

LAND A TOOL FOR CLIMATE CHANGE MITIGATION

The Kyoto Protocol negotiated in the mid-1990s to address climate change adaptation and mitigation will be replaced by a post-Kyoto agreement in 2012. The new agreement under negotiation needs to seal the policy gaps in adaptation and mitigation that were omitted or excluded from Kyoto on account of scientific uncertainties. Particular attention needs to be given to the potential of land in all its dimensions considering its high capacity to store carbon. Land stores twice as much organic carbon as vegetation and the atmosphere combined.

This policy brief draws attention to the gaps in the existing provisions on land-use for climate change mitigation, with a specific focus on degraded lands and drylands in particular. It proposes the recognition of soil carbon restoration in degraded areas, action in agriculture, and increased synergies between the Rio sister conventions as potential approaches to enhance climate change mitigation. To this end, it proposes the inclusion of investment measures that promote soil carbon sequestration in degraded lands and for agriculture in the portfolio of finance mechanisms envisioned in the post-Kyoto agreement now under negotiation.

Current Strategies for Climate Change Mitigation

Negotiators of the post-Kyoto agreement are building mitigation strategies on the basis of the framework laid out in the Kyoto Protocol. While national policies aim to change individuals' consumption patterns through market instruments such as taxation, initiatives at the global level are designed to induce coordinated systemic change. The reduction of green house gas emissions (GHG) and elimination of excess emissions comprise the two broad strategies in use.

The global policy instruments used to operationalize these strategies are Emissions Trading, the Clean Development Mechanism (CDM), Joint Implementation (JI) and Reducing Emissions from Deforestation in Developing Countries (REDD). These instruments enable net GHG emitters to write off some of their excess emissions, without reducing their own but rather, they purchase emissions from GHG under-emitters or reduce emissions in third countries. Reductions via the CDM are written off against emissions of countries without an obligation to reduce GHGs. JI reductions involve exchanges between countries with reduction obligations. REDD provides incentives to discourage deforestation particularly in tropical countries. GHG emitters may also purchase credits from reforestation projects in such regions.

The GHG mitigation strategies elaborated in Article 4 of the United Nations Framework Convention on Climate Change (UNFCCC) recognize the use of sinks and reservoirs of all GHGs, including biomass, forests and oceans, as well as other terrestrial, coastal and marine ecosystems. While the Kyoto Protocol (Article 2 and 3) recognizes these measures, Article 3.3 limits mitigation to net changes in sinks associated with afforestation, reforestation and deforestation.

This approach is supported by the 2007 IPCC Working Group III report that attributed 5.8 gigatonnes of carbon dioxide emissions in the 1990s to deforestation, and stated that deforestation offers the largest and most immediate carbon stock impact in the short term. In light of these policy incentives, the use other sinks remains underexploited.

For example, the land-use land-use change and forestry (LULUCF) initiative under REDD has paid limited attention to mitigation practices in agriculture although the sector contributes 10-12% of all GHGs and farmers in some countries are already engaged in emissions reduction.



Photo by: Tina Marie de Leon, Philippines, 2005 UNCCD Photo Contest

Climate Change Mitigation Strategies

The omission of initiatives in soil-, marine- and ocean-based sinks and reservoirs in the Kyoto Protocol reflected the level of scientific uncertainty at the time of its elaboration. However, science has since caught up in the area of soil carbon sequestration. The discovery of the soil's potential to store organic carbon, advances in the measurement of soil carbon sequestration, and the presence of large local populations already engaged in mitigation activities and of a large land surface with potential for soil carbon sequestration have fuelled interest in this issue, and to its untapped market.

Potential for Soil Carbon Sequestration

Soil carbon is stored in below ground biomass, dead organic matter and soil. Land degradation involves the loss of soil carbon, primarily through loss of biomass and increased soil erosion. By 1990, some 15% of the total earth's surface was degraded, but by 2005, an additional 25% was in the process of degradation. It is estimated that 10-20% of the drylands that make up 40% of the earth's land surface are degraded. Every year, drylands contribute 0.23-0.29 gigatonnes of carbon, that is, 4% of all emissions. The vulnerability of drylands to climate change is likely to exacerbate this situation.

