

SOIL CONSERVATION AND THE INTERNATIONAL ENVIRONMENTAL CONVENTIONS

Julian Dumanski

Consultant, Sustainable Land Management

Ottawa, Canada

ABSTRACT

This paper discusses the international environmental conventions in relation to opportunities for promotion of soil conservation. Although all the conventions imply soil conservation in some way or other, it's only the UNFCCC and the UNCCDD which specifically deal with soil conservation. The international conventions do not guide activities in soil conservation, but they serve to focus discussions on objectives to be achieved and procedures to be followed, including development of new market based opportunities.

The development of market based incentive mechanisms is taking place under negotiations for the United Nations Framework Convention for Climate Change (UNFCCC) and the Kyoto protocol. This paper argues that negotiations under Kyoto are illustrative of how market mechanisms under the international conventions can be used to promote soil conservation. The popularity of these approaches are indicative that market based opportunities will become available for the other international conventions, thus cementing good business practices with provision of environment goods and services.

The evolving principles of Sustainable Land Management (SLM) have distinct advantages for pursuit of joint agriculture-environment-soil conservation objectives. The pillars of SLM are the application of agro-ecological principles to farming; an emphasis on human resource development and knowledge based management techniques; a participatory, decentralized and farmer centered approach; the value placed of natural and social capital enhancements in addition to economic efficiency gains, and the role of strong and self reliant rural institutions.

INTRODUCTION

In the modern world, the politics of soil conservation are increasingly centering on environmental management and provision of global environmental goods and services. The soil conservation community must pursue these issues, and partner with others, particularly the environmental NGOS, who also are pursuing these issues and the funding opportunities that accrue therefrom. In many cases, the other disciplines are more effective than the soil conservation community in capturing global attention.

The environmental impacts of global populations are now of such magnitude that for the first time in history how we manage the land can impact directly on global life support systems. These include processes such as global nutrient cycling, atmospheric warming, and the global hydrologic cycle. Already, about 70% of the total land surface is now under human management, either in agriculture, managed natural and plantation forests, or managed nature preserves (Vitousek 1994), and estimates are that by early in the next century, all land will be under some degree of management. In the agricultural area, the immediate challenge is increasing food production to meet demand, while maintaining and enhancing the quality of natural resources on which production depends. As a society, we have never been at this point, and we are unsure how best to proceed.

The recently published UNEP Millennium Ecosystem Assessment report (UNEP, 2005) cited the following general conclusions about the state of the global environment:

Approximately 15 out of 24 major ecosystem services are being degraded or are used unsustainably. These include life support services as fresh water, air and water purification, regulation of climate, natural hazards and pests, and capture fisheries. Many such services are being degraded to increase supply of other services, such as food production.

Evidence is increasing that the ecosystem changes are increasing the likelihood and frequency of potentially irreversible changes, such as creation of dead zones in coastal environments, shifts in regional climates, abrupt alterations in water quality, collapse of fisheries, etc.

The harmful effects of ecosystem degradation are disproportionately born by the poor, thereby contributing to growing inequalities and sometimes social conflict.

The consumption of ecosystem services is expected to grow as a consequence of an expected three to six-fold increase in global GDP by 2050, regardless of an expected leveling off of global population growth.

In terms of land use and degradation of ecosystem services, the report cites the following:

More land was converted to cropland since the Second World War, than in 150 years between 1700 and 1850. Medium and intensively managed agricultural lands now occupy about 25% of global terrestrial surface.

Approximately 20% of coral reefs were lost and a further 20% degraded, and 35% of mangrove swamps were lost in the last decades of the 20th century

Fresh water withdrawals from lakes and rivers doubled (70% for agriculture), and water impoundments behind dams quadrupled

Since 1960, flows of biologically available nitrogen have doubled, and flows of phosphorus have tripled. Almost half of all synthetic fertilizers ever used, has been used since 1985.

