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Kyoto Protocol and Bonobo Project

S. Vaglio[1], B. Chiarelli[1], G. C. Faussone[2-3]

[1] Department of Animal Biology and Genetics "Leo Pardi", Laboratory of Anthropology, University of Florence
[2] In.Ser. S.p.A., Turin
[3] Designated National Authority for the Kyoto Protocol, Kinshasa, Democratic Republic of Congo

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Abstract

At present bonobo (Pan paniscus) is a species of non-human primates with a strong risk of extinction. The Kyoto Protocol is one of the last and great opportunities to save this species and to ensure conservation of biodiversity of overall Congolese forest.
The aim of this research, within the scope of the "Proposal for the development of projects CDM in Democratic Republic of Congo" already approved from Ministère des Affaires Foncières, Environnement et Tourisme of Democratic Republic of Congo (DRC), consists in the development of a project to restore the "forest of bonobos" in DRC.
In particular the steps of the project involved in the establishment of a Nature Reserve over a large area – the Maringa-Lopori-Wamba (MLW) region – where a wide area deforested will be reforested, are as follows: i) reconstruction of the bonobos ecosystem; ii) new insertion of bonobos and of the other autochthonous species related to their diet (plans of control and monitoring by satellites); iii) actions towards local human populations (activities of economic sustenance, plans of environmental and feeding education, programs to improve knowledge about HIV).
At this purpose we have determined the amount of CO_2/ha yr removal by sinks following the guidelines of Intergovernmental Panel on Climate Change (IPCC) - National Greenhouse Gas inventories Programme (IGE, 2003) with the scope to make possible the "certification" of the project by United Nations Framework Convention on Climate Change (UNFCCC) and, consequently, to provide temporary CO_2 credits (t-CERs).

Introduction

Bonobo (*Pan paniscus*) is the most similar species to Man (with 99% of genome in common with *Homo sapiens*): unfortunately it is endemic of the forests of Democratic Republic of Congo (DRC) and currently it is at strong risk of extinction (Rowe, 1996; Fleagle, 1999).
Tragically, the recent civil war in DRC has fragmented and decimated the bonobo population, which has dropped from 100,000 in 1980 to, by some estimates, less than 10,000 today. The subsequent peace has brought increased interest in logging the few places where isolated bonobo populations still live (Hurley, 2005).
A recent United Nations (UN) study indicated that, with infrastructure growth at current levels, the undisturbed bonobo habitat left by 2030 is projected to be 4% (four per cent) of its original range. This is the lowest of any great ape range. This project will play an important role in reversing this trend and offering hope to bonobos and other species in this important region (Figure 1).
The aim of this project is the conservation of biodiversity of Maringa-Lopori-Wamba (MLW) region in the middle-northern part of DRC, by means of the KP application (in particular the Kyoto Protocol's Clean Development Mechanism Afforestation/Reforestation – CDM A/R).
In accordance with paragraph 38 and section K of the CDM A/R modalities and procedures, the selected approach to address non-permanence is the issuance of temporary CO_2 credits (t-CERs).
It is unlikely that private reforestation or protection of this area without availability of financial revenues from CERs sales occur, since financial returns for such activities including the carbon revenue are negative. The areas, where these forests will be planted, will be designated as preservation and conservation areas: with this action, the issue of permanence and maintenance of carbon stocks is assured in the reforested areas by implementation of the project and, moreover, agricultural activities and cattle breeding will become illegal.
The steps of the present project are as follows:

