World Bank Carbon Finance Business

CARBON FINANCE DOCUMENT

for **Land Use, Land-Use Change and Forestry (LULUCF) Projects**

Project name	**PRESERVING AND ENHANCING ENVIRONMENTAL SERVICES THROUGH CARBON SEQUESTRATION AND CONSERVATION IN INTEGRATED FORESTRY AND AGROFORESTRY SYSTEMS IN LOS TUXTLAS BIOSPHERE RESERVE, MEXICO (LOS TUXTLAS PROJECT)**
Date submitted	September 4th, 2007

A. Project description, type, location and schedule

General description	
A.1 Project description and proposed activities	The *"Sierra de Los Tuxtlas"* Biosphere Reserve includes one of the largest intact portions of moist forests in Mexico. Scientists have recorded 943 species of plants, 80 ferns, 1,272 insects, 122 reptiles and amphibians, 561 birds, and 128 mammals. Many plant and animal species present in Los Tuxtlas are endemic to Mexico or to this Eco-region. Most of the reptiles and amphibians here are restricted to small isolated areas of mountain forests. The region boasts the highest bird diversity in Mexico in terms of comparable area. It is also a refuge for many rare and threatened species that have been displaced from other areas of Mexico, including 19 endangered mammals. Nearly 90 percent of the area of these important forests has been eliminated over the last 30 years. If the current annual deforestation rate (2.87%[1]) continues, by 2017 more than half of the 1993 forest cover will be lost, and more than half of the biodiversity of this region is expected to be lost. With this project, carbon emission reductions will be introduced as a new product in the agro-ecosystems of the Los Tuxtlas Biosphere Reserve. The goal is to increase and diversify farmers´ sources of income and to modify the current land-use change pattern in the region while promoting and enhancing environmental services from forests. Project forestry and agroforestry activities will be aimed to generate a diverse landscape in the biological corridors that promote connection of the three core areas of the biosphere reserve, and to protect other important ecosystems in their buffer zones. The National Forestry Commission (CONAFOR) is currently implementing a program of Payments for Hydrological Environmental Services (PSAH) in Mexico and for environmental services from biodiversity conservation, carbon sequestration and improvement of agroforestry systems (CABSA). Implemented since 2004, PSAH and CABSA have covered about 683,000 hectares all over the country. The Tuxtlas Project will allow CONAFOR to expand its existing

[1] As estimated by CONAFOR (2007), with available land use and vegetation maps from INEGI for 1993 and 202.

	program to specific priority areas, and to include carbon finance in new reforestation activities. Project will include two components: a) **Reforestation component**: This component will be carried out in 15,000 hectares, and will be compliant with CDM criteria and methodologies; activities to be undertaken in this component are: i) Plantations for wood production in 7,000 hectares ii) Agroforestry systems in 4,000 hectares each iii) Reforestation through natural regeneration for conservation purposes in 4,000 hectares In order to preserve and restore natural conditions, native species will be used for each project activity to the extent possible. b) **Reducing Emissions from Deforestation**: Management activities will be promoted to avoid deforestation. Economic incentives will be used to discourage land-use change in areas with a high potential risk of deforestation. Compliance monitoring will be carried out as a base for annual payments from PSAH and CABSA, and also for estimation of avoided emissions; remote sensing and GIS technology as well as field surveys will be used for monitoring purposes. Land use change for agricultural or grazing purposes has been identified as a main driver of deforestation in Los Tuxtlas as a consequence of needs for immediate economic revenues and incentives for agriculture and cattle-raising. An estimated area of 18,480 hectares of forests will be considered for the emission reductions component; the project will implement a PSA scheme to specifically protect an extent of 3,260 hectares identified as having a medium to very high deforestation risk; these areas were determined using a Deforestation Risk Index developed by the National Institute of Ecology (INE). For both components, CONAFOR will promote desired land use changes and management activities for forest conservation implementing economic incentives through payments for environmental services (PSAH and CABSA). It is expected that carbon revenues will create new income sources to compensate opportunity costs of land owners for land uses and management practices adopted.
A.2 Technology to be employed	For the CDM component of this project, carbon sequestration will be promoted by reforestation of grassland and agricultural lands, specifically by: (i) reforesting agricultural and pasture lands using forest plantations for wood production; (ii) planting trees in agroforestry systems; and (iii) promoting natural regeneration of grasslands or agricultural lands. The non-CDM component is aimed at preventing land-use change from natural forest systems to crops or pasture agrosystems.

The table below gives the tentative break-down of project lands according to surface areas. The exact areas will be determined through a community consultation process.

Strata in baseline scenario	Project activities (hectares)			
	Plantations for wood production	Agroforestry systems	Promoting natural regeneration for conservation	Total
1. Cattle-raising (grasslands)	3,500	2,000	2,000	7,500
2. Agriculture	3,500	2,000	2,000	7,500
Total	**7,000**	**4,000**	**4,000**	**15,000**

Man-made reforestation for wood production will be promoted on medium to high quality sites presently covered with pasture or agriculture, using tree seedlings from CONAFOR and from other local nurseries and planting about 1,100 trees/ha.

Agroforestry will be promoted on lands currently used for agriculture or cattle-raising. An integral agroforestry system that associates valuable timber species, with traditional basic food crops, such as corn, will be used in the project. Trees could be planted in windbreaks or fences, and in rows mixed with crops. Timber species in agroforestry systems will be planted at a mean density of about 500 trees/ha; with this density of plantation forest parameters for Mexico's forest definition will be reached.

Native species will be used for all three reforestation activities. Wood production species include roble (***Tabebuia rosea***), primavera (***Tabebuia donell-smithii***), cedro rojo (***Cedrella odorata***), mahogany (***Swietenia macrophylla***), cedro nogal (***Juglans olanchana***), laurel (***Licaria capitata***), and súchil (***Cordia alliodora***).

Agroforestry systems include a greater variety of species such as palo mulato (***Bursera simaruba***), pimienta (***Pimenta dioica***), roble (***Tabebuia rosea***), primavera (***Tabebuia donell-smithii***), cedro rojo (***Cedrella odorata***), mahogany (***Swietenia macrophylla***), jobo (***Spondias mombin***) and chalahuite (***Inga sp***).

Natural regeneration for conservation purposes will be promoted by grazing control and reducing lands for agricultural use on degraded hillsides areas, to allow the development of the traditional "acahual" (a type secondary forest), which has a high diversity of tree and shrub species.

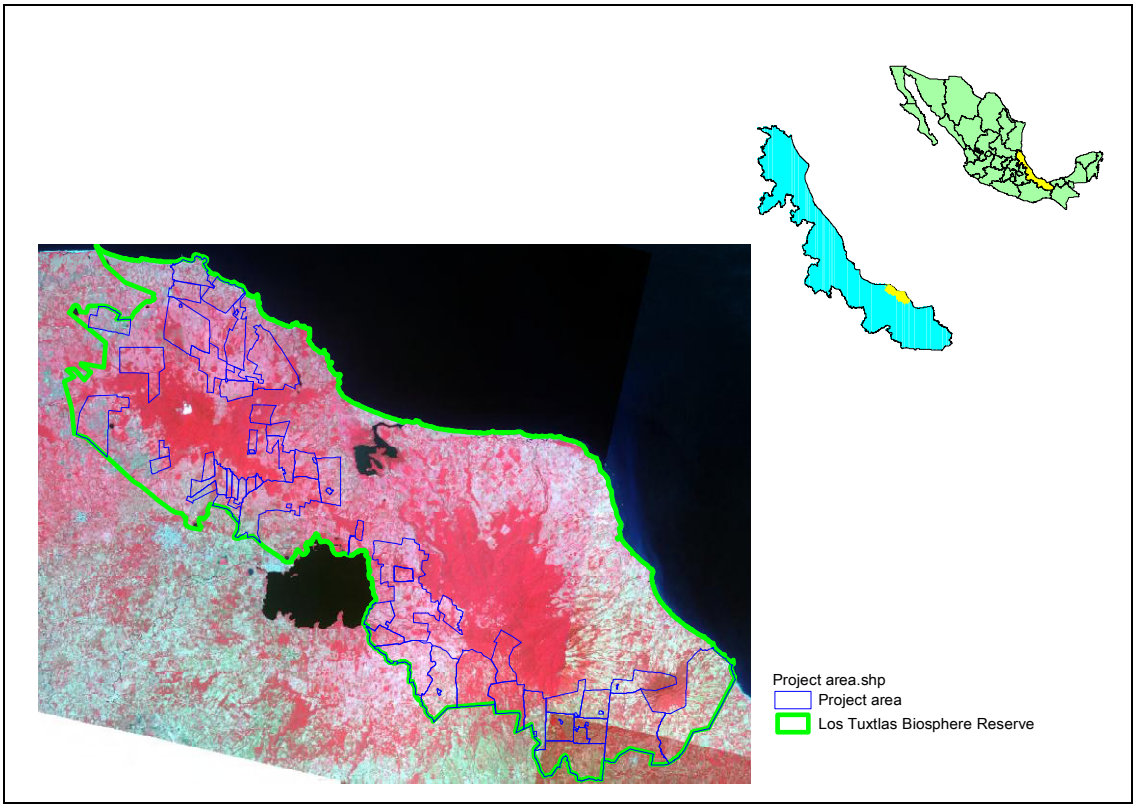
Natural regeneration will be achieved by controlling grazing and agriculture to promote establishment of native species through a succession process; the PES scheme will contribute to compensating landowners for adoption of the desired land use. Direct planting and/or seeding will be used only if necessary to support natural regeneration (e.g., when promoted natural regeneration is expected not to reach national thresholds of forest definition).

	In every case, traditional non-mechanized activities will be performed for site preparation, plantation, fencing and maintenance of reforested sites. Only chainsaw will be used during thinning or harvesting activities. Other related activities will be carried out using labor force and manual tools only. Net anthropogenic removals of GHG will be estimated using CDM approved methodology AR-AM0004; estimates will include aboveground and belowground biomass only, as established in the selected methodology. Conservative criteria and standards supported by the IPCC (when applicable) have been adopted. For estimating net anthropogenic removals of GHG, TARAM tool (version 1.2) developed by CATIE and the World Bank was used. It is expected that land owners adopting the proposed activities will receive payments for carbon capture in proportion to the carbon stored in the selected pools of the ecosystem. They will also receive payments for environmental services from water and biodiversity conservation, through PSAH and CABSA, and partly for this reason displacement of agricultural activities (leakage) is not expected. For all three activities, site preparation for reforestation does not consider use of fire or fertilization. Even when soils are not completely degraded, soil erosion and compaction are present as an effect of agriculture and grazing.
Proponent submitting the project	
A.3 Name	Comision Nacional Forestal (CONAFOR)
A.4 Organizational category *(choose one or more)*	b. Federal government agency (De-concentrated Governmental Organization)
A.5 Other function(s) of the project developer in the project *(choose one or more)*	a. Sponsor
A.6 Summary of relevant experience	CONAFOR was created by Presidential Decree on April 4th, 2001. Its main objective is to develop, promote and increase forestry production, as well as forest conservation and restoration. CONAFOR also participates in the process of planning and implementation of national policies to promote a forestry sustainable development. It is a de-concentrated body within the Secretary of Environment and Natural Resources of Mexico (SEMARNAT). It finances a variety of forestry activities through credit and other mechanisms directed to small- and medium-sized producers. Its mission is to contribute to increase the life quality of the Mexican people, and to create new employment and development opportunities by promoting the sustainable management of the national forest resources. CONAFOR is also responsible for the implementation of the program of Payments for Forest- Hydrologic Environmental Services (PSAH) and for PES for biodiversity conservation, carbon sequestration and improvement of agroforestry systems (CABSA) in Mexico. In 2003 the program included 273 landowners and “ejidatarios”, covering an area of 126,000 hectares, with an investment of US$30 Million/year; in 2004 this area reached 215,000 has. In 2005, 195,000 hectares were incorporated and by 2006 145,000 hectares were included in the mentioned programs.

	In total, by 2006 about 683,000 hectares all over the country were turned into forest conservation management through PSAH or CABSA. Budget for the implementation of PSAH comes partly from the fees for the use of national water collected by the National Water Commission (CNA), while CABSA budget comes from federally collected taxes. In 2007, the available budget was raised to about US $70 million and a total of 321,000 hectares are expected to be incorporated into the PES schemes. In order to improve efficiency and the impact of CONAFOR's PES programs, a 4-year project was prepared and approved by the World Bank and the Global Environment Facility (GEF) in 2006. A World Bank loan of US $45 million and a GEF donation of US $15 million were approved for implementing the Environmental Services Project. The main project objective is to maintain and improve the provision of environmental services of local benefits (water) as well as global benefits (biodiversity conservation and carbon sequestration). The Project was approved in May 2006 and became effective in October 2006. The Environmental Services Project is aimed to improve management and scale up the implementation of the program of payments for environmental services in Mexico as well as developing markets for forest environmental services. Under Environmental Services Project CONAFOR is implementing a subcomponent aimed to strengthen its ability to promote land use change projects that sequester or conserve carbon in forest and agro-ecosystems while also promoting biodiversity conservation and poverty alleviation. The existing program will be strengthened, while new mechanisms will be explored to complement CABSA and provide added sustainability by linking proposed land use changes to the international market for carbon sequestration. To this end the project will support (i) strengthening CABSA to facilitate its preparation of projects and proposals to attract funding from carbon markets; (ii) establishing financing mechanisms to improve incentives for land use changes that seek to attract carbon market participants; and, (iii) analyzing, designing, and implementing financial instruments to facilitate carbon sequestration transactions between land users, CONAFOR, carbon market intermediaries, and carbon buyers. Even though IBRD loan and GEF grant will not be used to finance the establishment or operating costs of this project, the two operations will be linked to realize efficiency gains. Up to now Environmental Services Project has contributed building capacities needed for preparing the Tuxtlas' CFD and eventually PDD, thus reducing some of the transaction costs associated with preparation and implementation of forestry carbon projects. Participating institutions and organizations are expected to gain more knowledge and skills in order to improve preparation and implementation of forestry carbon projects.