Since 1750, atmospheric concentration of CO₂ has increased by 32 % (from 280 to 376 ppm), due to fossil fuel use and land use changes. Approximately 60% of this has taken place since 1959.

Human activities are resulting in significant losses of global biodiversity, and changing the diversity of life on earth.

Most ecosystem changes in the recent past were the result of rapid growth in demand for food, water, timber, fibre, and fuel. In the process and amongst other things, food production increased by two and a half times, water use doubled, timber harvesting increased by more than half but tripled for pulp and paper production, and installed hydropower doubled. These changes have contributed to substantial net gains in human well-being and economic development, but at growing costs of ecosystem degradation, increased risks of extreme events, and exacerbation of poverty for some groups of people. The degradation of ecosystem services represent losses of capital assets, and while this can sometimes be justified to produce greater gains in other services, often more degradation of ecosystem services takes place than is in the best interest of society.

ENVIRONMENT CONVENTIONS RELATED TO SOIL CONSERVATION

Biodiversity and Agriculture: Biodiverse ecosystems have a fundamental role and importance in sustainable development, providing many important benefits. They often contain a variety of economically useful products that can be harvested or serve as inputs for *production* processes, as well as providing *habitats* for flora and fauna, and many key *ecological services* including those associated with nutrient cycling, disturbance regulation, availability and quality of water for agriculture, industry, or human consumption, etc. Agriculture remains dependent on many biological services, such as provision of genes for improved varieties and livestock breeds, but also for crop pollination, soil fertility services provided by microorganisms, and pest control services provided by insects and wildlife. Conversely, sustainably managed agricultural landscapes are important to the conservation and enhancement of biodiversity. The term agrobiodiversity has been coined to describe the important subset of biodiversity that contributes to agriculture.

International Waters and Agriculture: Almost half of the world's land surface and 80% of the fresh river flows exists in major basins which cross or form international boundaries. There are 261 major basins and countless aquifers that cross political boundaries, including most of the major river basins in South Asia, Africa and South America.

Many of these shared watercourses are subject to alarming rates of environmental degradation, with strong linkages with land and water management (GEF, 2002):

Water withdrawals from lakes and reservoirs, water diversions, upstream dams and lake reclamation for agriculture and aquaculture, significantly deplete the size of the water bodies, destroying habitats for plants and animals and sometimes causing very high levels of salinization.

Deforestation and land degradation in international watersheds such as the Nile, Niger, Parana, and Indus affect rainfall patterns, increase the range of local temperatures, and cause major variations in water flow and quality. Soil erosion leads to siltation and sedimentation of lakes and reservoirs, shorten their lifetimes,

destroy aquatic environments, reduce the productivity of their ecosystems, and diminish the flood control capacity.

Approximately 75% of global pollution of marine waters is from land-based activities. Pollutants include toxic chemicals including pesticides, nutrients from fertilizers and sewage, sediments and solid wastes. Pollutions from nitrates and phosphorus is growing rapidly due to overuse of fertilizers, increased domestic and industrial sewage, and increased aquaculture.

There are many complex links among water quality, health, and poverty. Polluted water affects the health of about 1.2 billion people, and contributes annually to the death of about 15 million children under the age of five. About 20% of the world's population lacks access to safe drinking water, and about 50% lack adequate sanitation.

Desertification and Agriculture: The objectives of the United Nations Convention to Combat Desertification (CCD) are to combat desertification, land degradation, and the effects of drought in arid, semi-arid, and dry sub-humid areas. Efforts to combat desertification are to be integrated with strategies for poverty eradication, and they are to be guided by the principles of stakeholder participation, international cooperation, and consideration of the specific needs of affected developing countries. National Action Programs (NAPs) are to be developed to define and promote preventive measures, enhance climatologic, meteorological, and hydrologic capabilities, strengthen institutional frameworks, provide for effective stakeholder participation, and review implementation regularly. The Convention gives priority to Africa while not neglecting other regions. It has no independent financing, but a Global Mechanism (GM) was established to mobilize and coordinate funds for combating desertification. Funding has recently been greatly increased under the TerAfrica program.