	Total Carbon Stock per region (Gt)	Carbon stock in drylands (Gt)	Share of regional carbon stock held in drylands (%)
North America	388	121	31
Greenland	5	0	0
Central America & Caribbean	16	1	7
South America	341	115	34
Europe	100	18	18
North Eurasia	404	96	24
Africa	356	211	59
Middle East	44	41	94
South Asia	54	26	49
East Asia	124	41	33
South East Asia	132	3	2
Australia/NZ	85	68	80
Pacific	3	0	0
	2053	743	36

Table 1: Regional soil carbon stocks in the drylands.

(Trumper, K., Ravilious, C. & Dickson, B. Carbon in Drylands: Desertification, Climate Change and Carbon Finance. A UNEP-UNDP-UNCCD Technical Note for Discussions at CRIC 7, Istanbul, Turkey - 03-14 November, 2008. 2008. Prepared on behalf of UNEP by UNEP-WCM)

On the other hand, drylands account for 36% of the total carbon stock of terrestrial ecosystems (see figure 1). Despite its low plant biomass per unit area of 60 tonnes per hectare compared to the 100-180 tonnes per hectare in other terrestrial systems, there is substantial potential for soil carbon sequestration given its large surface area and high degradation of its soils. The Third Assessment Report of the IPCC observes that an ecosystem depleted of carbon by past events may have much higher rates of carbon accumulation than a comparable one in which carbon stocks have been maintained.

The restoration of degraded and eroded dryland soils demands an increase of soil carbon, which would lead to the sequestration of 0.4-0.6 gigatonnes of carbon per year. Land is restored through applying soil amendments, both organic or inorganic materials, on the soil surface in the form of mulch or by incorporation. This approach to restoring dryland soils is referred to as soil carbon sequestration in studies of climate change.

Soil carbon sequestration has positive spill-over benefits beyond those of soil restoration. Dry soil tends to store carbon for longer, compared to some wet forest soils, due to its resistance to mineralization (See fig. 2 on pg. 3). Also, forest-related measures are short-term, investing in soil carbon sequestration is medium-term, and thus complementary. Scientific evidence suggests that soil carbon picks up as forest effectiveness in sequestration tails off following plant maturity. Considering that increasing soil carbon enhances soil fertility, workability and water-holding capacity and reduces soil erosion, soil carbon sequestration in drylands is a useful measure for climate change mitigation among vulnerable communities.

Generally, the modalities of measurement, reporting and verification of mitigation initiatives have been a key constraint to the adoption of soil carbon sequestration in global policy initiatives. However, soil carbon lends itself well to measurement and, considering its features, is a suitable indicator of climate change. Soil carbon is a familiar property with well-defined characteristics that can be measured directly and along various dimensions (width, length, depth and time), and through repeated measurements taken on the same site. Soil carbon also has a memory and as a key driver of soil formation, is important for ecosystem performance and services and for soil fertility.

Agriculture and Sustainable Land Management

The Fourth Assessment Report of the IPCC states that GHG emissions from land use account for 30% of total

GHGs, of which 10-12% is from agriculture emitted from energy, fertilizers and tillage. The Report also notes that the management of cropland and grazing land and the restoration of degraded and cultivated organic soils present the greatest potential for carbon reduction, while livestock and rice field management have greatest potential for nitrous oxide reductions. Further, it states that close to 90% of this GHG could be reduced through soil carbon sequestration. While international policy has not focused on these issues, farmers have begun developing carbon credit schemes in some countries. Considering both the emissions and potential for sequestration, as well as existing knowledge on alternative agricultural approaches and on soil carbon measurement, policy incentives to induce farmers into action are needed.