A.7 Address	Periferico Poniente No. 5360 Col. San Juan de Ocotan City: Zapopan, Province: Jalisco Country: Mexico Zip Code: 45019
A.8 Contact person	Ing. Víctor Sosa Cedillo M.C. Leonel Iglesias Gutierrez
A.9 Telephone / fax	Telephone: +52(33) 3777 7085 +52(33) 3777 7085 ext. 2000 +52(33) 3777 7085 ext. 2020
A.10 E-mail and web address	Website: http://www.conafor.gob.mx E-mail: vsosa@conafor.gob.mx E-mail: liglesias@conafor.gob.mx E-mail: serviciosambientales@conafor.gob.mx
Sponsor(s) financing the project *(List and provide the following information for each project sponsor)*	
A.11 Name	Comisión Nacional Forestal (CONAFOR) -National Forestry Commission-
A.12 Organizational category *(choose one or more)*	CONAFOR is a de-concentrated federal government agency PEMEX is a de-centralized public organism of Mexico's federal government
A.13 Address *(include web address)*	Comisión Nacional Forestal (CONAFOR) Address: Periférico Poniente 5360, Col. San Juan de Ocotán, C.P. 45019 City: Zapopan State: Jalisco Country: México Web address: www.conafor.gob.mx Petróleos Mexicanos (PEMEX) Address: Marina Nacional #329, Col. Huasteca, C.P. 11311 City: México State: Distrito Federal Web address: www.pemex.gob.mx
A.14 Main activities	CONAFOR's main activities include promoting sustainable forestry management, conservation and restoration of forest ecosystems in order to increase forest sector's contribution to national economy and improve livelihood of land owners and inhabitants inside forest areas, while preserving provision of environmental services with local and global benefits. PEMEX's activities consist in exploration and exploitation of national hydrocarbon resources in order to maximize their economic value of hydrocarbons as well as of their derivatives, to contribute to the sustainable development of the country.
A.15 Summary of the financials of the project sponsor *(total assets, revenues, profit, etc.)*. Please also refer to Annex 2 for a financial documentation checklist.	Please see attached files in annex 2.

Type of project	
A.16 Greenhouse gases targeted	CO_2
A.17 Type of activities	Reforestation for carbon sequestration and forest conservation for reducing emissions from deforestation.
A.18 Field of activities (*Select code(s) of project category(ies) from the list in Annex 1*)	1. Rehabilitation of degraded lands to forest 3. Establishing tree/shade crops over existing crops 4. Plantations for wood products 4a. Small scale landholder driven 16. Emission prevention from land use change
Location of the project	
A.19 Country	Mexico
A.20 Nearest city	Santiago Tuxtla, San Andrés Tuxtla, Catemaco, Soteapan, Mecayapan, Pajapan and Tatahuicapan de Juárez.; all these cities are located in the state of Veracruz (see Map 1).
A.21 Precise location. For multiple sites, include a list in Annex 6 (*Include latitude and longitude if known*).	The Los Tuxtlas Biosphere Reserve is located in the state of Veracruz, in the coastal plains of the Gulf of Mexico between 18° 10´ to 18° 45´ North of the Equator, and 94° 42´to 95° 27´ West of Greenwich (Map 1**¡Error! No se encuentra el origen de la referencia.**). It lies within the municipalities of Santiago Tuxtla, San Andrés Tuxtla, Catemaco, Soteapan, Mecayapan and Tatahuicapan de Juárez. Some project areas intersect with the core zones of the Los Tuxtlas Biosphere Reserve which are public lands managed as protected areas. These core areas are named San Martin Tuxtlas, Santa Marta and Pajapan.



Map 1. Location of Los Tuxtlas Biosphere Reserve and project area. CONAFOR, SPOT 2006.

Expected schedule	
A.22 Earliest project start date *(Year in which the project will be operational)*	The crediting period shall begin on the same date the proposed reforestation activities begin, namely in July 2008, when rain season begins and weather conditions for planting are favorable. Some activities such as fencing of selected sites could start one month earlier but soil preparation could not start but a few weeks earlier.
A.23 Estimate of time required before becoming operational after approval of the CFD	Time required for financial commitments: 2 months Time required for legal matters: 2 months Time required for negotiations: 2 months Time required for establishment: 2 months
A.24 Year of the first expected CER / ERU / lCER / tCER / RMU / VER delivery	2012
A.25 Project lifetime *(Number of years)*	30 years
A.26 Current status or phase of the project	a. Identification and pre-selection phase
A.27 Current status of the acceptance of the project by the Host Country *(choose one)*	a. Letter of No-Objection is available (see attached file).
A.28 Position of the Host Country on the project *(Are carbon sinks encouraged as CDM/JI activities? Describe the legal relationship between the Project Sponsor and the Owner of the future Emission Reductions? If the Project Sponsor intends to sells the Emission Reductions, is the Sponsor allowed to do so legally? Has the Host Country endorsed the project? If not, when will it do so? Is there a risk the Host Country will not endorse the project? Please also refer to Annex 7)*	CONAFOR will have no intentions to claim the emission reductions (carbon credits); these will be owned by landowners implementing the project activities. Interministerial Commission for Climate Change (CICC) has endorsed this project and issued a no-objection letter. SEMARNAT acts as the secretariat of the CICC as the Designated National Authority (DNA) responsible for issuance of No-objection or Approval Letters; it is expected that CICC will issue the letter of approval based on the Project Design Document for this project. Project preparation has included the participation of other national agencies, such as the National Commission for Natural Protected Areas (CONANP), and the proposed activities fully comply with national policies and laws which promote sustainable forestry development.
A.29 Position of the Host Country with regard to the Kyoto Protocol *(choose one)*	The Host Country is a party to the Kyoto Protocol (Mexico ratified the Kyoto Protocol on April 29, 2000).

B. Expected environmental and social benefits and risks

Environmental benefits and risks	
B.1 Baseline scenario *(Please describe the most likely scenario in the absence of the proposed project and explain why the project leads to more carbon being sequestered than would otherwise occur. What would the future look like without the proposed project? Different scenarios may be envisaged, including the continuation of a current activity ("business-as-usual"), implementation of the proposed project activity and many others. Please also refer to Annex 3 on baseline methodology.)*	The baseline scenario is discussed for the two project components: (i) reforestation; and (ii) emission reductions through forest conservation. For the first component, as established in AR-AM0004, the applicable baseline approach is *"existing or historical, as applicable, changes in carbon stocks in the carbon pools within the project boundary"*. Plausible scenarios for the project area are: a. Continuation of current land uses and activities; b. Abandonment of lands currently under agriculture or grazing purposes and establishment of forests through natural regeneration in succession process; c. Reforestation activities through establishment of plantations for wood production, adoption of agroforestry systems and promoting natural regeneration in areas under agricultural or grazing purposes. There are no legal barriers for implementing any of the options mentioned above, but without proper incentives, current land use is expected to continue in the future. For this component, the most likely baseline scenario is a continuation of current land use; assumption is based on evidence, such as land use maps, aerial photography or satellite imagery, showing that agriculture and grasslands areas have been maintained for the few past decades. Agriculture and cattle-raising have been the main income sources for landowners and lack of financial resources and other appropriate incentives currently prevent landowners from adopting and/or maintaining desired forest land uses. Land use for cattle-raising and agriculture represent the most important income source for landowners and, without proper incentives, is unlikely that abandonment of such activities or desired land-use changes will occur, especially when no revenue is expected. Although reforestation activities could represent a profitable land use, it is not likely to occur due to a lack of financial incentives to initiate activities. Revenues from reforestation activities are expected in the mid-term, so landowners cannot afford the start-up cost associated with beginning implementation of reforestation activities. Considering the most likely baseline scenario as option (a) mentioned above, carbon stock levels are estimated to be maintained at the same levels at which they are occurring now. With project implementation and carrying out of reforestation activities, one can expect an increase in carbon stocks above the baseline scenario due to an increment in forest biomass. For the emission reduction component, a similar approach was considered; the main drivers of deforestation in Los Tuxtlas region are agriculture and cattle-raising. Existing evidence indicates that a deforestation process is still going on, although at a minor rate. At the beginning of the 1970's, colonization of tropical areas of Mexico was a principal cause for deforestation; in the late 1970's

	huge areas of tropical forests were converted to agricultural and grazing land uses with government incentives. Cattle-raising is the principal (and even sole) system employed by the majority of the indigenous and non-indigenous settlements in Mexico. The local agriculture based on the traditional "milpa" system with the cultivation of corn and beans and squash is widely used for subsistence and, in a small proportion, for commercial purposes. In addition to the poly-cultural milpa fields, people also manage small areas with monocultures of sugarcane, orange, sesame, beans and chili. These monocultures are generally planted for commercial purposes. In the past, farmers usually cultivated areas for one to three years and then left the land fallow for 15-20 years; increasing population pressure on the land base has caused a shortening of the resting phase, and the slash and burn system will be modified with higher management levels, higher inputs or be replaced by a more permanent, less biodiverse system. Because of this, biodiversity-rich second growth and old-growth forest ecosystems are gradually converted to less sustainable and less biodiverse agriculture systems. Due to population pressure and income needs, proposed lands are subject to permanent agricultural or grazing uses; nevertheless, management conditions will be studied carefully to determine appropriated baseline conditions and stratification. A study conducted by Guevara et al (2004) for the Los Tuxtlas Biosphere Reserve, estimated deforestation in the three periods of time (1972 to 1986, 1986 to 1990 and 1990 to 1993)[2]; study results showed that annual deforestation rate in Los Tuxtlas, were 1.69%, 1.11% and 9.42%, respectively (see Chart 1 annex 3). Increase in the last period of time might be explained with creation of government programs (PROCAMPO) to incentive production of basic crops, such as corn. A loss of forest area of 44.05% was estimated when analyzing deforestation for the period 1972-1993 with same data available from the above mentioned study; an average annual deforestation rate of 2.73% was estimated for the same period of time. Recently, CONAFOR estimated deforestation for the period 1993-2002 with data available from Land Use and Vegetation maps produced by INEGI (National Institute of Statistics, Geography and Informatics) for the Los Tuxtlas Biosphere Reserve; results showed a reduction of 23.06% in forest area, with an annual deforestation rate of 2.87%, consistent with annual deforestation rate for the 1972-1993 period of time, estimated from data available of Guevara et al (2004) (see Chart 1 annex 3). Observed changes in annual deforestation rates suggest that external factors, other than economics might affect decisions of landholders, and therefore drivers for deforestation must be carefully identified and analyzed. Even though the impact of programs which promote agriculture and grazing uses has been decreasing, and the promotion of sustainable forestry management has been increasing in the

[2] Guevara, S.; J. Laborde and R. Landgrave. (2004). La deforestación. In Los Tuxtlas. El paisaje de la sierra. Guevara, S.; J. Laborde and Sánchez-Ríos. Editors. Instituto de Ecología, A.C. y Unión Europea, Xalapa, Veracruz, México.

	recent past, deforestation continues to date. For the Los Tuxtlas Biosphere Reserve CONAFOR estimated an annual deforestation rate of 2.87% for the period of 1993 to 2002 (see Map 3 in Annex 3). Estimations were based on a comparative analysis of land use and vegetation cover maps generated by INEGI (National Institute for Statistics, Geography and Informatics). Using a Deforestation Risk Index developed by the National Institute of Ecology (INE), the remaining forest was classified according to a deforestation risk (very high, high and medium risk). Topographic conditions, road access and proximity to human settlements are the main variables explaining deforestation behavior in the project area (see Map 3). It is important to note that the Deforestation Risk Index is not providing information on when deforestation will happen but it only indicates a relative risk when compared to other forest areas. Nevertheless, deforestation is expected to take place first at sites with a very high risk of deforestation; then, assuming same rate levels as for period 1993-2002 (i.e. 2.87% annual rate), it is possible to estimate how much of this area is likely to be deforested every year. A description of Deforestation Risk Index is attached along with annex 3. The colonization of Los Tuxtlas region was based on clear cutting extensive areas for agriculture but especially for cattle-raising at expenses of tropical and temperate forests; currently there are not enough incentives to promote forest restoration and for the period from 1993 to 2002, deforestation was estimated to at an annual rate of 2.87%. At this rate, carbon emissions from land use change are estimated as a total of 152,429 tonnes of CO_2e by 2012 and 274,977 tonnes by 2017 in the areas with medium to very high of deforestation risk index.
B.2 Estimate of carbon sequestered or conserved *(in metric tonnes of CO_2 equivalent – t CO_2e. Please base estimates on the difference between the proposed project activity and the baseline scenario identified in B.1.)*	**Reforestation component** Up to and including 2012: 116,602 t CO_2e Up to and including 2017: 1,298,475 t CO_2e **Reduced emissions from avoided deforestation** Up to and including 2012: 105,368 t CO_2e Up to and including 2017: 196,458 t CO_2e
B.3 Existing vegetation and land use	How much land has a tree cover of a. < 10%: 31,636 hectares of land classified as no-forest b. 10-30%: No information available c. > 30%: 18,480 hectares of land classified as forest These areas were roughly the same as in 1990, as estimated from an analysis of available satellite imagery. In the 1970's land use change occurred in the project area due to legal incentives which promoted human settlements in the southern part of Mexico, including in the Los Tuxtlas area of influence. People arriving at Los Tuxtlas were encouraged to change land use from forest to agriculture or grassland, and therefore the area identified as eligible is expected to fulfill requirements for CDM land eligibility.