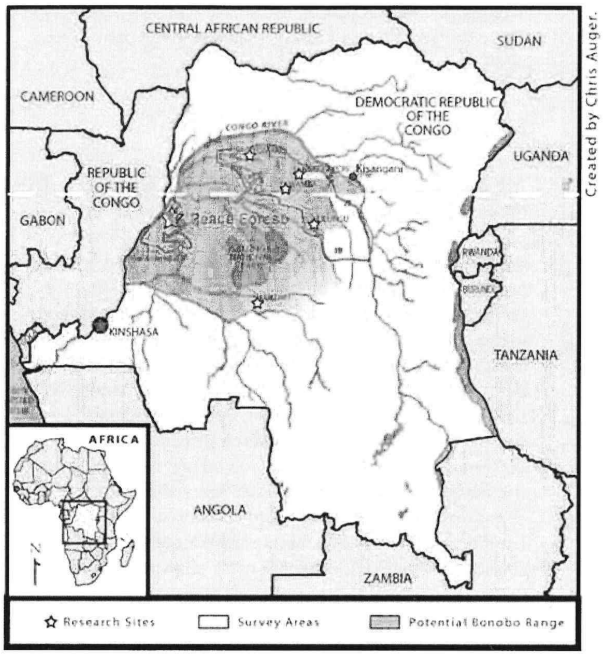

Fig. 1

i) forestation with native arboreal species; ii) safeguard of bonobos in a protected reserve after reforestation; iii) actions towards local human populations.
The establishment of a new forest-covered area will be carried out in order to realize a standard unit of the natural habitat of bonobo (*Pan paniscus*). Forest corridors with native species will be realized and a protected public reserve – including new forest corridors and forest islands yet existent – will be established. This activity will complement existing conservation programs including the establishment of Community-Based Reserves by the no-profit organization Bonobo Conservation Initiative (Figure 2).
One of the major threats for bonobos and other biodiversity has been the fragmentation of the forests. This project will target specific areas of degraded and cleared forests to establish corridors that may promote habitat viability for previously isolated and fragmented bonobo populations.

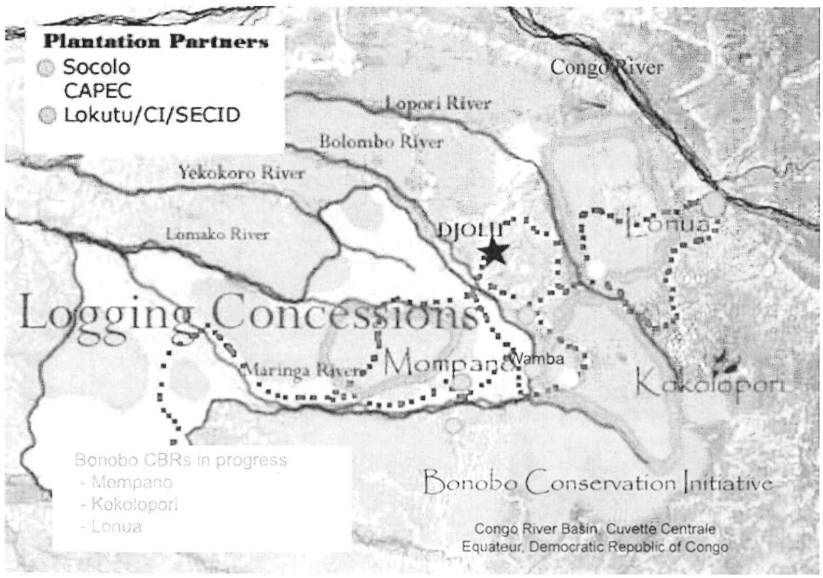

Fig. 2

As a consequence of the daily food requirements of animals, each forest island will be planted according to these parameters: vegetable species fit to their life, territorial survivals (territorial productivity due to presence and to energy contribution of leaves, fruits, grubs, birds and small mammals), seasonality of forest production, size of reserve also in relation to distance between islands.
The safeguard of bonobos will be ensured by enlargement and enrichment of the home range and mainly by the positive impact on genetic variability of isolated bonobo colonies.
In the future, once the new forest will be mature, it will be possible to think of a new insertion of bonobos within the protected reserve. Concerning the new insertion of bonobos, first of all we will take into account different techniques of new insertions of settlements. However, the plan of reintroduction will be carried out following the "Guidelines for Non-human Primate Re-introductions" (Re-introduction Specialist Group of IUCN/SSC, 2002).
Finally, in order to oppose the habits of local human people about the use of these animals as food, we will plan a multidisciplinary program as follows: i) introduction of cattle and other breeding animals (in order to make easier supply of food for local populations and to change their feeding behaviour); ii) introduction of activities to improve their economic state by quantifying the dimensions as involved people; iii) planning of informative and educational programs (for both to unstimolate the hunting of bonobos and to train to a sustainable economic use of forest and to oppose the spread of *HIV* virus).

Materials and methods

The project will use traditional technology for the reforestation works and for soil preparation. However modern geo-referencing (GPS) techniques have been introduced to simplify monitoring procedures.
The project is structured in the following items: i) nursery, ii) planting, iii) maintenance or weed control, iiii) fire control.
The reforestation schemes are adapted to different environmental and edaphic conditions of plantation sites. For this reason we have foreseen to use a large typology of selviculture systems, necessarily adapted. Thus, we have foreseen to use direct sowing or stump plantation or seedling transplantation from nursery. These techniques depend on biology of seeds either imported or collected *in situ* and thus we want to adapt the best selvicultural techniques to physiological features of the species to plant (Evans, 1982).
The reforestation activity to establish natural corridors will be carried out by using the technique called "Okoumé Technique" on the overlogged natural forest zones. Moreover, in the areas between such natural corridors and forest islands already existent enrichment techniques will be also taken into account (OTA, 1983).
The amount of CO_2 / (ha x yr) removal by sinks has been calculated by following the guidelines of Intergovernmental Panel on Climate Change (IPCC) - National Greenhouse Gas Inventories Programme (IGE, 2003).