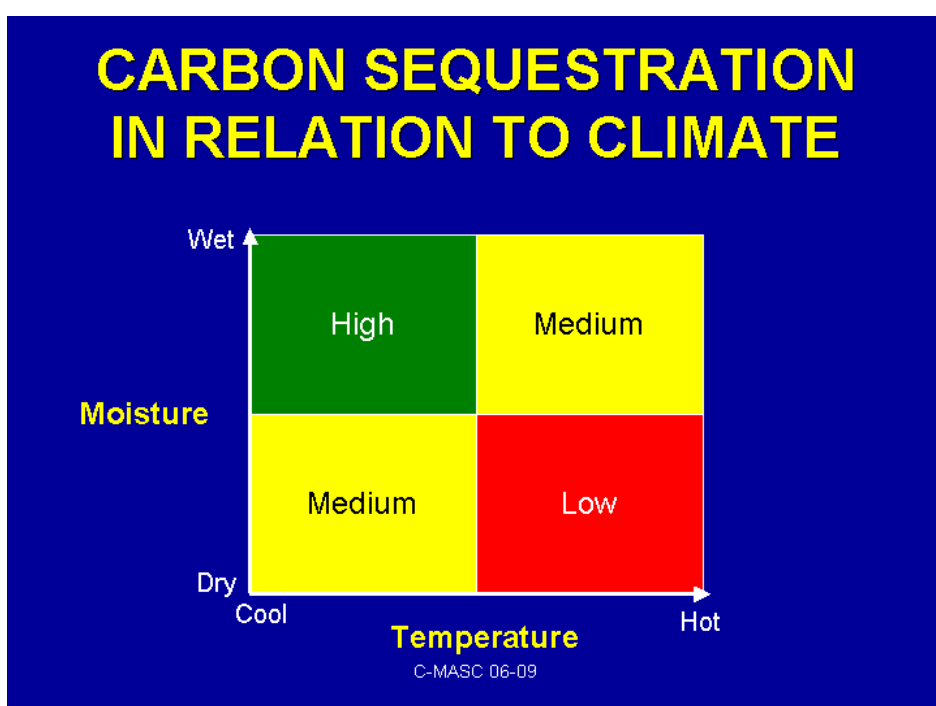


Figure 1: Potentials for SCS in different soils.

(Lal, Rattan, 2009, p20, Carbon Sequestration in Relation to Climate, in Soil Amendments and Carbon Sequestration. Paper presented at the United Nations Convention to Combat Desertification Land Day on 6 June 2009, Bonn, Germany.)

Erosion from intensive land tillage, deforestation, overgrazing and woody encroachment reduce soil organic matter that lead to the loss of soil carbon. Alternative agricultural practices such as silvo-pastoralism, use of cover and nitrogen-fixing crops and crop rotation enhance soil carbon sequestration. Soil carbon emissions can be minimized by avoiding erosion through undertaking sustainable land management and conservation practices such as reducing forage take-off, arresting soil erosion, leaving crop residues and practicing no-tillage farming.

UNCCD and UNFCCC Synergies

Synergy is the interaction or cooperation of two or more organizations, substances or agents in order to produce a combined effect greater than the sum of their individual effects. The establishment of the Joint Liai-

son Group of the three Rio sister conventions affirms this widely acknowledged fact. Considering the reciprocal effects of climate change or DLDD, there is a need for, and potential to, enhance synergies at the national level. The Conventions also have three similar pursuits.

First, the UNCCD and UNFCCC have overlapping concerns regarding deforestation, agricultural practices, land-use, biodiversity loss and food security. UNFCCC and UNCCD have similar interests in enhancing: national efforts and capacity to adapt to and mitigate the effects of climate change, including the mainstreaming of desertification and climate change agendas into national socio-economic development plans; formulation and implementation of integrated strategies and policies; capacity for coordination and support mechanisms at national and local levels; data collection, analysis and management; and institutional strengthening.

Second, a demonstration at the global level of political will to promote synergy would encourage institutional collaboration among the focal points, as the action programmes for these conventions are, for the most part, also located in the same ministry. A preliminary study found an institutional co-location of at least three of the focal points of the UNCCD, CBD, UNFCCC and GEF in 37 of the 54 countries in Africa, 39 of 56 countries in Asia, 23 of 33 countries in Latin America and the Caribbean and 15 of the 17 countries in the Northern Mediterranean and Central and Eastern Europe.