Climate Change and Agriculture: The linkages between agricultural land use and greenhouse gases (GHGs) relate to land-use dynamics and management of rural landscapes. During previous periods of rapid agricultural expansion, primarily in temperate regions, there was widespread conversion of native lands for agriculture, with concomitant huge emissions of CO₂ to the atmosphere due to oxidation of organic carbon in vegetation and soils. In recent years, deforestation in temperate regions has been reversed, but land conversions in the tropics has greatly expanded, and this has become a major source of CO₂ emissions to the atmosphere. Annually, about 20% of total anthropogenic CO₂ emissions are due to land conversions, and a further 5 % is contributed from continual carbon losses from cultivated soils. Also, agriculture contributes around 50% of anthropogenic CH₄ emissions globally, primarily from the rumen of livestock and from flooded rice fields, and about 70% of anthropogenic N₂O, largely as a result of nitrogen inputs from synthetic fertilizers and animal wastes, and biological nitrogen fixation (IPCC, 2000).

The Ramsar Convention: The Convention on Wetlands is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It came into force in 1975, and

it is the only global environmental treaty that deals with a particular ecosystem. The Convention's mission is "the conservation and wise use of all wetlands through local, regional and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world".

Wetlands provide fundamental ecological services and are regulators of water regimes and sources of biodiversity at all levels - species, genetic and ecosystem. They are windows on interactions between cultural and biological diversity, and they constitute a resource of economic, scientific and recreational value for the global community. Soil conservation has an important role in the rehabilitation and preservation of wetlands, and prevention of serious and sometimes irreparable damage to provision of ecosystem services.

THE GLOBAL ENVIRONMENTAL FACILITY (GEF)

The GEF Operational Program in Land Degradation, OP#15 – Sustainable Land Management: The GEF Program in land degradation is called Sustainable Land Management. This program takes a holistic view of land degradation, focusing not on individual objectives, but on capturing synergy among various GEF focal areas as these relate to land degradation. Sustainable land management takes a landscape approach, which requires integration among all major issues involved in natural resources management, including the various factors influencing decisions about land use at the local, national, and regional level. This OP invests in projects that integrate sustainable land management into national development priorities, strengthen human, technical, and institutional capacities, bring about needed policy and regulatory reforms, and implement innovative sustainable land management practices.

The GEF emphasizes fostering the appropriate enabling environment and institutional capacity to support sustainable land management, particularly in least developed countries, which may lack such infrastructure. Related activities include harmonizing relevant planning and policy frameworks, integrating land use planning, and establishing institutional mechanisms for the management of trans-boundary resources. An essential part of the GEF's work on sustainable land management is supporting on-the-ground investments to address land degradation, such as packages to restore ecosystem health while improving local livelihood and the flow of goods and services they provide. The packages relate to sustainable agriculture, rangeland, and forest management. The GEF is currently funding or developing 56 projects in land degradation in developing countries, involving investments of over \$400 M.

TERRAFRICA – A NEW ALLIANCE FOR LAND DEGRADATION IN AFRICA

Land degradation is an increasingly serious problem in Sub-Saharan Africa, and a genuine constraint to economic growth (World Bank, 2005). Currently, about 65 per cent of Africa's population is directly and indirectly affected by land degradation (Reich, P.F. et al. 2001). Agriculture employs about two-thirds of the African workforce, and generates about one-third

of the continent's Gross National Income. However, agricultural production has been falling at about 3 %/yr as a result of land degradation and other causes (Berry, L. 2003). The loss in gross annual income due to land degradation is estimated at USD 9 billion for Africa (GTZ, Fact Sheet Desertification in Africa). As a consequence, food insecurity in Sub-Saharan Africa is expected to increase by 25 percent between 2000 and 2010 (Weibe, K. 2003).