	Land proposed for this project is currently dedicated to agriculture, specially corn or pasture or other annual crops (subsistence purposes) and grazing (meat and dairy production).
B.4 Leakage *(Do the activities planned under the project cause leakage, i.e. greenhouse emissions outside the project and baseline boundary? E.g., will agricultural or pastoral activities be displaced from the project sites to other locations? Please also say if the current level of LULUCF activities in the country would be reduced by the project coming on-line due to a process of resource reallocation?)*	It is expected that displacement will not occur in this project; landowners will be trained to improve their agriculture and grazing practices. Once farmers decide to participate in the project, it is understood that agricultural activities in the project areas will not be performed, therefore these will not be displaced to areas outside project boundaries. Grazing is carried out in an extensive way and it does not always use full animal load limits (estimated to be 1 animal/ha). Nevertheless, it is expected that cattle from grazing areas will be displaced to remaining grasslands (always under maximum load limit) or sold. In both cases, PES will be used to compensate for their opportunity costs in order to avoid displacement of activities. Leakage from the use of posts for fencing will be calculated once specific areas for implementation are assigned (currently there already are many areas with fences). Leakage from burning fuels for transportation of seedlings, labor and products is also considered. No fertilization will be carried out, nor use of machinery use for site preparation, planting or harvesting. Only chainsaws will be used for thinning and harvesting activities.
B.5 Local environmental benefits and risks *(Please also refer to Annex 4 on environmental benefits and risks.)*	Forestry and agroforestry systems provide many local environmental services to local communities. These services complement products that farmers require for commercial and home use. The project will provide local benefits such as: improvement of slope stability, maintenance of soil fertility by increased inputs of organic matter to the soil, conservation of water resources (quality and quantity) via greater infiltration and reduced surface runoff or erosion on steep slopes. Carbon sequestration through implementation of reforestation activities will contribute to alleviate deforestation pressures and improve biodiversity conservation as well as provision of water environmental services, especially in fragmented landscapes. Relevant ecosystems for biodiversity will be preserved and enhanced by the project. Environmental advantages of sustainable land use production systems versus slash and burn in hillside areas include increasing water retention, recovery of wildlife, increasing carbon accumulation and improvement of watersheds hydrology (water quality and flow regulation). A number of environmental, social and economic benefits are expected with project implementation, and project activities seem to be eligible for certification under criteria and indicators of Climate, Community and Biodiversity Alliance (CCB standards); thus, CONAFOR and project participants will explore requirements and procedures, as well as costs and benefits, in order to assess whether or not certification under CCB standards will be sought.

	For the non-CMD component (i.e. emission reductions from avoided deforestation), the Voluntary Carbon Standard will be adopted in order to fulfill requirements for issuing Voluntary Carbon Units (VCUs).
B.6 Consistency between the project and the environmental priorities of the Host Country	The project responds to the environmental priorities of the country, which are aimed at alleviating poverty and preserving biodiversity while providing social and economic benefits. The project is also responding to strategic activities established in the National Strategy for Climate Change (NSCC), recently announced by the President of the Republic. Afforestation and reforestation activities within the NSCC will be promoted to increase country's capacity for carbon sequestration, as well as forest conservation and management to reduce emissions from deforestation and degradation. The NSCC will promote design and implementation of CDM projects, included those for forestry sector, to take advantage of international sources for financing afforestation/reforestation and conservation/management activities.
Socio-economic benefits and risks	
B.7 How will the project improve the welfare of the community involved in it or surrounding it? What are the direct effects, which can be attributed to the project and which would not have occurred in a comparable situation without that project? *(e.g., employment creation, poverty alleviation, foreign exchange savings).* Indicate the number of communities and the number of people that will benefit from this project. Please also refer to Annex 5 on community benefits and risks.	The population of the area was estimated at 31,660 people in 2001. Particularly in the project area there are 63 ejidos, communities and small properties inhabited by 4,226 people who will thus be beneficiaries of the project. Their main economic activities are based on agriculture and cattle-raising. The project will incorporate carbon as a new product in the farmers' economy, in order to diversify their sources of income. The agroforestry activities will alleviate poverty through improved crop productivity and development of alternative crops. The project incorporates activities that energize the local economy, generating incomes from environmental services payments and employment. All the carbon incomes will be invested in the project area in the form of payments to the farmers for the environmental services produced by them. The payments received by the farmers will allow them to undertake the reforestation activities, including area fencing, tree planting, and maintenance (weeding, fire protection, hunting prevention, etc). Reforestation and agroforestry activities will require labor that is normally supplied by the farmer and his or her family. The estimates of labor requirements for agroforestry depend on the type of agroforestry activity. For example, for windbreaks, the labor requirement is 30.8, 7.8, and 8.7 person days/year) for the first, second, and third year, respectively. For planting trees in fences, the requirement is 28.9, 6.7, and 7.2 person days/year. For trees mixed with crops, the requirement is 6.2, 1.5, and 0.5 person days/year. Labor requirements for forest plantation are higher: 24.3, 15.3, 15.4, 11.0, 6.9, and 5.5 (person days/year/ha) for the first, second, third, fourth, fifth, and sixth year, respectively. The estimation of labor force for reforestation by natural regeneration is estimated in 10 to 12 day persons per year/ha. Advantages of sustainable land use production systems versus slash and burn in hillside areas include effects on food security, as growing season extends, resist dry periods, reduces soil erosion and landslides, increases yields and generates an important

	amount of the firewood needs. Sustainable land use production systems have also effects on economics from increasing incomes, reducing the use of external inputs, increasing production and diversification, competitive with improved grains for domestic consumption. They also reduce the number of labor days, increase labor efficiency and reduce the use of herbicides.
B.8 Are there other effects? *(e.g., training/education due to the introduction of new technologies and products, replication in the country or the region)*	Yes, a component for training and technical assistance will be implemented along with project reforestation and forest conservation activities. This component will be aimed to remove technical and/or organizational barriers that could prevent their participation in this project and also for implementing desired forest land uses and management and conservation activities. Training for implementing monitoring will also be carried out as a part of this component. This project has raised awareness in some other natural protected areas, which would like to replicate the project and thus participate in the market for carbon credits through conservation and other activities. Lessons learned from project design and implementation will be used to build institutional capacities and promote new projects. As noted in A.6, this project is linked to the Environmental Services Project, which also has a strong capacity building component.

C. Finance

Project costs[3]	
C.1 Preparation costs (*feasibility studies, monitoring plan, PDD, etc.)*	US$ 0.16 million (Baseline Study, Monitoring Plan, Due diligence by WB / CF Unit)
*C.2 Establishment costs (*site and soil preparation, seedlings, planting, weeding until planting is completed)	US$ 6.32 million
C.3 Operating costs (*from planting onwards and for the duration of the project*)	US$ 32.93 million
C.4 Other costs *(explain)*	US$ 0.14 million (Validation, Annual verification)
C.5 Total project costs	US$ 39.55 million
Sources of finance to be sought or already identified	
C.6 Equity (Include names)	**US$ 6.32 million** (three sources of funding have been identified: (i) producers/project beneficiaries, (ii) CONAFOR (iii) and PEMEX

[3] NOTE: Financial analysis is NOT considering conservation component (i.e. reduced emissions from avoided deforestation).

	(Petróleos Mexicanos)
C.7 Debt – Long-term *(Include names of lenders)*	Not applicable
C.8 Debt – Short term *(Include names of lenders)*	Not applicable
C.9 Not identified	Not applicable
C.10 Contribution sought from the BioCarbon Fund	Not applicable
C.11 BioCarbon Fund contribution sought in upfront payment *(The quantum of advance payment will depend on the assessed risk of the project by the World Bank, and will not exceed 25% of the total ER value purchased by the World Bank for the project. Any upfront payment will be discounted by a factor considered appropriate by the World Bank for the project.)*	(US$ million and clarification of the reasons)
C.12 Sources of carbon finance *(Has this project been submitted to other carbon buyers? If so, say which ones?)*	NO
C.13 Indicative CER / ERU / lCER / tCER / RMU / VER price *(subject to negotiation and financial due diligence)*	US$ 4.0 /ton CO2e
C.14 Emission Reductions Value *(= price per tCO_2e * number of tCO_2e)*	
Until 2012	**US $1,511,824.00**
Until 2017	**US$ 4,105,760.00**
C.15 Financial analysis (If available for the proposed CDM / JI activity, provide the financial internal rate of return (FIRR) for the project with and without the CER / ERU / lCER /	**FIRR without carbon: 14.2%** **FIRR with carbon: 16.4%**

tCER / RMU / VER revenues. Provide the financial rate of return at the expected CER / ERU / lCER / tCER / RMU / VER price above and also at US$4/t$CO_2$e. Assume 20 years of carbon payments even though the BioCF will not be able to pay beyond 2017. Please attach financial analysis spreadsheet using format referred to in Annex 2.)	

Annex 1: LULUCF Project Categories

Code	***Afforestation and reforestation***[4]
1	Rehabilitation of degraded lands (e.g. *Imperata* grasslands*)* to
1a	forest
1b	agroforestry
2	Reforestation of degraded temperate grasslands or arid lands by tree planting
3	Establishing tree/shade crops over existing crops (e.g. coffee)
4	Plantations for wood products
4a	Small scale landholder driven
4b	Commercial scale
5	Landscape rehabilitation through planting corridors etc
6	Fuel wood plantings at a commercial scale
	Forest Management
7	Improved forest management via fertilizer, in-plantings etc
8	Improved fire management
9	Reduced impact logging
10	Alternatives to fuel wood for forest/environmental protection
	Cropland management
11	Reduced till agriculture
12	Other sustainable agriculture
	Grazing land management
13	Revegetation of semi-arid and arid lands with shrubs or grasses
14	Improved livestock management leading to vegetation and soil recovery
15	***Bio-fuels***: Use of biological residue to produce energy
16	***Other***

[4] This is the only class of activities accepted under the CDM for the first commitment period

Annex 2: Financial Documentation Checklist

Please provide for each sponsor and the project company (where applicable):

1. Experience statement, including all the projects the firm has closed, their current status, and additional details on projects similar to those to being presented to the BioCarbon Fund.

CONAFOR is currently implementing a payment scheme for hydrologic environmental services. Payments are based on forest protection from land use change and other disturbance factors, monitoring is supported on satellite imagery analysis. Payments for nearly USD 20 million were delivered in 2003, and almost USD 40 million in 2004. Program will deliver yearly payments to forest owners (ejidos and communities, as well as private owners) in a five year period contract.

CONAFOR has begun implementation of a program for developing market for environmental services for biodiversity protection, establishment of agroforestry practices and carbon sequestration. Nearly US$ 10 million were delivered to promote capacity building and technical assistance for developing markets of environmental services through CABSA.

Currently CONAFOR is implementing a project of Forest Environmental Services with financing of a loan of World Bank and a GEF grant. Project includes a strong component of training and capacity building for developing environmental services markets in promissory areas in Mexico. This Environmental Services Project was designed as a pilot scheme to break new ground in the exploration and development of new mechanisms. It will provide assistance to indigenous communities and ejidos that own forests in priority regions for conservation, by creating environmental services markets that recognize the relevance of forest environmental services. It is expected, these markets would ensure the communities a sustainable inflow of financial resources for improved management and conservation of their forest resources, while at the same time generating alternative sources of income for the communities. This project seeks to improve current payments schemes for forest environmental services in Mexico.

2. Any ratings and reports from D&B, S&P, Fitch, OECD (country only).

Reports included:

- OECD revised report on the application of the convention and 1997 recommendations on combating bribery of foreign public officials in international business transactions
- OECD Conclusions and Recommendations of Environmental Performance Reviews - Mexico (1998)
- Lloyd Report March 2005, reporting S&P rating (bilingual)

3. Public filings, if any.

Not identified.

4. Audited financial statements for most recent three years.

Audited financial statements attached for the years 2001-2002 and 2003-2004, and January, February and March 2005 (see attached files, Spanish only)

5. Company Bylaws/Articles of Association.

Sustainable Forest Law includes institutional bylaws (see file attached, Spanish only). Other institutional bylaws are policies for procurement of good and services, as well as policies for public work and related services are available at CONAFOR website (see files attached, Spanish only).

6. List of Directors and Managers of the Company.

Biol. José Cibrián Tovar, CONAFOR's General Director

A. Victor E. Sosa Cedillo, General Coordinator of Forest Production and Productivity

A.1. Leonel Iglesias Gutiérrez, Manager of Environmental Services of the Forestry

A.2. Saúl B. Monreal Rangel, Manager of Commercial Forest Plantations

A.3. Germanico Galicia Garcia, Manager of Forest Development

A.4. José de Jesús Solís Rodríguez, Manager of Integration of Forest Productive Chains

B. Vicente Arriaga Martínez, General Coordinator of Forest Restoration and Conservation

B.1. Ramón Cardoza Vázquez, Manager of Soil Conservation

B.2. Jaime Villa Castillo, Manager of Forest Health

B.3. José Ricardo Sánchez Vázquez, Manager of Reforestation

B.4. Roberto Martinez Dominguez, Manager of Forest Fire Protection

C. Rodolfo Orozco Gálvez, General Coordinator of Planning and Information

C.1. Luis Casas de la Peña, Manager of Planning and Evaluation

C.2. Alberto Sandoval Uribe, Manager of Forest Inventory and Geomatic

C.3. Luis Vázquez Lecanda, Manager of Informatics

C.4. Jorge Antonio Robles Valdes, Manager of Forest Information

D. Alfredo Mayén Mena, General Coordination of Education, Training, Research and Culture

D.1. Eugenia Maria Barba Robert, Manager of Education and Training

D.2. Mauricio Mendoza Briseño, Manager of Investigation and Technologic Development

D.3. Carlos Enrique González Domínguez, Manager of Forest Culture

E. Carlos Rodríguez del Toro, General Coordinator of Administration

E.1. Angel Manzano Chávez, Manager of Finance Resources

E.2. Jorge Iván Arce Rodríguez, Manager of Services and Goods Procurement

7. Shareholders Agreement.

Not applicable because CONAFOR is a federal government institution

8. List of Company Subsidiaries, if not included in financial statements.

Not applicable

9. List of Company Debts (maturities, interest rates, security) if not included in financial statements.

Not applicable

10. **Paper and electronic copies of company financial projections including assumptions, balance sheet, income statement, cash flow; include proposed projects and other planned investments.**

Not applicable

Please provide for this project (where applicable):

11. **Financial analysis (please present a spreadsheet using the financial analysis model available at http://carbonfinance.org/router.cfm?Page=submitproj)**

See attached file

12. **Project Business Plan/Feasibility Study/Market Study.**

None of them are available.