Lastly, the design of the UNCCD and UNFCCC action programmes are complementary. The design of the UNCCD action programmes is bottom-up and demands action at the local level. UNFCCC action programmes evince a top-down design that requires implementation at the national level. Synergy between the two conventions has potential for realizing integration and better implementation of policy.

For the sister conventions, the aim is to promote coordination of activities among the implementing entities at the national and local levels. The experience already gained from cooperation on these issues at the local level can be built up to buttress closer relations at the national level. Fostering synergy in implementation would maximize resource use and effectiveness by minimizing replication, while mutually reaping spill-over benefits.

Synergy can be realized through jointly developing common policies and strategies, defining common thematic areas of implementation and promoting sustainable land management, as well as the joint development of: work programmes to strengthen institutional linkages; targeted actions for conservation and sustainable use of resources; reporting measures; scientific and technological solutions to desertification and climate change.



Policy Recommendations

To make the effective use of soil in climate change mitigation, various policies are needed to induce land users to practice sustainable land management, and development partners (donors), UNFCCC and UNCCD parties to embrace synergy at the national level.

Sustainable Land Management

- Promote sustainable land management in the UNFCCC and UNCCD conventions as a policy to promote mitigation through soil carbon sequestration and reduce agricultural methods that lead to carbon emissions and soil carbon release.
- Use soil carbon as a measure of climate change mitigation.
- Develop appropriate measures, including: a baseline and procedures for carbon measurement that integrate a life cycle analysis, boundaries for what is measured and leakages.
- Include soil carbon sequestration in the portfolio of products funded under climate change finance by the Clean Development Mechanism, Joint Implementation, Land-Use Land-Use Change and Forestry and Emission's Trading.
- Compensate actors for:
 - ⇒ avoided erosion through: reducing carbon-based input, improving energy efficiency of biofuels, and controlling erosion;
 - ⇒ soil carbon sequestration, specifically: creating negative emissions through mulching, cover cropping and soil amendments (the addition of biochar, manure, zeolites, etc); creating positive nutrient budgets, for example, the addition of bio-fertilizers; and addition of chemical fertilizers;

- ⇒ employ strategies of carbonization through: restoration of degraded lands and savannahs and soil erosion control.

Agriculture

- Mainstream agriculture in the talks by recognizing farmers as a key actor in mitigation initiatives.
- Establish carbon credit programmes, payments for ecosystem services and government programmes with farmer-to-farmer relations.
- Build incentives around sustainable agricultural practices that increase resilience.
- Ensure measurement including a life cycle analysis.
- Establish market incentives that correspond to farmers' financial cycles.
- Develop aggregation measures for farmers with small sized farms.

Synergy among the UNFCCC and UNCCD Focal Points

- Define joint concepts around key ideas such as sustainable land management.
- Design clear mandates for the NFPs that include: elaboration of common guidelines for cooperation and targets to be achieved.
- Promote and reward collaborative processes.
- Address governance at all levels.
- Harmonize institutional practices.
- Build capacity.
- Build cooperation into future structures in areas such as human resource development, institutional arrangements, lessons learned, risk assessment and coping mechanisms.

About the UNCCD

Developed as a result of the Rio Summit, the United Nations Convention to Combat Desertification (UNCCD) is a unique instrument that has brought attention to land degradation in some of the most vulnerable ecosystems and affected populations in the world. Thirteen years after coming into force, the UNCCD benefits from the largest membership of the three Rio Conventions and is increasingly recognized as an instrument that can make an important contribution to the achievement of sustainable development and poverty reduction. As the sole institution with a United Nations mandate to focus on issues of drought in the drylands, the UNCCD provides policy guidance and proposals to the United Nations system on measures that will enable drought-prone and newly affected countries to adapt effectively. It also has the responsibility of advising UNFCCC parties on related gaps in the current and new agreement that require action.