Past efforts on land degradation have been inadequate compared to the scale of the threat, and land degradation continues to accelerate. Land degradation issues such as forest clearance, overgrazing, salinization, loss of soil fertility and erosion, have already been the subject of much research and technical solutions, but the indirect impacts and socio-economic, root causes of land degradation have been much less analyzed. Also, the impacts of investments in land management and the significant institutional and policy barriers have not been analyzed, including limited access to markets for inputs and produce, financing institutions and capital to invest in land management improvements as well as in related enabling conditions, insufficient dissemination of knowledge and support to analytical underpinnings to guide decision-making and to assess socio-economic costs and benefits, limited alignment in collective advocacy work, and lack of long term financing.

Application of the principles and procedures of Sustainable Land Management (SLM) is needed to reverse this trend. This requires addressing not just the physical manifestations of land degradation but also its root causes. "Sustainable Land Management combines technologies, policies, and activities aimed at integrating socio-economic principles with environmental concerns so as to simultaneously maintain or enhance natural resource based production systems, protect the natural resource base, be economically viable and socially acceptable (Smyth and Dumanski, 1993)". It is increasingly recognized that well designed, farmer-centered, sustainable land management (SLM) interventions have distinct advantages as vehicles for pursuit of joint agriculture-environment objectives. The pillars of SLM are the application of agroecological principles to farming; an emphasis on human resource development and knowledge based management techniques; a participatory and decentralized approach; the value placed on natural and social capital enhancements in addition to economic efficiency gains, and the role of strong and self-reliant rural institutions.

TerrAfrica works to develop a framework based on a new business model, including a focus on identified bottlenecks and improved cooperation and harmonization between all major stakeholders - African countries, donor agencies, researchers, and civil society, including farming communities. The approach will ensure that SLM is mainstreamed more at the center of governments' and other stakeholders' priorities, attract new investment, scale-up successful programs, improve national and international knowledge on policies, advocacy, and investment packages for SLM. The program is built around three key 'activity lines: a) coalition Building for SLM financing and implementation and strengthening and harmonizing advocacy, policy dialogues and strategies, and improve coordination at all levels, b) knowledge management to identify and generate stronger analytical capacity to selectively guide investments and decision-making and to harmonize monitoring and evaluation systems, and c) investments at country level to create enabling policy environments at national level

to support the process of mainstreaming of SLM policy and investment dialogue, and catalyze up-scaling and harmonization of investments at national and local levels.

MOBILIZING MARKET MECHANISMS TO PROMOTE SOIL CONSERVATION – An Example from the UNFCCC

The Kyoto Protocol and Soil Conservation: The objective of the Kyoto Protocol is to stabilize and reduce GHG emissions, mitigate climate change, and promote sustainable development. The Protocol is historic in that it is the first attempt to achieve international agreements to mitigate global climate change through reduction in GHGs, and the first to employ the flexibility of the global market for global environmental management. The Kyoto Protocol recognizes the overwhelming importance of controlling and reducing GHG emissions (sources), primarily from industrial and transportation sources, but it also recognizes the corresponding opportunities to be gained through better management of carbon reservoirs and enhancement of carbon sinks (sequestration) in forestry and agriculture. The latter are achieved through soil conservation, improved local land management practices, such as crop rotations and zero tillage, and management of land use change (conversions). Through these mechanisms, the Kyoto Protocol is emerging as an important and effective opportunity for promoting soil conservation. It is a classic “win-win” situation.

Global, national, and regional C markets are evolving in the US, Europe, and Asia. However, the prices being offered for a certified C credit (one t CO₂ equivalent) are highly variable, indicating that the market is still very immature. Although governments have major roles in developing the market by regulating policy and directly and indirectly setting the price through incentive payments and other interventions, the current action of governments in the evolution of these markets is not clear. Thus, it remains difficult to judge whether current market prices will be sufficient to entice many farmers to make the necessary changes in land management to ensure sufficient sequestration to meet Kyoto requirements. Regardless of the uncertainty, there is a good deal of interest in participating in the potential global C trading market by both industry who can claim credits, and from farmer groups who benefit from providing environmental services.