Please provide as available, but no later than appraisal (where applicable):

13. **Major Project Contracts (e.g. Engineering, Procurement and Construction).**

Not Applicable

14. **Purchase contracts (e.g. power).**

Not Applicable

15. **Concession/License and permits.**

Not Applicable

16. **Financing agreements, letters of intent or similar from banks, equity providers, other carbon finance sources, etc., expected to provide financing.**

Not Applicable

17. **Technical Assistance Agreements, if applicable.**

Among others, CONAFOR has signed technical assistance agreements with:

a) Mexico's National Council of Science and Technology (CONACYT)
b) Costa Rica's Agronomic Centre for Research and Training (CATIE)
c) University of Alberta, Canada
d) Finland Government through Ministry of Agriculture
e) Chilean Foundation of Chile
f) Israel's Keren Kaymet Foundation
g) Rain Forest Alliance (NGO)
h) International Tropical Timber Organisation (ITTO)

18. Laws governing project operations (e.g. Build, Operate, Transfer laws, and government decrees).

The Sustainable Forest Law rules CONAFOR's operations (see file attached, Spanish only).

19. Sources of major procurements.

Goods, supplies and services are acquired from a great variety of particular companies; public contracts are obtained only through a bidding process regulated by Law. Sources of procurements for 2004 and 2005, as well as sources of services and goods for the year 2005, are listed in CONAFOR's website.

20. Paper and electronic copies of project financial projections including assumptions, per unit (e.g. $/MWh, $/ton) product costs and prices (tariffs), income statement, and cash flow.

Not Applicable

Annex 3: Baseline Methodology

Please use this annex to specify the baseline methodology used in selecting the baseline scenario in B.1 and why it is applicable to the project case. A baseline methodology is a tool to identify the most likely future development out of different possible scenarios in an objective and transparent fashion (e.g. a financial analysis of different investment options). Applying the methodology determines which among these possible scenarios is the baseline scenario. If, through the use of the baseline methodology, a scenario is selected, which leads to less sequestration than the proposed project, the project can be considered additional. A baseline methodology is an application of an approach listed in paragraph 22 of UNFCCC Decision 19/CP.9 (CoP9 Milan, December 2003) available at http://cdm.unfccc.int/Reference/Documents/dec19_CP9/English/decisions_18_19_CP.9.pdf .

A bottom-up approach has been defined for the development of LULUCF baseline methodologies. Project participants may either use an approved methodology, if applicable, or propose a new methodology established in a transparent and conservative manner. In developing a new baseline methodology, the first step is to identify the most appropriate approach for the project activity and then an applicable methodology. Baseline methodologies approved by the CDM Executive Board are publicly available along with relevant guidance on the UNFCCC CDM website (http://unfccc.int/cdm).
Your description in the box must start with a choice of baseline methodology from the options listed in paragraph 22 of the CoP9 text (see link above) and justify it based on the project's circumstances, then describe the baseline scenario arrived at applying this methodology. The box should also argue that the project is additional using the tools proposed by the Executive Board (please refer to http://cdm.unfccc.int/EB/Meetings/016/eb16repan1.pdf).
Please write in the box below and use more space if necessary.

Approved methodology AR-AM0004 "Reforestation or afforestation of land currently under agricultural use" was selected as the baseline and monitoring methodology for the Los Tuxtlas project. Applicability of this methodology is discussed below.

(i) **Baseline approach**: Selected approach is fully applicable to this project.

(ii) **Project activities**: Proposed project activities consider those applicable for AR-AM0004, i.e. reforestation through tree planting (plantations for wood production and agroforestry) and assisted natural regeneration. Lands will be reforested through promotion of natural regeneration and direct planting.

(iii) **Displacement of activities**: AR-AM0004 considers that project activities can lead to a shift of pre-project activities outside the project boundary; e.g. a displacement of agriculture, grazing and fuel-wood collection activities, including charcoal production. The Los Tuxtlas project will be supported by payments for environmental services program to compensate land owners for adopting desired land uses and management practices and to avoid displacement of current activities outside project boundaries. Project implementation also considers a training, educational and technical assistance program to improve agriculture and cattle-raising outside project boundaries in order to eliminate or minimize leakage.

(iv) **Current land conditions**: Even when lands for implementing project activities are not completely degraded, current land use for agriculture or grazing are increasing land degradation due to increased erosion and compaction and productivity loss, therefore it is expected that carbon stock will decrease or remain at a low steady level.

(v) **Conditions for natural regeneration**: As considered in AR-AM0004, anthropogenic pressures inside project boundaries, i.e. land use for agriculture and cattle-raising, are not allowing natural tree vegetation to reestablish itself as forests according to the threshold values of the national definition for CDM purposes.

(see next pages)

(vi) **Site preparation**: According to AR-AM0004, soil preparation does not cause significant longer term net decreases of soil carbon stocks or increases of non-CO_2 emissions from soil.

(vii) **Soil drainage and disturbances**: As in AR-AM0004, these are expected to be insignificant, so that no CO_2 greenhouse gas emissions from this type of activities can be neglected. It is noted that neither machinery nor fire will be used for site preparation purposes.

(viii) **Selected carbon pools**: According to AR-AM00004, selected pools are above and below ground only.

(ix) **Carbon in non-selected pools**: As in AR-AM0004, carbon stocks in soil, litter and dead wood can be expected to decrease more due to soil erosion and human intervention or increase less in the absence of the project activity, relative to the project scenario.

(x) **Flooding irrigation**: As is established in AR-AM0004, flooding irrigation is not allowed.

(xi) **Use of nitrogen-fixing species**: As in AR-AM0004, amount of nitrogen-fixing species used in this project is not significant, so that gas emissions from denitrification can be neglected in estimation of actual net greenhouse removals by sinks.

(xii) **Lands for project activities**: Reforestation project activities will be implemented on lands where there are no other on-going or planned reforestation activities.

Determination of additionality

Project additionality is discussed using tool for the demonstration and assessment of additionality in A/R CDM project activities (EB21 annex 16). A stepwise procedure is followed to demonstrate that the proposed project activities are additional and not the baseline scenario.

STEP 0: Preliminary screening based on the starting date of the A/R project activity

This preliminary screening is not required, because the crediting period is not intended to start prior to registration of the project activity. The crediting period for the proposed project will start in 2008 with the start of activities.

Step 0a: Preliminary screening based on the specific features of A/R activity

Land eligibility of proposed lands as non-forest is proven applying host country's national thresholds for forest definition, as communicated by Mexico's Designated National Authority (see http://cdm.unfccc.int/DNA/ARDNA.html?CID=140).

Proposed lands for reforestation activities are currently under agricultural or grazing uses. In both cases land is prevented from reverting to forest due to ongoing human usage. Proposed lands are not in a temporarily unstocked condition as a result of human intervention, as harvesting, or natural causes, nor are covered by young natural stands or plantations which have the potential to revert to forest (i.e. to reach crown density and/or tree height thresholds) without human intervention.

Land eligibility is demonstrated by interpreted Landsat images from 1987 and 1990, 2000 and 2003 available for the project area. A preliminary spatial analysis was performed by CONAFOR to demonstrate that project areas were no-forest as of December 31, 1989.

Boundaries of potential project locations at this stage were delimited using GIS and satellite imagery; a more precise boundary delimitation process will be undertaken shortly, as an activity for preparing PDD and prior to project implementation, through a land survey and GPS. Use of GIS and ground-truth validation process will be implemented for a more precise delimitation of project boundaries.

Proposed project activities are intended to create man-made forests compliant with the host country's national thresholds for forests under the CDM.

STEP 1: Identification of alternatives to the A/R project activity consistent with current laws and regulations

Sub-step 1a: Defining alternatives to project activity

Plausible scenarios for the project area are:

a. **Status quo**: Continuation of current land uses and activities; this includes marginal agricultural uses and grazing for cattle-raising;

b. **Permanent abandonment of lands:** Project lands, currently under agriculture or grazing uses, are abandoned by landowners and due to ecological succession forest will established through natural regeneration;

c. **Reforestation activities**: Project lands are converted to man-made forests through establishment of plantations for sustainable wood production, adoption of agroforestry systems for sustainable harvests. and promoting natural regeneration through agriculture and grazing control.

Sub-step 1b. Enforcement of applicable laws and regulations

There are no legal barriers for implementing any of the options mentioned above, but without proper incentives, current land uses are expected to continue in the future.

Sub-step 1c. Selection of baseline scenario

The most likely baseline scenario is a continuation of current land uses; assumption is based on evidence, such as land use maps, aerial photography or satellite imagery, showing that agriculture and grasslands areas have been maintained or even increasing in the past decades. Agriculture and cattle-raising have been the main income sources for landowners and lack of financial resources and other appropriate incentives currently prevent landowners from adopting and/or maintaining desired forest land uses.

Land use for cattle-raising and agriculture represent the most important income source for landowners and, without proper incentives, is unlikely that abandonment of such activities or desired land-use changes will occur, especially when no revenue is expected.

Although reforestation activities could represent a profitable land use, it is not likely to occur due to a lack of financial incentives to initiate activities. Revenues from reforestation activities are expected in the mid-term, so landowners can not afford the cost associated to start implementation of reforestation activities.

Considering the most likely baseline scenario to be option (a) mentioned above, carbon stock is estimated to be maintained at the current levels. With project implementation and carrying out of reforestation activities, carbon stock is expected to increase above those in the baseline scenario due to an increment in forest biomass.

STEP 2. Investment analysis: It is not performed.

STEP 3. Barrier analysis

a. **Investment barriers**

Cattle-raising and agriculture are the two main sources of income for local communities in the project area. Agriculture is subject to climate conditions and productivity is low and, for most cases, it is undertaken for subsistence purposes (self-consumption) in order to secure food needs. Under this situation many farmers still live below the average national poverty level and therefore it is unlikely they could afford the high investment needed to establish plantations or agroforestry systems, considering that revenues from these activities will come in the mid-term (8 or more years after project beginning). In other words, there are prohibitive financial entry barriers for low income communities interested in developing a commercial forestry project in the Los Tuxtlas area.

Due to their low income levels, farmers will hardly qualify as receivers of commercial loans from banks. Even so commercial loans for reforestation activities would be small. They are subject to commercial constraints (income, assets, etc.), which are very hard to reach for farmers in the project

area. Forest activities are also considered as a high risk due to legal tenure problems, fires, drought and some other weather conditions and pests among others. Although wood products are highly demanded, recently market conditions for national wood products have become quite adverse due to an increase in imports from other tropical countries, further compounding conditions to obtain commercial loans in Mexico.

b. **Institutional barriers**

Individual farmers do not have enough capacity to successfully manage the process for investment, production and market for wood production which are very different from activities they are already familiar as cattle-raising and agriculture. Up to now, they do not have enough organizational skills or technical training to efficiently deal with the proposed project activities.

Although proposed project activities (i.e. plantation for commercial purposes, agroforestry and promoting natural regeneration) are not the "first of its kind" in Mexico and a great experience has been achieved in this matter by CONAFOR and other participants, no carbon finance projects of this kind have been prepared before and thus no project of this type is currently operational in the country.

c. **Technological barriers**

Even when local farmers own lands with tropical forests, they do not have enough skills for managing seed collection, for producing quality seedlings or for planting trees, as well as for preventing planting trees from being affected by fires, pests or grazing.

d. **Market risks**

Land owners are highly dependent on regular income streams due to their poverty level; therefore they will not be willing to participate unless an attractive income is secured, such as revenues from the sale of carbon credits or timber.

STEP 4. Impact of CDM registration

It is expected that approval and registration of the proposed project activity will remove economic and financial barriers, as well as other identified barriers, so project activities can be successfully undertaken.

Expected benefits from project implementation are:

- Removals of CO_2 from the atmosphere with a resulting sale of carbon credits; if the project is not implemented carbon stocks are expected to maintain at a low steady level due to continue use of lands for agricultural and grazing purposes.
- Training and technical assistance provided by involved institutions and NGO's will allow land owners to get knowledge and skills to efficiently perform activities for tree planting and management.
- Project implementation will allow farmers' organizations to overcome institutional barriers so they can successfully manage process for production and marketing of timber.
- Revenues from carbon credits, timber sales and payments for environmental services will remove investment barriers and increase incentives for participation.
- Enhanced institutional capacities for preparing carbon finance projects are expected, as well as for implementing and monitoring forest carbon projects.

Proposed methodology for the emission reduction component

There are no "standard" methodologies for assessing emission reduction from avoided deforestation, therefore we are proposing a methodology, largely based on ideas exposed by Pedroni (2007)[5] at Latinamerican Workshop for developing A/R CDM projects, held in Lima, Peru; proposed methodology

[5] Pedroni, L. 2006. Metodología para la deforestación evitada (ideas preliminares). Powerpoint presentation at Taller Regional Latinoamericano para la formulación de proyectos de forestación y reforestación en el marco del Mecanismo para el Desarrollo Limpio, held in Lima, Peru. March 19 to 23 2007.

also considers what is noted by Brown et al (2006)[6]. A revision of recent draft methodology for estimating reduced emissions from avoided deforestation and forest degradation prepared by Pedroni (2007)[7] for BioCarbon Fund shows that proposed approach for the Tuxtlas Project considers essential elements of referred draft methodology, although is not yet as complete as that of Pedroni's. At the end, reducing emissions component it is expected to be prepared following methodology finally adopted by BioCarbon Fund. Also, emission reduction component will be prepared under principles, criteria and procedures of the Voluntary Carbon Standard (VCS)[8] taking into consideration its most recent update, in order to issue Voluntary Carbon Units (VCUs).

It is noted that further discussion and analysis will have to be undertaken to finally agree on methodology for estimating and accounting avoided emissions from deforestation.

Project proposed approach considers 10 steps, as discussed below:

Step 1. Defining boundary of the reference region and of the project

Total extent of Los Tuxtlas region (about 155,000 hectares) were selected as a reference region for estimating land use changes and deforestation rates; an extent to of about 18,400 hectares was determined as boundary of the project for this component (see Map 2).

