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LULUCF projects under the CDM: an opportunity to increase food security in developing countries

LULUCF Proyectos bajo el CDM una oportunidad para incrementar la seguridad alimentaria en paises en vias de desarrollo

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Resumen

La amenaza de cambio climático presenta importantes retos en el futuro cercano, especielamente en los países en vías de desarrollo donde sus efectos podrían ser más intensos. El Mecanismo de Desarrollo Limpio bajo el Panel Intergubernamental de Cambio Climático es una de la iniciativas más prometedoras para la reducción de los gases efectos invernadero y promover el desarrollo sustentable. Sin embargo, se ha subestimado el potencial de estos proyectos para aliviar problemas urgentes. La correcta planeación, implimentación y ejecución de proyectos de Uso de Suelo, Cambio de Uso de Suelo y Forestería reducirá las emisiones pero también podría mejorar la salud, alimentación y en general las condiciones de vida de las comunidades rurales de los países que no están en el Anexo I.

Palabras clave: Seguridad alimentaria, Cambio climático, Mecanismo de Desarrollo Limpio, LULUCF, países en vías de desarrollo.

Abstract

Global climate poses important challenges to the world in the near future, especially in poor developing countries where the effects will be stronger. The CDM under the IPCC is one of the most promising initiatives to reduce the amount of GHG and promote sustainable development. Never the less, potential to link these projects with urgent needs, as food security remains vague. The correct planning, execution and adaptation of LULUCF projects in developing countries can help to reduce the GHG emissions but also improve the health, nourishment and overall living conditions of rural communities in Non-Annex I countries.

Keywords: Food Security, Climate Change, CDM, LULUCF, developing countries

INTRODUCTION

Global warming and the unpredictable effects of the high concentration of greenhouse gases (GHG): carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and F-gases (IPCC, 2006) in the atmosphere; lead to more than 180 countries to sign the United Nations Framework Convention on Climate Change (UNFCCC) to decrease the discharge of GHGs into the atmosphere (UNCTAD, 2003). Through three main mechanisms: Joint Implementation, Emissions Trading and the Clean Development Mechanism (CDM) Annex-I countries (developed nations) and Non-Annex countries collaborate in order to reduce the global emissions.

Under the CDM, the modality of Land-Use, Land-Use Change and Forestry (LULUCF) allows Annex-I countries to meet their reduction goals earning credits (Bloomfield & Pearson, 2000) (Certified Reduction Emissions) by financing sequestration projects in developing countries (Non-Annex I) that have ratified the Kyoto Protocol (UNCTAD, 2003).

On the other hand, has been predicted that the effects of Climate Change could be greater on poor developing countries that are reliable on the environment for their nourishment and living (La Vina, 2002; FAO, 2008) compare with rich industrialized countries that supply the basic demands from other sources. Adjacent to environmental danger, the extremely high rates of growing population in developing countries requires a doubling of the food production to satisfy the demand for the next 30 years, including the increment of fertilizers and water use as well as soil degradation (Verchot et al., 2007).

The main objective of the present review is to demonstrated the lack of importance given to LULUCF projects as tools to enhance food security, transfer technology, mitigate climate change, and improve overall living conditions of recipient countries.

METHODS

The present paper presents an assessment of different LULUCF approved methodologies under the CDM of the Kyoto Protocol. Also, the following study comprehends a literature review with the latest available scientific publications describing the necessity to link LULUCF projects with food security especially through the transfer of technology to developing countries.

LULUCF Methodologies and Food Security

One of the main objectives of the Kyoto Protocol, as stated in article 2 of the Convention, is to ensure that food production is not endanger along with a sustainable economic growth (IPCC, 2009). In other words, the sequestering GHGs projects under the Kyoto Protocol cannot become a competition for lands destined to food production.

According to IPCC (2006) and the LULUCF initiative, the following approved methodologies can be connected to sustainable development projects and thus the enhancement of food security: Afforestation and Reforestation activities include the conversion of non-forested lands into plantations "through planting, seedling and/or human-induced promotion of natural seed sources". In the same way, Revegetation projects comprehend all human activities to increase carbon stocks in minimum 0.05 hectares "through the establishment of vegetation". Also Forest Management activities that seek the sustainable use of forest to meet ecological, economic and social functions. And finally, Cropland management and Grazing management that contain practices to manage vegetation and livestock in actual or past croplands, or lands use for livestock.

