Submission by the United Nations Convention to Combat Desertification

5th Session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA 5), Bonn, Germany, 29 March – 8 April 2009

Submission containing ideas and proposals on Paragraph 1 of the Bali Action Plan:

Required policy actions to include carbon contained in soils including the use of biochar (charcoal) to replenish soil carbon pools, and restore soil fertility and sequester CO_2

Summary

1. The United Nations Convention to Combat Desertification (UNCCD) is one of the "Rio" conventions that resulted from the 1992 United Nations Conference on Environment and Development (UNCED). The UNCCD has a global objective to address the issues of land degradation including desertification as well as mitigation of the effect of droughts, namely desertification, land degradation and drought (DLDD) and emphasizes action to promote sustainable development in drylands from the global to the community level.
2. The role that land, i.e., soils, plants and vegetation plays in sequestering carbon is an issue of interest for the three Rio Conventions. As regards drylands the inclusion of the potential of soils in carbon sequestration can help to achieve the ultimate objective of the UNFCCC to reduce emissions while guaranteeing the priority sustainability issues of developing and developed countries. The contrary is also true, carbon release that happens in drylands impacts in several ways DLDD and negatively impacts sustainable livelihoods, ecosystem management, and global benefits.
3. The UNCCD recognizes that globally drylands cover around 41.3% of the land surface[1].
4. The growing population in drylands will reach as much as two billion people during this decade, most of it susceptible to DLDD. Vulnerabilities and associated risks to climate change and variability may negatively impact agricultural yields and practices, biodiversity, and livelihoods in these areas.
5. Indeed, the UNCCD's 10-year strategic plan (10YSP) recognizes the links between DLDD and climate change. One indicator of the plan's strategic objectives is to generate global benefits through effective implementation of the UNCCD; another one is to achieve an increase in carbon stocks (soil and plant biomass) in affected areas.
6. Actions related to sustainable land management (SLM) influence directly, through the soil component, the increased capture and sequestration of carbon and other greenhouse gases that mitigate global climate change. Conversely, unsustainable land practices that lead to DLDD can bring about further disturbances in carbon storage and management. Policy frameworks that target the conservation of soils in a sustainable way in degraded ecosystems, such as drylands, contribute to, *inter alia*, the increased capacity of ecosystem services from these lands, the generation and availability of other goods that improve the living conditions of people living off the land, thus contributing to sustainable food production and food security. Other direct long-term environmental benefits that SLM can help to achieve are: the

[1] Including hyper-arid regions. Antarctica and Greenland not included.

enhancement of soil water storage capacities, and the mitigation of risks of drought and flood prevention.

7. The recognition of soil carbon as a greenhouse gas abatement technology can be optimally achieved with the utilization of Biochar. As indicated in the first submission to the LCA made by the UNCCD secretariat (Poznan, December 2008) we stated that "According to the IPCC biochar management would be a valid carbon sink in the current and post 2012 LULUCF guidelines. However, the following policy action is urgently required:
   a. Raising awareness on the role of the land on mitigation and adaptation to climate change and in particular the importance of Biochar in enhancing the sequestration of carbon in the soils.
   b. Inclusion of biochar in the CDM mechanism along with currently already included afforestation and reforestation (A/R).
   c. Revision of the additionally and permanence rules in order to take into account the fact that biochar is a permanent means of carbon capture that has more value than the potentially reversible (A/R).
   d. In view of item 3 above, increase the level of CERs that an annex I Party can use towards meeting the Kyoto Protocol targets from the current 1% to a higher percentage. This would result in large financial flows for both mitigation and adaptation to developing countries where use of this technique would result in the highest returns, due to the high losses of SOC."
8. The present submission refers to the role and approaches for action on reducing emissions from carbon in soils in drylands of developing countries.
9. There is the short-term need to include into the negotiation agenda of UNFCCC other practical approaches, such as biochar-related mitigation (CDM) focusing on increased land productivity, which simultaneously takes into account the global objective of the UNFCCC to reduce emissions, as well as the objectives of combating desertification and conservation and sustainable use of biodiversity. In the medium-to-long term all stakeholders need to engage in the dialogue for the post 2012 climate regime as this approach to soil organic carbon restoration can constitute a significant adaptation tool to climate change, in addition to sequestering carbon. Biochar utilization as a soil amendment could be the strong link needed between the three Rio conventions as it simultaneously addresses climate change, desertification and biodiversity issues.