Step 2. Analysis of historical land-use and land-cover change (HLUC) in the reference region during the past years

Existing evidence indicates that a deforestation process is still going on. At the beginning of 70's, colonization of tropical areas of Mexico was a principal cause for deforestation; at late 70's huge areas of tropical forests were converted to agricultural and grazing land uses with government incentives such as for clearing forests and to promote cattle-raising activities. In fact, colonization of Los Tuxtlas region was based on clear cutting extensive areas for agriculture but especially for cattle-raising at expenses of tropical and temperate forests.

A study conducted by Guevara et al (2004) for the Los Tuxtlas Biosphere Reserve, estimated deforestation in the three periods of time (1972 to 1986, 1986 to 1990 and 1990 to 1993)[9]; study results showed that annual deforestation rate in Los Tuxtlas, were 1.69%, 1.11% and 9.42%, respectively (see Chart 1). Increase in the last period of time might be explained with creation of government programs (PROCAMPO) to incentive production of basic crops, such as corn.

A loss of forest area of 44.05% was estimated when analyzing deforestation for the period 1972-1993 with same data available from the above mentioned study; an average annual deforestation rate of 2.91% was estimated for the same period of time.

Recently, CONAFOR estimated deforestation for the period 1993-2002 with data available from Land Use and Vegetation maps produced by INEGI (National Institute of Statistics, Geography and Informatics) for the Los Tuxtlas Biosphere Reserve; results showed a reduction of 23.06% in forest area, with an annual deforestation rate of 2.87%, consistent with annual deforestation rate for the 1972-1993 period of time, estimated from data available of Guevara et al (2004) (see Chart 1 annex 3).

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[6] Brown, S., M. Hall, K. Andrasko, F. Ruiz, W. Marzoli, G. Guerrero, O. Masera, A. Dushku, B. DeJong, and J. Cornell, 2006. Baselines for land-use change in the tropics: application to avoided deforestation projects. Consulted at International Energy Studies web site (http://ies.lbl.gov/iespubs/61456.pdf).

[7] Pedroni, L. 2007. Draft methodology for project activities reducing emissions from deforestation and forest degradation (version 01). BioCarbon Fund.

[8] The Climate Group; IETA; WEF (2007). Voluntary Carbon Standard. Verification Protocol and Criteria. Proposed version 2. The Climate Group, International Emissions Trading Association and World Economic Forum Global Greenhouse Register. Consulted in September 2007 at Voluntary Carbon Standard web site (http://www.v-c-s.org/uploads/Voluntary_Carbon_Standard_Proposed_Version_2_final.pdf.)

[9] Guevara, S.; J. Laborde and R. Landgrave. (2004). La deforestación. In Los Tuxtlas. El paisaje de la sierra. Guevara, S.; J. Laborde and Sánchez-Ríos. Editors. Instituto de Ecología, A.C. y Unión Europea, Xalapa, Veracruz, México.

Observed changes in annual deforestation rates suggest that external factors, other than economics might affect decisions of landholders, and therefore drivers for deforestation must be carefully identified and analyzed.

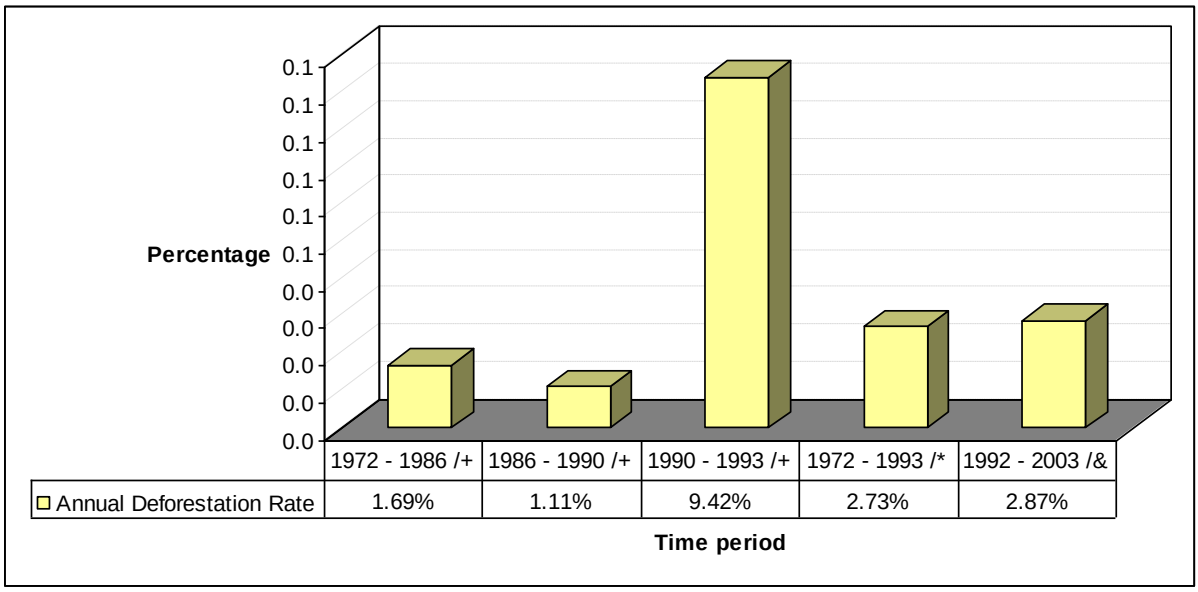


Chart 1. Changes in Los Tuxtlas' annual deforestation rates
/+ Annual deforestation rates as estimated by Guevara et al (2004)
/* Annual deforestation rate estimated by CONAFOR with data available from Guevara et al (2004)
/& Annual deforestation rate estimated by CONAFOR with land use and vegetation maps from INEGI (1993 and 2002).

Deciding what annual deforestation rate is reflecting current tendency of forest loss in Los Tuxtlas Biosphere Reserve is critical, as it has a direct impact for estimating potential emissions from deforestation; assessing impact of federal and local government policies and programs and some other factors such as growth population, cultural issues, market conditions and prices of products from agriculture and cattle will be necessary to better decide which annual deforestation rate is to be used for estimating baseline emissions from deforestation.

Step 3. Analysis of deforestation drivers (determining deforestation agents, immediate causes and underlying causes)

Main drivers for deforestation in Los Tuxtlas region are land use change for agricultural and cattle-raising purposes undertaken by farmers. Cattle-raising are the principal (and even sole) system employed by the majority of the indigenous and non-indigenous settlements in Mexico. The local agriculture based on the traditional "milpa" system with the cultivation of corn and beans and squash is widely used for subsistence and, in a small proportion, for selling purposes. In addition to the poly-cultural milpa fields, people also manage small areas with monocultures of sugarcane, orange, sesame, beans and chili. These monocultures are generally planted for selling purposes.

In the past, farmers usually cultivate areas for one to three years and then leave the land fallow for 15-20 years; increasing population pressure on the land base, has caused a shortening of the resting phase, and the slash and burn system will be modified with higher management levels, higher inputs or be replaced by a more permanent, less biodiverse system. Because of this, biodiversity rich second growth and old-growth forest ecosystems are gradually converted to less sustainable and less biodiverse agriculture or grazing systems.

Even though the impact of programs which promote agriculture and grazing uses has been decreasing, and that the promotion of sustainable forestry management has been increasing in the late years, deforestation continues.

Step 4. Selection of applicable baseline approach

Proposed methodology indicates a selection of a baseline approach is necessary.

a. **Historical baseline**. Assume that the future annual deforestation will continue at the average rate observed in the past 5 to 10 years.

b. **Reference scenario**. Deforestation is predicted using a regression model based on independent variables representing the key deforestation drivers as identified in step 3.

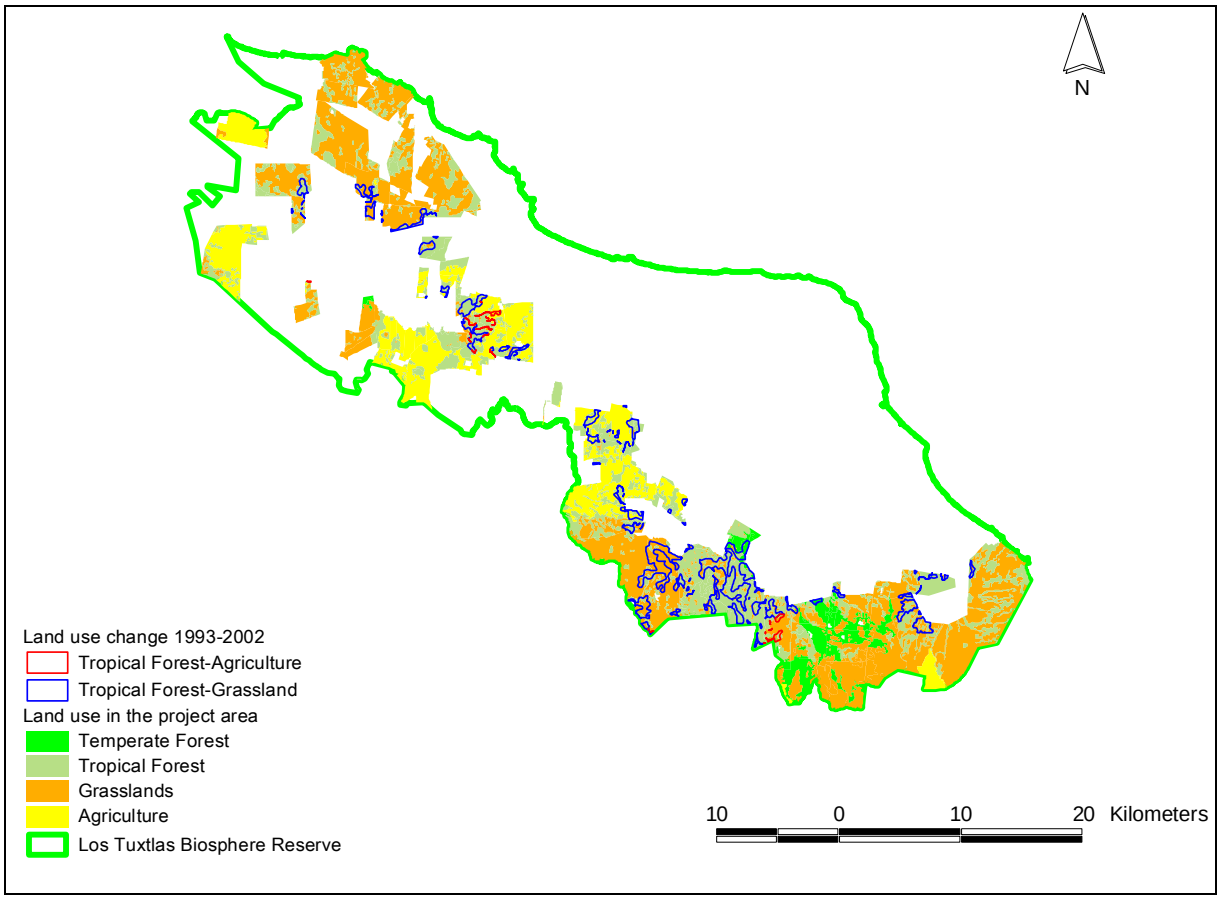
Approach (a) above was selected as applicable for this project, due to existent evidence and studies conducted about deforestation in Los Tuxtlas and lack of foreseeable changes.

Step 5. Estimation of annual deforestation rates according with selected baseline approach

For the Los Tuxtlas Biosphere Reserve, CONAFOR estimated an annual deforestation rate of 2.87% for the period of 1993 to 2002. Estimations were based on a comparative analysis of land use and vegetation cover maps generated by INEGI (National Institute for Statistics, Geography and Informatics) for 1993 (also known as Series II Land use and vegetation cover) and for 2002 (also known as Series III Land use and vegetation cover); see Map 2.

Based on the deforestation quantity that has occurred in the historical reference period, a linear extrapolation will be used to estimate deforestation quantity throughout the project life time. The linear extrapolation is intended to be conservative, based on historical data available.

A similar analysis performed for area comprised in the 63 participant ejidos only, resulted in an annual deforestation rate of 4.27%; nevertheless, annual deforestation rate of 2.87% will be used at this point to estimate emissions from deforestation in projected area.

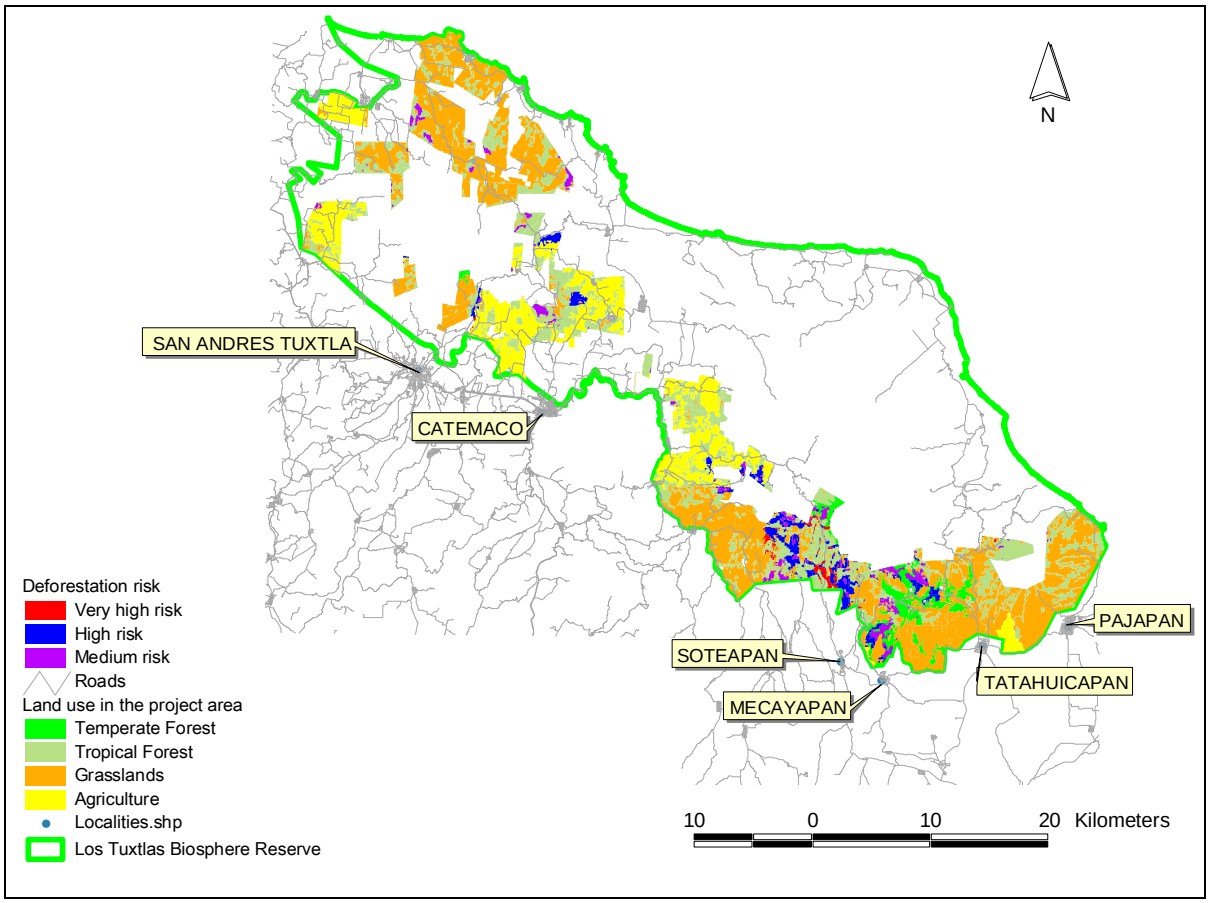


Map 2. Land use change in the project area of 1993 to 2002 in Los Tuxtlas Biosphere Reserve, CONAFOR, 2007

According with selected baseline approach for the project, future annual deforestation is assumed to continue at the compound average rate observed in 1993-2002 period (i.e. 2.87%).

