroforestry, and landscape management. UNEP, UNDP and FAO are working in partnership to ensure a holistic and integrated approach to REDD.
- Environmental and socially relevant strategies and policies on biofuels are needed for both developed and developing countries to promote a balanced trade-off to ensure ecosystems maintain their functions and resilience.

GENDER EQUITY CONSIDERATIONS IN ADAPTATION AND MITIGATION

Mainstreaming gender in agriculture, land use and better environmental management is key to spurring equitable sustainable development. Of particular interest is the impact of the division of labour between men and women, as well as consumption patterns that may directly or indirectly contribute to environmental degradation. Various key characteristics such as sex, age, income level, or geographical location, continue to shape the inextricable impact of agriculture and climate change on the environment and on communities worldwide.

In developing countries, rural women have limited access to information and productive assets[5] yet remain actively engaged in subsistence food production thus contributing over 60% of the agricultural labour force. A particular focus on empowerment of rural women as agents of enhancing sustainable rural development, will not only contribute to widely-shared objectives of sustainable development through equity and justice, but also makes good economic, environmental and social sense. It is therefore crucial to ensure that they continue to play a key role in ecosystems management. [6]

Policy Recommendations

- Gender responsive analyses, indicators and criteria should be applied in environmental policy development, implementation, evaluation and reporting.
- The implementation of mitigation and adaptation measures against negative impacts of overexploitation and climate change on ecosystems should include engagement of both men and women.

ECOSYSTEMS MANAGEMENT

An ecosystems approach to environmental management takes a balanced account of the multiple services and benefits from natural resources. Traditional sectoral approaches to natural resource management, such as looking only at agricultural production at the exclusion of other linked sectors, have largely been ineffective in maintaining ecosystem productivity and biodiversity. UNEP's Ecosystems Management Programme offers a new approach for management integration across sectors to maintain functionality and resilience of ecosystems and provide essential ecosystem services. Such an approach can reduce vulnerability and promote long-term sustainability.

Policy Recommendations

- Make agriculture more environmentally sustainable by integrating ecosystem approaches into development planning through linkages between agrobiodiversity, ecosystems functioning, resilience and delivery of ecosystem services.
- Governments should enhance their capacity to promote landscape management, taking a more holistic view of the services provided by ecosystems by balancing their benefits and services (e.g., balancing water for agriculture against that needed for biodiversity). They should also analyze the socio-economic, or cultural impacts on ecosystems as well as the

[4] World Development Report, 2008, World Bank, Washington, USA
[5] World Development Report, 2008. World Bank, Washington, USA.
[6] UNEP 2004. Mainstreaming Gender in Environment.

impacts of more direct drivers such as overextraction of water and land degradation towards addressing these to reduce their impacts on ecosystem functioning.

www.unep.org