I. Short-term policies: Raising awareness on carbon storage in drylands and Biochar

10. The key policy requirement is the recognition of soil carbon sequestration as an accredited mitigation and adaptation technique, for all countries, within the framework to be adopted in Copenhagen. It is necessary then to raise awareness on the existence of the missing information for decision-making. Through the past years, efforts in the management of greenhouse gases have highlighted the relevance of forest carbon sock management, as the amount of carbon sequestered by forests is important. The secretariat of the UNCCD supports these efforts and believes that the issues of LULUCF and REDD are perfectly complementary with the inclusion of soil carbon sequestration.
11. The intention of this submission is not to go further in the existing knowledge on how plants take up carbon dioxide from the atmosphere and incorporate it into plant biomass through photosynthesis, as this is currently included within the different negotiation frameworks of UNFCCC. The main interest of the UNCCD is to flag the case of what happens to the carbon that is left in the live and dead vegetation, above and below ground. The organic carbon

reservoirs made up by this biomass enhance the soil carbon pools. In the case of Biochar, however, mean residence time of Biochar's recalcitrant carbon in soils is about 2,000 years[2], meaning that Biochar effectively removes net carbon dioxide from the atmosphere in a virtually permanent soil carbon pool, when sustainable production of the biomass feedstock is achieved.[3]

12. The Biochar white paper states that incorporating Biochar into the soil "does not in the long-term disturb the carbon-nitrogen balance, but holds and makes water and nutrients available to plants. When used as a soil amendment along with organic and inorganic fertilizers, biochar significantly improves soil tilth, productivity, and nutrient retention and availability to plants."[4]

13. Research conducted to date indicates that the world's soil reservoirs contain more organic carbon than the atmospheric or global vegetation reservoirs. Thus a change in the flow of carbon in the soil carbon reservoir, however small, can have a significant effect on a global scale[5].

14. The research undertaken so far provides the evidentiary recognition[6] that action geared to SLM directly impacts the soil component by increasing capture and retention of carbon and other greenhouse gases that mitigate global climate change. Soil conservation brings about, *inter alia*: the capability to improve the services of the ecosystem; the sustainable production of food, henceforth contributing directly to food security, as well as other goods that improve the living conditions of populations living off the land; increased capacities for water storage, drought mitigation, flood prevention, and water supply. These are the direct long-term environmental benefits that SLM can help to achieve.

15. It is known that in the drylands there is a low plant biomass per unit area. Some researchers[7] put it at about 6 kilograms per square meter. Other terrestrial ecosystems have two to three times that amount. But when considering the size of the drylands around the world, their capability in relation to carbon sequestration is very high. According to a recent study commissioned by UNEP, UNCCD and UNDP, the total drylands represent 27% of total reserves of organic carbon in the soil. It is therefore plausible, given the extent of land degradation in drylands, that they are far from saturated with carbon, thus their potential to sequester carbon is estimated to be very high[8]. The potential for Biochar to contribute to land remediation and increased soil carbon sequestration in drylands should be investigated.

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[2] Kuzyakov, Y, Subbotina, I., Chen, H., Bogomolova, I., Xu, X., Black carbon decomposition and incorporation into soil microbial biomass estimated by 14C labeling, Soil Biology & Biochemistry 41 (2009) 210-219.
[3] Biochar White Paper (2008), the International Biochar Initiative, http://www.biochar-international.org/
[4] Ibid
[5] Ibid
[6] This is recognized by many, for example IPCC, IUCN, UNCCD, UNEP and others. For IUCN see: http://www.iucn.org/what/issues/law/index.cfm?uNewsID=242: International Forum on Soil, Society and Global Change in Iceland, 17 September 2007; For IPCC see, among others: The Physical Science Basis of Climate Change: IPCC Working Group I Report, 2007, available at http://soilcarboncenter.k-state.edu/originals/IPCC%20WG%20I.html. For UNEP see the paper available at WWW.UNCCD.int
[7] Trumper Kate, C. Ravilious and B. Dickson "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,Prepared on behalf of UNEP, UNCCD and UNDP. Nov. 2008.
[8] Ibid, page 2. The document was presented at a side event in Poznan (Dec 13, 2008) organized by the UNCCD secretariat.