Step 6. Developing spatial explicit model.

Using the Deforestation Risk Index (DRI) developed by National Institute of Ecology (INE)[10] areas likely to be deforested were identified; remaining forest was classified according to a deforestation risk (medium to very high). Topographic conditions, road access and proximity to human settlements are the main variables explaining deforestation behavior in the project area (Map 3). It is important to note that the DRI is not providing information on when deforestation will happen but it only indicates a relative risk when compared to other forest areas. Nevertheless, deforestation is expected to take place first at sites with a very high risk of deforestation; then, assuming same rate levels as for period 1993-2002 (i.e. 2.87% annual rate), it is possible to estimate how much of this area is more likely to be deforested every year. Once sites with very high risk of deforestation were cleared, sites with a high risk will be deforested and finally sites with a medium risk. In this way, we can estimate timing of deforestation assuming that very high risk areas would be cleared first than those areas with a lower deforestation risk index. Carbon stock levels will be estimated for every site taking account of its deforestation risk, vegetation type and biomass density and then to estimate reduced emissions from avoided deforestation.



Map 3. Deforestation risk index inside project's forest area of Los Tuxtlas Biosphere Reserve. CONAFOR, 2007, with information of INE and CONANP.

Step 7. Identify projected land-use and land-cover change (PLUC) according with selected baseline approach.

[10] Muñoz, C.; Alarcon, G.; Fernandez, J. (2003). Pixel patterns of Deforestation in Mexico 1993-2000 (Draft). INE Working Papers Series INE-0401. Instituto Nacional de Ecología, México.

For each project year, was identified the PLUC by selecting areas in descendent order of deforestation risk using estimated deforestation rate and DRI, to limit the amount of area likely to be deforested annually. A preliminary analysis indicates that an extent of 3,260 hectares with a very high, high or medium deforestation risk index could change to a non-forest use, i.e. agriculture or grassland.

Step 8. Stratification of project area.

Project area is stratified according to forest categories expecting to have different carbon densities. Identified areas as having very high, high or medium deforestation risk index have tropical forest; a preliminary stratification of project area considers only tropical forests. A more comprehensive stratification will be conducted to classify forest based on stand density and composition, creating categories or strata in order to estimate baseline and avoided emissions.

Step 9. Estimation of carbon baseline

Estimation of carbon baseline will be carried out through a stratified sampling of carbon densities in the areas identified with previous step, including at least all areas that would be deforested during the upcoming verification period (five years). There is a preliminary estimation of carbon stocks at baseline, based on information derived from National Forest Inventory undertaken by CONAFOR in 2005-2006 period.

Step 10. Estimation of reduced emissions

Preliminary estimations of reduced emissions for project area, are calculated as follows:

(i) Using 2007 as base year there, an initial area of 3,260 hectares is considered.

(ii) Forest area loss (column B Table 1) is calculated for 20-year period using annual deforestation rate of 2.87% as well as remaining area (column C).

(iii) Emitted carbon (column D) is estimated using weighted average of carbon stock.

(iv) Re-fixed carbon (column E) is calculated assuming a growth of carbon stocks in remaining areas

(v) Emissions (column F) are then estimated as a difference between emitted carbon an re-fixed carbon.

(vi) Accumulative carbon emissions (column G) are calculated from sum of emissions (column F)

(vii) Baseline carbon stocks (column H) are estimated from remaining area (column C) and weighted average of carbon stocks per hectare.

(viii) Project scenario (column I) is assumed to be current carbon stocks

(ix) Accumulated CO2e emissions (column J) are derived from difference of baseline and project scenario carbon stocks, and converted to CO2e using a 3.67 conversion factor.

Preliminary estimations of reduced emissions from avoided deforestation are presented in Table 1. See carbon estimates in annex archive.

Table 1. Estimation of reduced emissions from avoided deforestation in Los Tuxtlas project.

A	B	C	D	E	F	G	H	I	J
Year	Area Loss	Remaining Area	Emitted Carbon	Refixed Carbon	Emissions	Accum-C-Emissions	Baseline Without project	With Project	Accum-$C0_2$e-Emissions
2007	0.00	3,260.00	0.00	0.00	0.00	0.00	244,475.55	244,475.55	0.00
2008	93.57	3,166.43	7,017.06	935.70	6,081.35	6,081.35	238,394.20	244,475.55	22,318.57
2009	90.88	3,075.55	6,815.65	908.84	5,906.80	11,988.16	232,487.39	244,475.55	43,996.55
2010	88.28	2,987.27	6,620.02	882.76	5,737.26	17,725.42	226,750.13	244,475.55	65,052.31
2011	85.74	2,901.53	6,430.01	857.42	5,572.59	23,298.02	221,177.53	244,475.55	85,503.72
2012	83.28	2,818.25	6,245.45	832.81	5,412.64	28,710.66	215,764.89	244,475.55	105,368.12
2013	80.89	2,737.36	6,066.19	808.91	5,257.29	33,967.95	210,507.60	244,475.55	124,662.36

A	B	C	D	E	F	G	H	I	J
Year	Area Loss	Remaining Area	Emitted Carbon	Refixed Carbon	Emissions	Accum-C-Emissions	Baseline Without project	With Project	Accum-$C0_2$e-Emissions
2014	78.57	2,658.79	5,892.08	785.69	5,106.39	39,074.34	205,401.21	244,475.55	143,402.82
2015	76.31	2,582.47	5,722.96	763.14	4,959.82	44,034.16	200,441.39	244,475.55	161,605.37
2016	74.12	2,508.35	5,558.70	741.23	4,817.46	48,851.63	195,623.92	244,475.55	179,285.47
2017	72.00	2,436.35	5,399.15	719.96	4,679.19	53,530.82	190,944.73	244,475.55	196,458.10
2018	69.93	2,366.42	5,244.18	699.29	4,544.89	58,075.70	186,399.85	244,475.55	213,137.84
2019	67.92	2,298.50	5,093.66	679.22	4,414.44	62,490.14	181,985.41	244,475.55	229,338.82
2020	65.97	2,232.53	4,947.46	659.73	4,287.73	66,777.88	177,697.67	244,475.55	245,074.80
2021	64.08	2,168.45	4,805.46	640.79	4,164.66	70,942.54	173,533.01	244,475.55	260,359.12
2022	62.24	2,106.21	4,667.53	622.40	4,045.13	74,987.67	169,487.88	244,475.55	275,204.74
2023	60.45	2,045.76	4,533.56	604.53	3,929.02	78,916.69	165,558.86	244,475.55	289,624.25
2024	58.72	1,987.04	4,403.43	587.18	3,816.25	82,732.94	161,742.61	244,475.55	303,629.88
2025	57.03	1,930.01	4,277.04	570.33	3,706.71	86,439.65	158,035.90	244,475.55	317,233.52
2026	55.40	1,874.61	4,154.28	553.96	3,600.32	90,039.97	154,435.58	244,475.55	330,446.71
2027	53.81	1,820.80	4,035.04	538.06	3,496.98	93,536.96	150,938.59	244,475.55	343,280.64

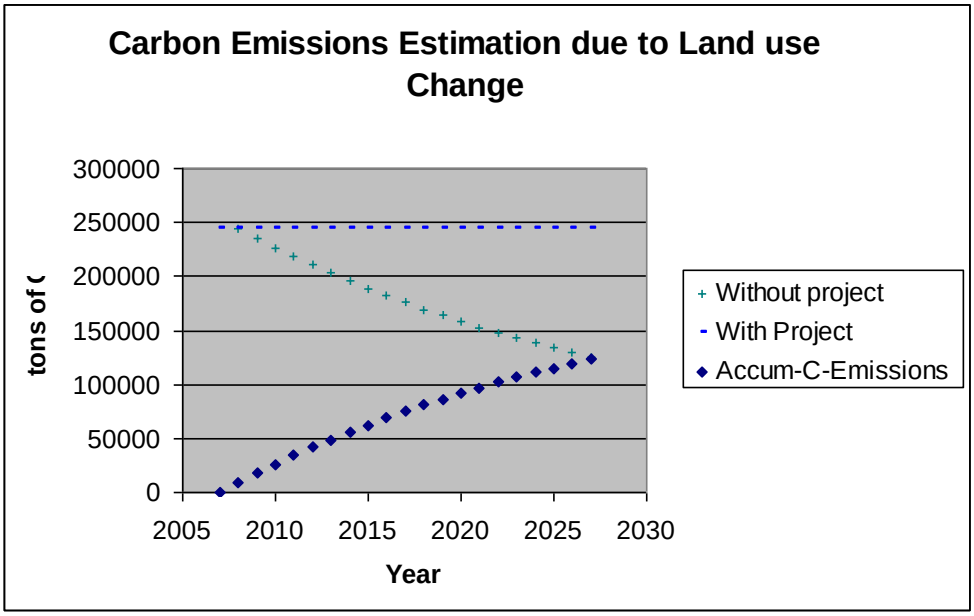


Chart 2. Carbon emissions estimation due to land use change.

Annex 4: Environmental Benefits and Risks

1. **Please identify and briefly describe the physical characteristics and major biological communities of the project area and its surrounds.**
    a. Please provide a map and/or photograph of the project site and project area, including key to land cover classes.
    b. Please note if the region, and in particular the project area, is recognized as having important habitat or biodiversity conservation values.
    c. Please note whether the region contains any threatened species *(e.g. from www.redlist.org or local lists)* and which habitats they are associated with.

Los Tuxtlas Biosphere Reserve is located in the state of Veracruz in the coastal plains of the Gulf of Mexico between 18°10' to 18°45' North and 94°42' to 95°27' West. It lies within the municipalities of Santiago Tuxtla, San Andrés Tuxtla, Catemaco, Soteapan, Mecayapan and Tatahuicapan de Juárez (Map 1). Land use in the Los Tuxtlas Biosphere is as follows (see Table 2).

Table 2. Land use in the Los Tuxtlas Biosphere Reserve

Land Use	Area (ha)	%
Mountain Cloud Forest	10,770	6.94
Mangrove	521	0.34
Savanna vegetation	75	0.05
Mountain Humid Forests	10,451	6.74
Low lands Humid Forests	504	0.32
Mid-elevation Humid Forest	19,697	12.70
Coastal dunes vegetation	237	0.15
Second Growth Mountain Cloud Forest ("Acahual de montaña")	1,006	0.65
Lowland Second Growth ("Acahual de selva")	10,651	6.87
Sugar cane	5,852	3.77
Pastures and crops	4,198	2.71
Shade coffee	102	0.07
Permanent Fruit Trees (mango, avocado, tamarindo, etc.)	9	0.01
Pasture	26,763	17.25
Pasture with isolated trees	59,976	38.67
Pine Forest	1,689	1.09
Towns and other infrastructure	1,520	0.98
Water	1,088	0.70
TOTAL	**155,109**	**100.00**

The altitudinal range is from sea level to higher altitudes; the San Martín Tuxtla volcano at 1,780 meters is the highest one. Other high volcanoes are the Santa Marta at 1,660 meters and San Martín Pajapan at 1,245 meters.

The region of Los Tuxtlas is a volcanic massif, dating back to the Tertiary period, whose still active volcanism has produced principally basalts and basaltic clays. Lava flows, volcanic ash, and other pyroclastics cover almost the entire area. Very few sedimentary, marine outcrops from the Tertiary exist in the area, and most of these are found towards the south.

The most recent lava flows filled riverbeds, forming falls and cascades, and ash deposits were distributed over the majority of the area. The volcanoes are divided into three groups: large, partially eroded stratum volcanoes; small, partially eroded cones with a shallow slope; and very recent cones, generally with steep and abrupt slopes. Seven large and partially eroded volcanoes and 300 small volcanic cones can be distinguished. To a large extent, it is primarily volcanic byproducts that condition the local relief, as lava flowed defining the structure of buildings, rivers, and cliffs; whereas ash and other pyroclastic products form the hilly areas.

In Los Tuxtlas region, mountain topography rises from an extensive plain producing a large variety of climates, elevation ranges, and typical land uses. Due to its immense ranges in elevation (from the coast to the tops of the volcanoes), the reserve is an example in Mexico where multiple forest types are contained in one region.