As seen in Table 1, *conversion to agroforestry* and *cropland management* are direct correlated with food security. These activities are the two principal agricultural practices that can positively influence food production in developing countries. In the same way, this fact compare with the carbon sequestration potential of both methodologies, *conversion to agroforestry* shows us that there is an incredible high possibility to meet the carbon storage goals along with increasing the food provision (Figure 1).

According to several measurements (IPCC, 2006; FAO, 2008), Agro forestry is seen as the best alternative to link carbon sequestration and agricultural systems. In the world there is a potential 630 x 10^6 ha for agroforestry activities (Kandji, et al., 2006). The most important carbon storage regions worldwide are humid tropical southlands in Asia and America, as well as North America, as shown in Table 2.

Table 1: Summary of potential rates of Carbon gain and associated impacts (Adapted and modified from IPCC, 2000)

Activity	Tropical ecozone	Key practices	Average (tC/ha/ yr)	Associated Impacts
Cropland management	Dry	Reduced tillage, residue retention	0.2	Increased food production, improved soil quality, reduced erosion, possibly higher pesticide use
	Wet	Reduced tillage, improved fallow management, fertilization	0.5	Increased food production, improved soil quality, reduced erosion, fertilizers often unavailable, possibly higher pesticide use
	Wet (Rice)	Residue management, fertilization, drainage management	0,50	Increased food production
Agroforest management		Improved management	1.0	
Grassland management	Dry	Grazing management, species introduction, fire management	0.9	Reduced soil degradation, higher productivity, woody encroachment (reduced productivity)
	Wet	Species introduction, fertilization, grazing management	1,20	Increased productivity, reduced biodiversity, acidification
Forest management	Dry	Forest conservation, reduced degradation	1,75	Ecological improvement, high cost efficiency
	Wet	Reduced degradation	3,40	Environmental improvement
Conversion to agro forestry		Conversion from cropland or grassland at forest margins	3,00	Improved biodiversity, CH4 sinks, poverty alleviation, food security

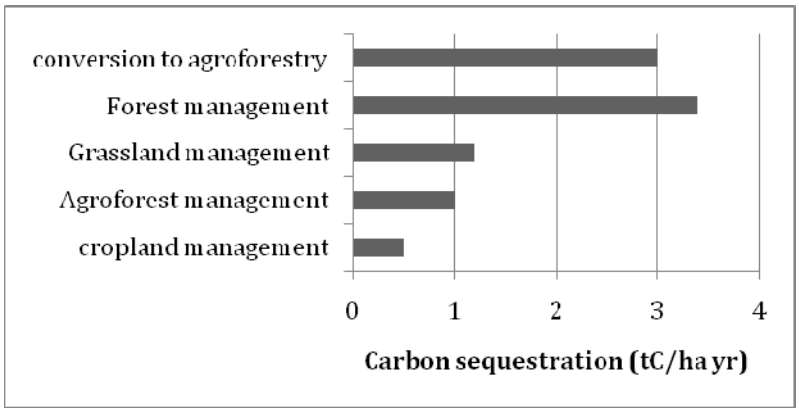

Figure 1. Carbon sequestration potential comparing different LULUCF methodologies (Data modified from IPCC, 2000)

Table 2. Potential Carbon storage for agroforestry systems (Modified from Kandji, et al., 2006)

Region	Ecoregion	System	Mg C ha $^{-1}$
Africa	Humid tropical high	Agrosilvicultural	29-53
South America	Humid tropical low	Agrosilvicultural	39-102
Southeast Asia	Humid tropical dry	Agrosilvicultural	12-228
	lowlands		68-81
Australia	Humid tropical low	Silvopastoral	28-51
North America	Humid tropical high	Silvopastoral	133-154
	Humid tropical low	Silvopastoral	104-198
	Dry lowlands	Silvopastoral	90-175
Northern Asia	Humid tropical low	Silvopastoral	15-18

Technology transfer

Worldwide is known that one of the main challenges of climate change will be to maintain sufficient food production to satisfied the increasing demand. Above all, should be considered that one of the best ways to enhance food security is through increasing biodiversity, reducing erosion and maximizing crop productivity. The correct transfer of technology from Annex-I countries to developing countries can assure the productivity in degraded lands (Trines et al., 2006). Increasing the capability of adequate resources management and the use of technological advances can enhance productivity in agricultural lands to protect people from climate change (La Vina, 2002; FAO, 2008).