Although the interest in C trading is considerable, the prices per C credit are highly variable. Monitoring of the rudimentary C market in the US and Europe indicates trades often coming in as low as US\$0.85 - 3.00 per t CO₂ equivalent (\$3.15 – 11.10 per t C), whereas industrial carbon credits traded on the European exchange are normally about 20 Euros or higher. The Prototype Carbon Fund, developed by the World Bank for purchase of emission reductions (ERUs) from industry, has priced one t of emission reductions at US\$3 per t CO₂ equivalent. Currently, the same prices are being considered by the proposed BioCarbon Fund for purchase of credits (CERs) from C conservation and sequestration activities in forestry and agriculture (Benoit Boesquet, personal communication). The high value of the European market is due to the legislated cap and trade system; the value of mandated reductions is higher value than voluntary reduction.

CONCLUSIONS

The international conventions do not guide activities in soil conservation, but they serve to focus discussions on objectives to be achieved and procedures to be followed, including development of new market based opportunities. The development of market based incentive mechanisms is taking place under negotiations for the United Nations Framework Convention for Climate Change (UNFCCC) and the Kyoto protocol. This is being explored through the flexibility mechanisms, e.g Joint Implementation (JI), Clean Development Mechanism (CDM, being negotiated under the Kyoto protocol, and the evolution of the international market to promote trading of carbon credits. These negotiations, as well as those under other international environmental conventions, open opportunities to better promote soil conservation. However, this requires that the soil conservation community become better informed, more proactive, and more actively involved in the discussions involving the negotiations.

This paper argues that negotiations under Kyoto are illustrative of how market mechanisms under the international conventions can be used to promote soil conservation. The popularity of these approaches indicate that market based opportunities will become available for the other international conventions, thus cementing good business practices with provision of environment goods and services. Although all environmental international conventions deal with land management in some way or other, currently it's only the UNFCCC which provides direct opportunities and financing mechanisms from which farmers can draw benefits, and which can promote soil conservation. However, the new program for Africa, TerrAfrica, is illustrative of the re-awakened awareness of the severity of land degradation and the inter-connectiveness of land degradation and rural poverty. It is also illustrative of new opportunities for promotion of soil conservation under the umbrella of the international environmental conventions. Application of the principles of sustainable land management illustrate the opportunities that can be gained when the objectives of economic development and ecosystem maintenance are combined.

REFERENCES

- El-Swaify SA with an international group of contributors. 1999. Sustaining the global farm – strategy issues, principles, and approaches. International Soil Conservation Organization (ISCO), and the Department of Agronomy and Soil Science, University of Hawaii at Manoa, Honolulu, Hawaii, USA.
- GEF. 2002. GEF. Dynamic Partnerships. Real Solutions. GEF, Washington, D.C.
- IPCC, 2000. Intergovernmental Panel on Climate Change. Land use, land use change, and forestry. Cambridge University Press, Cambridge, UK
- Smyth AJ and J Dumanski. 1993. FESLM. An international framework for evaluating sustainable land management. World Soil Resources Report No. 73. FAO, Rome.
- UNEP, 2005. Millennium Ecosystem Assessment. UNEP. Nairobi, Kenya.
- Vitousek, P.M. 1994 “Beyond Global Warming: ecology and global change”. *Ecology* 75: 1861-76.
- Wiebe, K. 2003. Linking Land Quality, Agricultural Productivity and Food Security. USDA Agricultural Economic Report Number 823. USDA, Washington, D.C.

World Bank, 2005. TerrAfrica Information Brief. World Bank, Washington, D.C. Also cited in TerrAfrica Information Brief:
Reich, P.F. et al. 2001. Land resources stresses and desertification in Africa.
Berry, L. 2003, Case studies on the impact and cost of land degradation.
GTZ, Fact Sheet Desertification in Africa