Los Tuxtlas has enormous biodiversity that is rivaled by few other areas in Mexico. Nine forest vegetation types have been identified. These include deciduous forests, oak forests, mangroves, savanna vegetation, high evergreen forests, evergreen lowland forests, mid-elevation semi-deciduous forests, pine forests and coastal vegetation. The region is considered a *´hotspot´*, with approximately 2,695 species of vascular plants, including 42 subspecies and 102 varieties, represented in 214 families and 6 classes of plants.

Biogeographically, the region is represented by aquatic, boreal, and endemic taxa encompassing a significant percentage of the original flora of Central and South America. Los Tuxtlas is registered as one of the five top regions for the greatest quantity of endemic trees in Mexico, with 26 of the 41 species of trees found exclusively in moist or cloud forests.

Los Tuxtlas is one of the five areas in Mexico with the highest rate of endemism, with about 10% of the trees being endemic to the region's hot humid zone. Although further research is necessary to determine the full extent of their range, current data suggests several species could be considered endemic to the reserve.

The fauna of the region is as rich as the flora; forest ecosystems have a great variety of fauna including endemic species for tropical and boreal forests. 19 out of 46 species of amphibians are protected under NOM-059-SEMARNAT-1994, one more is under special protection, and 18 are considered rare. Twenty-six species of reptiles are classified as rare, 11 are threatened, 18 are subject to special protection, and seven are critically endangered.

World Conservation Union (IUCN) reported 30 bird species classified as critically endangered and 55 as threatened. However, the Mexican NOM-059-SEMARNAT-2001, protects 164 species (55 are classified as rare, 46 are threatened, 12 are subject to special protection, and 11 are critically endangered). The king vulture *(Sarcoramphus papa),* the harpy eagle *(Harpia harpyja),* and the red macaw *(Ara macao)* are locally extinct.

Los Tuxtlas Biosphere Reserve reported a total of 139 species of mammals, representing 30% of Mexico's total; NOM-059-SEMARNAT-2001 considers 31 species located in Los Tuxtlas to be under some form of conservation, including howler monkey *(Alouatta palliata mexicana)* as endemic specie; porcupine *(Sphiggurus mexicanus),* nutria *(Lutra longicaudis),* jaguarondi *(Herpailurus yaguarondi),* and little grison *(Galictis vittata)* are classified as threatened; while spider monkey *(Ateles geoffroy),* howler monkey *(Alouatta palliata mexicana),* banded anteater *(Tamandua mexicana),* and tayra *(Eira barbara)* are critically endangered. 13 species are considered rare, including the woolly opossum *(Caluromis derbianus)* the false vampire bat *(Vampirum spectrum),* the cacomiztle raccoon *(Bassariscus sumichrasti),* and the kinkajou *(Potos flavus).* International organizations, including IUCN, report 17 species at risk. Puma *(Puma concolor)* is critically endangered, the rice rat *(Orizomys melanotis)* is classified as data deficient, the Mexican long-nosed bat *(Leptonycteris nivalis)* is considered critically endangered, the Mexican agouti *(Dasyprocta mexicana)* and the bat *(Lonchorhina aurita)* are considered threatened, and the bat *(Bauerus dubiaquercus)* and the howler monkey *(Alouatta palliata mexicana)* are considered Vulnerable.

Some of the larger mammals, including the jaguar (*Panthera onca*), the puma (*Puma concolor*), the tapir (*Tapirus bairdii*), the red brocket deer (*Mazama amaericana*), the whitelipped peccary (*Tayassu pecari*), and the west indian manatee (*Trichechus manatus*) in the Sontecomapan lake, have been locally exterminated due to illegal deforestation, uncontrolled hunting, and the illegal commerce of wild animals.

2. Please describe in more detail the specific biological communities that will be directly affected by the project.

a. Please include the relevant history of the site; *for example, time since the last major natural or human induced disturbance; the degree to which it affected the community; significant changes in management regimes etc.*

b. Please also identify any existing threats to the site; *for example, changing land use patterns, wildfires, invasive species, overgrazing etc*.

Forest plantations and reforestation by natural regeneration will be promoted only on land presently covered by pastures or under agriculture use. This area has suffered high levels of disturbance, and the main land uses are pastures for cattle and annual crops.

Nearly 90 percent of these precious forests have been eliminated over the last 30 years. If the current deforestation rate more than half of the biodiversity of this region is expected to be lost. Main drivers for deforestation in Los Tuxtlas region are land use change for agricultural and cattle-raising purposes. Existing evidence indicates that a deforestation process is still going on, although at a minor rate. At the beginning of 70's, colonization of tropical areas of Mexico was a principal cause for deforestation; at late 70's huge areas of tropical forests were converted to agricultural and grazing land uses with government incentives such as for clearing forests and to promote cattle-raising activities.

Cattle-raising is the principal (and even sole) system employed by the majority of the indigenous and non-indigenous settlements in Mexico. The local agriculture based on the traditional "milpa" system with the cultivation of corn and beans and squash is widely used for subsistence and, in a small proportion, for commercial purposes. In addition to the poly-cultural milpa fields, people also manage small areas with monocultures of sugarcane, orange, sesame, beans and chili. These monocultures are generally planted for commercial purposes. In the past, farmers usually cultivate areas for one to three years and then left the land fallow for 15-20 years; increasing population pressure on the land base has caused a shortening of the resting phase, and the slash and burn system will be modified with higher management levels, higher inputs or be replaced by a more permanent, less biodiverse system. Because of this, biodiversity rich second growth and old-growth forest ecosystems are gradually converted to less sustainable and less biodiverse agriculture systems.

A study conducted by Institute of Ecology (2004) for the Los Tuxtlas Biosphere Reserve, estimated deforestation in the three periods of time (1972 to 1986, 1986 to 1990 and 1990 to 1993)[11]; study results showed that annual deforestation rate in Los Tuxtlas, were 1.89%, 1.10% and 9.42%, respectively (see Chart 1, annex 3). Increase in the last period of time might be explained with creation of government programs (PROCAMPO) to incentive production of basic crops, such as corn.

Recently, CONAFOR estimated deforestation for the period 1993-2002 with data available from Land Use and Vegetation maps produced by INEGI (National Institute of Statistics, Geography and Informatics) for the Los Tuxtlas Biosphere Reserve; results showed a reduction of 23.06% in forest area, with an annual deforestation rate of 2.87%, consistent with annual deforestation rate for the 1972-1993 period of time, estimated from data available of Guevara et al (2004) (see Chart 1 annex 3).

Observed changes in annual deforestation rates suggest that external factors, other than economics might affect decisions of landholders, and therefore drivers for deforestation must be carefully identified and analyzed.

Despite impact of programs for agriculture and grazing uses have been decreasing and promotion of sustainable forestry management has been increasing in the late years, deforestation continues.

[11] Guevara, S.; Labore, J.; and Sánchez-Ríos, G. (2004). Los Tuxtlas. El paisaje de la sierra. Instituto de Ecología, A.C. y Unión Europea, Xalapa, Veracruz, México.

3. **Please describe the activities to be carried out as part of the project and their area extent. If the project has several activities** *(e.g. reforestation, forest protection, reduced tillage)* describe area extent and the biological communities affected by each. Mention any significant interactions between different activities *(e.g. "reforestation by selected native species (sp X, Y & Z) will occur in approximately 50 m wide strips around any patches of remnant ABC forest larger than 1 ha; or plantings will be established to minimize runoff onto gardens on steep slopes.")*

Activities to be carried out within project reforestation component will be:

a. **Plantation of high-value native species for wood production**, as primavera, cedar, mahogany or nogal, will be established in land currently under agricultural or grazing purposes. Planting density will be about 1,100 seedlings per hectare and 2 thinnings will be undertaken; rotation will be 25 years and replanting after clear cutting is also considered. Site preparation will use only man force and no fire will be used for this purpose. Sites with low slopes and mid to good productivity conditions will be used for plantations.

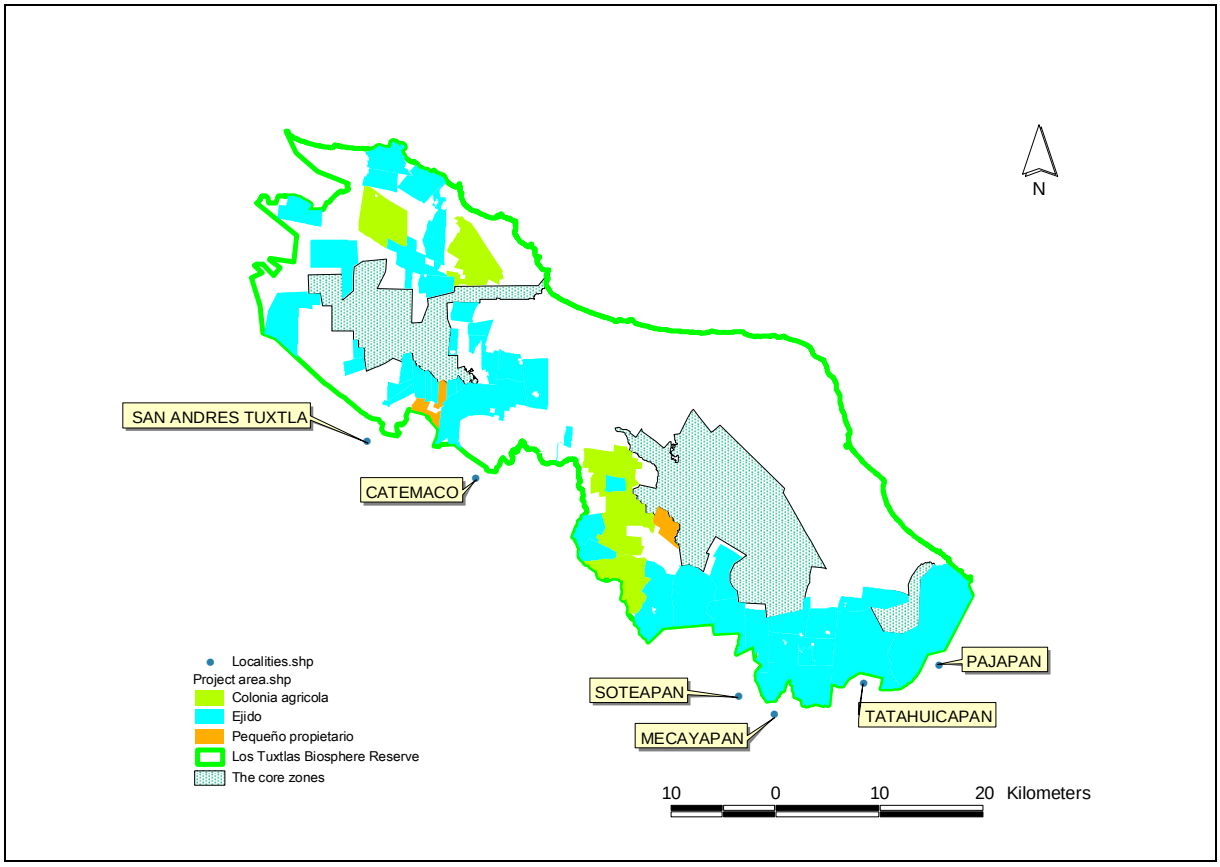
b. **Planting native species in agroforestry systems** with a density of 500 plants per hectare will be undertaken in lands under agricultural or grazing uses. Corn will be cultivated in association with trees. Rotation of 25 years is considered as well as replanting after clear cutting. Site preparation will use only man force and no fire will be used for this purpose. Sites with low slopes and mid to good productivity conditions will be used for plantations. Species considered are the same as for plantations for wood production.

c. **Promoting natural regeneration through agriculture and grazing control**; fencing of lands, activities for fire prevention and exclusion of fire in agricultural and grazing adjacent areas will be carried out to allow re-growth of trees in areas with low productivity and steep terrain.

Each activity will be carried out in land patches with an extent no less than 1.0 hectare to fulfill host country's national thresholds for definition of forest and they will exceed minimum crown density of 30%.

4. **Please identify the nature and area extent of environmental benefits due to each of the project activities**. Please make these as explicit as possible. You can cross reference material in other sections and in particular section 3. *(For example, "the buffer strips in activity 3c above are expected to greatly reduce the erosion from garden plots and extend their effective life to 6 years so halving the area that needs to be cleared"; or, "the plantings in 3b will include about 5% of species known to be food for threatened species X so extending its foraging range and connecting patches of its prime habitat")*

Project activities will be focused in 63 areas in Los Tuxtlas Biosphere Reserve, including ejidos, communities and small landowners. The core zones are well-conserved areas with an extension of 29,720 hectares, and their function is the preservation of the forest and other natural and cultural resources representative of the Los Tuxtlas Biosphere Reserve (see Map 4 and Map 5).