II. Medium-to-long-term policies: Issues, including technical, for the inclusion of soil carbon, especially Biochar, in drylands under the deliberations of UNFCCC towards Copenhagen 2009.

16. As indicated by some of the issues tabled by countries on Biochar[9] there is the need to open a dialogue to elucidate, within the framework of the UNFCCC and its subsidiary bodies, the constraints and opportunities that serve for the identification of best options, including technical and policy options, that can bring forward the notion of soil carbon sequestration and Biochar utilization as recognized mitigation and adaptation technologies.

17. As for the technical issues, the use of Biochar within a project-based approach is advisable. For this to occur more detailed research on Biochar as a soil amendment in drylands (per region / sub region of the world) is needed. Up front there is the need to clarify the role of soils (and Biochar) within the UNFCCC definitions.

    - **On additionality**: Establishment at the national level of soil carbon baselines for drylands and other ecosystems according to land uses.
    - **On Leakage**: There is the need to consider the issue of increased net primary productivity from biochar utilization as a soil amendment; carbon sinks by different land uses; as well as issues of incomplete combustion of biomass, as achieved in biochar production technologies.
    - **On Permanence**: This is directly related and congruent with the decisions, adopted and ongoing, on carbon mechanisms in place under the CDM that relate to compliance, insurance and other risks. As stated by multiple researchers, biochar has a mean residence time in soils (under natural conditions) of about 2,000 years.[10]
    - **On Monitoring**: These aspects should be developed according to specific land uses and can best be classified if linkages with ongoing monitoring schemes (such as under the CDM) and platforms are clearly identified.
    - **On Adaptation**: Carbon in soils and Biochar represent an optimal opportunity for policy development and implementation in drylands in developing countries. One such example, *inter alia*, on Biochar and adaptation and mitigation is Biochar as part of a solution to NAPAs implementation.

18. These are some of the issues to consider for the CDM, as well as the global carbon trade market to make practical options to increase soil fertility available and accessible to land managers, especially in drylands. Biochar is one such approach, with significant promise and ancillary benefits.

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[9] Micronesia in Poznan, Dec 2008 as well as new submissions scheduled to be made in 2009 by developing country parties prior to Copenhagen, as informed to the UNCCD secretariat.

[10] Kuzyakov, Y, Subbotina, I., Chen, H., Bogomolova, I., Xu, X., Black carbon decomposition and incorporation into soil microbial biomass estimated by 14C labeling, Soil Biology & Biochemistry 41 (2009) 210-219. See also: The Biochar White Paper states that (page 2) " most of the applied biochar can remain in the soil for several hundreds to thousands of years, (see also Terra Preta soils)". See also Pessenda, L.C.R., Gouveia, S.E.M., and Aravena, R., 2001, Radiocarbon dating of total soil organic matter and humin fraction and its comparison with 14C ages of fossil charcoal, Radiocarbon, 43: 595-601. And Schmidt, M.W.I., Skjemstad, J.O., and Jager, C., 2002, Carbon isotope geochemistry and nanomorphology of soil black carbon: Black chernozemic soils in central Europe originate from ancient biomass burning. Global Biogeochemical Cycles, 16: 1123. (Source IBI)

III. The UNCCD working towards the inclusion of carbon in soils and Biochar under the UNFCCC – Copenhagen agreement.

19. Given that carbon sequestration in soils has much to offer to climate change mitigation and adaptation, land and livelihood protection and resilience, concrete short and long-term actions must be identified as part of the Copenhagen agenda. These can be hampered by lack of data, lack of finance and perhaps lack of capacity to implement changes. This is why policies and institutions addressing these issues should work co-operatively, as set out in 10YSP of the UNCCD.
20. The secretariat of the UNCCD is ready to facilitate discussions on possible approaches on the importance of carbon in soils, particularly Biochar.