Results and discussion

According to the project the carbon sequestration will be provided through the growth of the planted trees by the process of photosynthesis removal of carbon dioxide from the atmosphere. With the implementation of the project an increase of biomass will be reached in comparison to the current situation and consequently more carbon will be sequestrated. As the forest matures, sequestration in different pools (living biomass above and below ground) will increase to a theoretical maximum.
Given the above considerations, the implementation of this project is of great importance to reduce GHG concentrations. The regions involved are currently lacking the natural resources that can mitigate the referred emissions, as well as contribute to improve microclimatic conditions. Additionally, the biodiversity in the DRC, already seriously undermined, has a chance to rely upon a new support for its conservation, represented by new forest areas, able to offer refuge and sustenance to the animals comprising the regional fauna.
All steps are carried out by following the guidelines of Intergovernmental Panel on Climate Change (IPCC) in order to make possible the "certification" of the project by United Nations Framework Convention on Climate Change (UNFCCC) and, consequently, to provide t-CERs. At this purpose:

- we have done a complete bibliographic research about arboreal species and planting techniques adapted to reforestation activity in this ecosystem (results shown in Table 1);
- we have carried out the Project Design Document Form for Afforestation and Reforestation Project Activities (CDM-AR-PDD) concerning this project;
- we have determined the amount of CO_2/ha yr removal by sinks (results – see Table 2 – show that this project expects an absorption equal to 48.405 tonnes CO_2/ (ha x yr) removal by sinks).

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BOTANICAL NAME	COMMON NAME	WOOD DENSITIES (G/CM3 OR T/M3)	DHB (cm)	VOLUME (mc)/ha	TREE DENSITIES trees/ha
Afromosia elata	Assaméla	0,58*			
Aucoumea klaineana	Okoumé	0,37	101,9	1,7 - 21,5	15
Baillonella toxisperma	Moabi	0,71			
Brachystegia laurentii		0,45	80	0,30045	
Chlorophora excelsa	Kambala / Iroko	0,55	80	0,82626	
Coelocaryon preussii	Ekoune	0,56			11,14
Entandrophragma cylindricum	Sapelli	0,60-0,75	80	1,43773	
Fagara heitzii	Olon	0,41			1,36
Gilbertiodendron dewevrei		0,65	60	24,2566	
Guarea cedrata	Bosassa/Bossé	0,48	60	0,18089	
Julbernadia seretii		0,58*			
Lophira alata	Azobé	0,87			
Milicia excelsa		0,58*			
Nauclea diderrichii	Bilinga	0,63	60	0,36192	1,05
Oxystigma oxyphyllum	Tchibudimbu/ tchitola	0,53	80	4,79219	
Staudia stipitata	Niové / Kamashi	0,75	80	1,08034	1,02
*Tectona grandis***	Teak	0,55			
Terminalia superba	Limba	0,45			
Tieghemella africana	Douka	0,55			
Triplochiton scleroxylon	Ayous	0,32			

* mean tree density for unknow species

** exotic species

Tab. 1

CO_2 ABSORPTION (following "Good Practice Guidance for Land Use, Land-Use Change and Forestry" published by the IGE for the IPCC)	ANNUAL REMOVALS OF GREEN-HOUSE GASES (following equation: $\Delta C\ LF = \Delta C\ LF\ LB + \Delta C\ LF\ DOM + \Delta C\ LF\ SOILS$)
Land converted to Forest Land _ Intensively	$\Delta C\ LF = (50.325 + 2.22 + 0.59)$ tonnes CO_2 / yr = 53.135 tonnes CO_2 / yr × ha
Forest Land remaining Forest Land _ Secondary	$\Delta C\ LF = (4.36 + 0.37 + 0)$ tonnes CO_2 /yr = 4.73 tonnes CO_2 / yr × ha
Total	$\Delta C\ LF = (53.135 - 4.73)$ tonnes CO_2/yr = 48.405 tonnes CO_2 / yr × ha

Tab. 2

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