Such transfer of technology should include: forest management and conservation, sustainable silviculture in afforestation and reforestation projects, genetic manipulation, effective harvesting, low-tillage practices, and cattle supervision (UNEP, 2009) as well as instruction and guidance (Roshetko, et al., 2007). The lack of these transfers can retard the mitigation process and advantages related with them (Sathaye *et al.*, 1999 in IPCC, 2009).

Despite the emphasis of the agreements in the Kyoto Protocol for the need to build projects that lead the host countries to sustainable development, the reduction of GHGs is perceive as the only objective of the UNFCCC. The link between green house gases, climate change and the risks to food production (Amin, 2005) has been unnoticed. Furthermore, the correlation between the opportunities of technology transfer through LULUCF projects in developing countries remains vague. As the FAO states (2008) it is extremely important to acknowledge the potential of LULUCF projects as providers of environmental services and as an approach to enhance the living conditions of poor people. Missing objectivity can lead to doubling efforts (Nkem et al., 2007).

Therefore, is extremely important to ensure the "effective transfer of technologies and implementation" strategies (Amin, 2005) in developing countries. As a matter of fact, is essential to increase the consciousness between international developers. The correct transfer of technology can help to increase "food security, health, biological diversity and conservation of natural resources" (UNFF, 2004) of the recipient country. As appropriate, is really necessary to ensure the cooperation between farmers, government, local, national and international stakeholders to guarantee the successful accomplishment of the project (Roshetko, et al., 2007). Indeed, governments should include adapting, global change and food security into their national agendas, policies and planning (Nkem et al., 2007).

Linking LULUCF projects with food security

Mitigation cannot become a priority for farmers in developing countries, unless their basic needs as nutrition and health are supplied (Trines et al., 2006). LULUCF projects have the potential not only to trap high amounts of carbon but to provide rural communities involve in the project important sources of food, shelter and fuels (Verchot et al., 2007).

Other of the benefits of the linkage between food security and mitigation is that land use for mitigation projects won't represent a direct competition to food production, but would

correspond to an enhancement of the alimentary provisions. Agroforestry mitigation projects not only favor food security issues, but also provide fuels, wood and other sources of income (Hooda et al., 2007).

Further on, poverty, health issues, water scarcity and food security problems could be solved due to a good "understanding" of the connection between the forests conservation (LULUCF projects) and these "political priorities" (UNFF, 2004).

As an example of successful implemented LULUCF project I can cite the Enda Syspro in Senegal, which combines technology transfer and capacity building in agro forestry systems (IPCC, 2009). With this system the soil fertility was maximized and on the other hand deforestation, erosion and fragmentation diminished, leading to GHG reduction but also increasing food security in the project area.

At the same time and despite the big economic and environmental potential of agro forestry projects is necessary to evaluate the profitability, risks, costs and requirements to understand and measure the benefits of the projects (Rao et al., 2007). These feasibility studies and research can be full field by the scientific community, international cooperation agencies and founding institutions during LULUCF project baseline preparation.

DISCUSSION

Many of the external aid from developing countries can lead to misuse instead of fulfilling its goal. Giving poor people the adequate support can improve in a prominent way their living conditions. Regarding LULUCF projects, there are not enough studies to prove that the transfer of technology was effective. In the same way, it is necessary to have a multidisciplinary connectivity to improve the use of resources and to accelerate the time to accomplish goals.

The available literature about the topic, is still deficient, therefore the necessity to evaluate the actually running projects in order to learn from the mistakes and enrich the following initiatives. Topics like ensuring the connection between climate change and food security need to be address in future meetings, especially in the COP15 in Copenhagen. Decisions have to be taken in order to increase the benefits of the international aid.

Agro forestry is the methodology that perfectly meets the requirements to combine both issues: carbon sequestration and food security, as well as supplement other environmental services and provides goods to the adjacent communities. Nevertheless, the technology transfer and the participation of the communities are key issues to ensure the success of the implemented projects.

CONCLUSIONS

Extremely important is to associate key worldwide initiatives like the CDM under the Kyoto Protocol with urgent problems as food security, health, education and better living conditions in developing countries. Therefore, it is imperative to plan, execute and adapt correctly LULUCF projects in developing countries, not only to reduce the GHG emissions but also to improve health, nourishment and overall living conditions of rural communities in Non-Annex I countries, especially food security issues for the next generations.

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