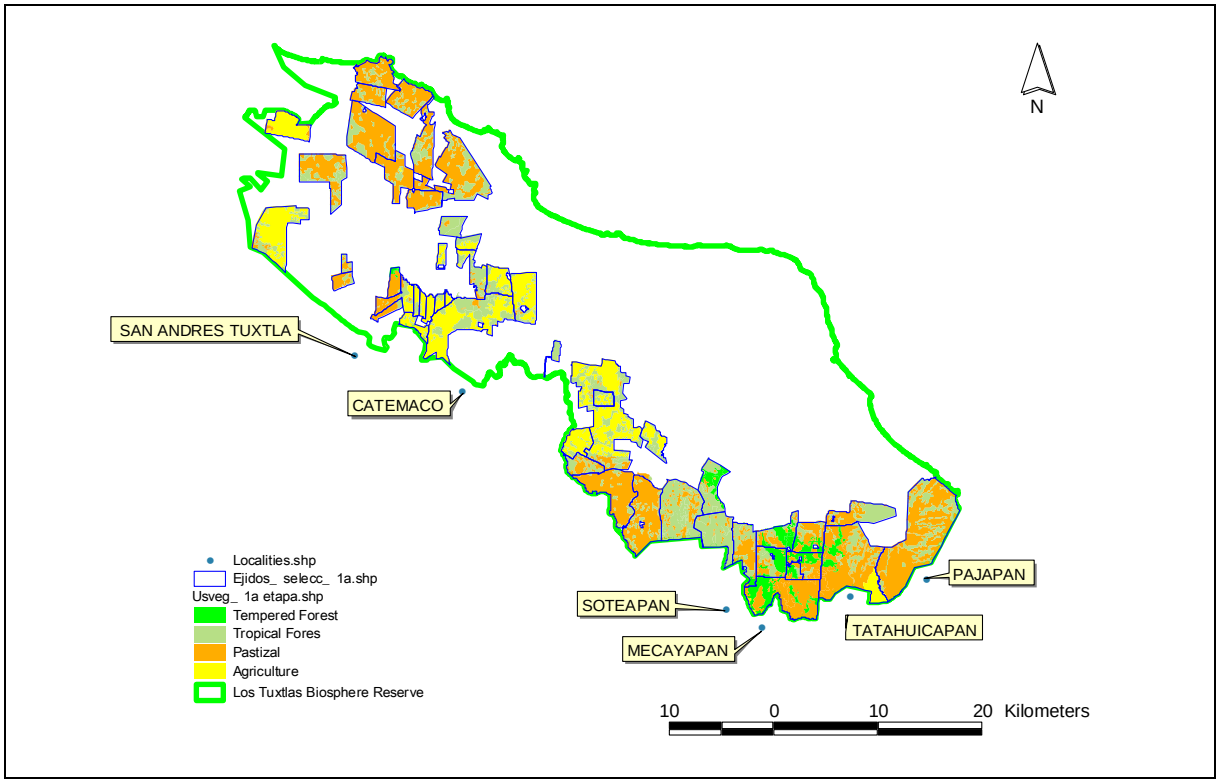
Map 4. Location of land holdings inside Los Tuxtlas Biosphere Reserve Area and nearest towns to the project areas. CONAFOR-CONANP, 2007

Table 3 shows general land uses and forest types; grasslands for cattle-raising is the greatest land use covering 44% of project area, followed by agriculture (19%), tropical forests (32%) and temperate forests (5%) (see Map 5).

Table 3. Vegetation cover and land use in the area selected for the project.

Vegetation cover or land use	Area (hectares)	Percentage
Temperate forest	2,603	5%
Tropical forest	15,876	32%
Grassland	22,066	44%
Agriculture	9,570	19%
Total	50,116	100%

Source: CONAFOR-CONANP (2007) Land use and vegetation map updated for Priority Eco-region of Los Tuxtlas, Veracruz, with SPOT satellite imagery from 2004 y 2005. From National Commission for Natural Protected Areas



Map 5. Land use of the project areas inside Los Tuxtlas Biosphere Reserve. CONAFOR-CONANP, 2007

The four forestry activities will be developed in 63 areas within the project area. These activities will create a diverse landscape in the areas to promote and enhance natural processes in the reserve, including biodiversity protection.

These activities will create a diverse landscape in the corridors that favors the maintenance of natural processes in the reserve, including biodiversity protection. The conservation and restoration of the forest will generate environmental services additional to carbon sequestration, which will benefit the communities in the project area. The goal is to develop a diverse landscape in the project area, in order to maximize social and environmental benefits. This diverse landscape will provide incomes, food security and also will benefit populations of small mammals and bird populations in the area.

Such landscape-use pattern represents an almost ideal strategy of conservation because it allows the economic success while maintaining and managing biological (and genetic) diversity. In this context, we need to learn more about different types of multi-use strategy. It requires a scientific recognition of local land use strategies, as well as an appropriate conservationist policy and, especially, a new attitude towards local traditional land uses. The creation of landscape mosaics under the multi-use strategy in areas originally covered by only one natural community (in this case tropical humid forests) is a human originated mechanism which theoretically tends to maintain (and even increase) biodiversity. In fact, several authors have stressed the importance of the models of low intensity mosaic usage of the landscape by indigenous peoples and other small-landowner populations for biodiversity conservation. It matches some conservationist theories, as for example the island archipelago approach of forest management. The promotion of diverse land uses in the project area implies that farmers will maintain good levels of incomes and food security, but also that it will favor the production of environmental services (Table 4).

Table 4. Advantages of sustainable land use production systems versus slash and burn in hillside areas

Variable	Advantages
Food security	Extends the growing season, resist dry periods, reduces soil erosion and landslides, increases yields and generates 80% of the firewood needs.
Economics	Increases incomes, reduces the use of external inputs, increases production diversification, competitive with improved grains for domestic consumption
Labor	Reduces the number of labor days, increases labor efficiency, reduces the use of herbicides
Environment	7-12% increase in water retention, recovery of wildlife, increases carbon accumulation, improves river hydrology (water quality and flow regulation)

Source: Cherret, Ian. 2002. Land use planning and sustainable rural development. Power Point presentation.

Likewise, forests and well-maintained agricultural landscapes can provide water users with high quality surface water supplies by decreasing soil erosion and the subsequent sediment load in streams (Table 5).

Table 5. Soil erosion (t/ha/year) registered in different land use agrosystems

Agrosystem	Slope (%)	Erosion (t/ha/year)
Mechanized plowing	8	41
Slash and burn	35	92
Pastures with fire	37	102
Slash and burn plus fertilizers	35	83
Conservation tillage	34	26
Shade coffee	37	39
Agroforestry	38	18
Dry Tropical Forest	30	35
Lower Mountain Humid Forest	32	22

Finally, forests and forest cover can regulate surface and groundwater flow in various ways that benefit people. For example, flooding and landslides have been widely linked to deforestation, road construction, and other forms of development. Beneficiaries of improved flow regulation include farmers, agricultural markets, landowners in flood plains, taxpayers, insurance companies, and a range of government agencies.

In order to increase biodiversity benefits and social impact it is better to have a “diverse” landscape, that is, a region with mixed land uses, such as agriculture, agroforestry, natural forest at different stages of development).

Table 6. Expected environmental benefits by proposed project activity

Promoted land uses	Environmental benefits
Reforestation by natural regeneration	Recovery of original forest composition and structure reduced soil erosion and sedimentation, including regulation of water flows
Agroforestry	Increases in water retention, recovery of wildlife, increase carbon accumulation, improvement river hydrology (water quality and flow regulation). Biodiversity recovery by creating new habitat for birds and small mammals.
Forest Plantations	*Biodiversity recovery by creating new habitat for birds and small mammals, improvement of river hydrology (water quality and flow regulation)*
Forest Conservation	*Reduced soil erosion and sedimentation, including regulation of water flows. Biodiversity protection by maintaining species habitat and seed sources for natural regeneration.*

5. **Please describe the rationale for the use of any species not native to the area. Describe the evidence you have that the introduction of such species will not present a threat** *(e.g. the species is already long-introduced in similar areas)*.

Only native species will be used in project reforestation activities.

6. Please describe the methods used to create new forests, and any evidence for the success of these methods in the project region.

a. **Reforestation component**:

(i) Forest plantations for wood production: this activity will be developed in 7,000 hectares of lands presently covered with pastures. They will be established in site with suitable soil conditions, slope lower that 30%, and good access.

(ii) Agroforestry: 4,000 hectares will be planted on lands presently used for agriculture or cattle. An integral agroforestry system that associates valuable timber species with traditional basic food crops will be used in the project. Trees could be planted in windbreaks, plantation in small blocks, plantation of trees in rows and fences, and trees mixed with crops.

(iii) Reforestation by natural regeneration: this activity will be developed in 4,000 hectares of lands presently covered by pasture, where forest plantations are not feasible, due to soil depth, slope, or access.

Three methods have been established in project area, although with a small extent; small-scale plantations for wood production has been tested and successfully established but financial requirements prevents landowners to scale up plantation activities. There is experience and training for plantation management.

Agroforestry systems have had a much smaller application than any other type of reforestation, but they have been successfully applied to the cases of coffee and camedor palm (*Chamaedor sp*).

In case of natural regeneration, ancient slash-and-burn system provides enough evidence of successful restoration of forest when slashed-and-burned areas have a fallow time enough to restore original vegetation. Success of this system will be based on an effective grazing and fire control.

b. **Forest Conservation (reducing emissions from deforestation)**

All over the world, PES schemes have been implemented for promoting desired land use or management practices in order to maintain or improve provision of environmental services such as water quality, reduced run off and biodiversity conservation, among many others. PES schemes have been recognized as an effective tool for channeling financial resources from environmental services users to forest conservation that could not be available under different circumstances. Since PES schemes are designed to compensate landowners for opportunity costs when adopting some land uses and/or management practices to achieve desired conservation goals; payments will be delivered only if such land uses or/management practices are implemented. PSAH and CABSA implementation have shown that with a set of rules and adequate training and monitoring, landowners are adopting desired management practices and land uses.

Avoided deforestation: as one of the project activities it has been proposed to conserve carbon in forest areas which would not correspond to activities compatible with reforestation/afforestation. Through the development of conservation actions in these areas several benefits would result such as an increase in forest cover by natural regeneration and the conservation of carbon which has been sequestered for decades.

For this reason, in this project it is extremely important to conserve approximately 18,400 hectares of forest, specifically an extent of 3,260 (17.7%) classified as having and index of very high, high or medium deforestation risk. This activity is proposed taking into account the Stern Report which mentions that it is necessary to consider these type of elements to reduce the risk of deforestation since forest loss contributes to global annual greenhouse gas emissions in a greater extent that the transport sector.

These areas are surrounded by agriculture and grazing lands which have meant a heavy land use change pressure on these natural spaces (Map 3).

7. Please describe the site preparation methods.

a. Include the source of any planting stock. If they are native species, describe the geographical source of the seed and steps taken to ensure that their collection did not significantly harm native populations. Will the planting stock have significant genetic variation *(e.g. collected from 50+ parent trees in surrounding forests; or clonally material taken from imported stocks)*?

b. Describe the physical methods used to plant and establish new forests, crops or regeneration in the project area. Include the need for new access roads, herbicides, etc.

Forest species for natural regeneration will be all native species; natural regeneration process will allow the recovery of the original forest type, and it will be promoted in the project hillsides areas, where there are still remaining forest patches that will function as seed sources. In the case of agroforestry the project proposes to plant trees in association with annual crops; it is also expected that 100% of these trees will native. In the case of man-made forest plantations, only native species will be used (see list in Table 7).

Table 7. List of tree species to use in plantations and agroforestry.

Tree Species	Scientific name
Cedro Rojo	*Cedrela odorata*
Roble	*Tabebuia rosea*
Primavera	*Tabebuia donell-smithii*
Caoba	*Swietenia macrophylla*
Nogal	*Juglans olanchana*

The selection of species is based in the local accumulated experience in the use of these species; they adapt well in plantations and they have good seed supply. In the case of reforestation by natural regeneration the objective is to recover high slope hillsides, if farmers leave them alone, and if they exclude the use of fire in their land management system.

Local nurseries, using selected tree sources will produce seedlings for the forest plantations. There are two main tree nurseries in the project, and the existing seedling stocks for these are:

Table 8. Seedling stock in local nurseries

Catemaco tree nursery (CONAFOR)		**El Salto de Eyipantla tree nursery (local landowners organizations)**	
Species	**Stock**	**Species**	**Stock**
Cedro rojo (Cedrela odorata)	500,000	Ceiba (*Ceiba pentandra*)	100,000
Caoba (Swietenia macrophylla)	500,000	Roble (*Tabebuia rosa*)	50,000
Primavera (Tabebuia donell-smithii)	500,000	Nogal (*Juglans ochanda*)	30,000
		Primavera (*Tabebuia donell-smithii)*	100,000

Plants from these local sources will be used for plantation for wood production and agroforestry.

In the case of reforestation by natural regeneration the project relies on the supply of seeds coming from both existing forest patches and seed-soil-bank. There are already many lots in the project area in different levels of recovery -pastures-brush land-early secondary forests that will develop in a new forest if landowners leave them alone. It is estimated that there is enough land under this condition to implement the project. Natural regeneration is frequently observed in the field. It occurs when farmers stop burning or cut clearing the natural vegetation that grows naturally in the pastures. However, farmers cyclically burn out or clear the second growth vegetation, preventing them for become in forests; project proposes to mimic this process, but allowing the complete development of a natural forest. Project activities for natural regeneration will include:

i) identification of the areas;

ii) fencing around areas to exclude cattle (if required);

iii) forest fire prevention; and

iv) sign marking the area.

Site preparation will vary depending on the proposed reforestation activity; in the case of reforestation by natural regeneration, site preparation activities will require controlling grazing through fencing in the project areas and weed control if necessary; temporal abandonment of agricultural and/or grazing areas inside area of influence have demonstrated that secondary forest type (acahual) will be expected at beginning of success process. Fire will not be used for site preparation or to promote germination of seeds.

In the case of agroforestry, site preparation will include fencing, digging holes and weed control; preparation for associated cultures will use reduced tillage options; burning will not be carried out for site preparation. Weed control will be carried out manually. In case of forest plantations, site preparation will require fencing, digging hole and weed control in sites with aggressive grasses, but probably only during the first 2-3 years.

Since areas have been used for agricultural and cattle-raising purposes, there are enough roads and no further construction will be required.

8. Please describe how the effectiveness of steps taken to address identified threats will be monitored. What procedures are in place if the safeguards prove inadequate?

The project will not generate environmental risks; on the contrary it will contribute to improve the environmental conditions of the zone.

9. Please describe how the environmental benefits from the project will be maintained and sustained after the project is completed. Who will be responsible for this?

If the project is successful then local farmers would have the incentive to keep running the carbon sequestration project. The result will be dependent upon the kind of world environmental public policies, the state of the economy, social trends, etc. However, efforts will be made to create institutional arrangements that would ensure the continuity of project benefits.

10. Please describe how environmental benefits from the project will be monitored and verified and communicated to the wider community.

The monitoring plan will include four levels of information:

- Changes in carbon stocks
- Environmental impacts
- Social impacts.

Changes in carbon stocks will be assessed using the methodology CDM-AR-AM0004

Environmental impacts will be assessed using four criteria:

a. Landscape

b. Biodiversity

c. Water

d. Soil

A set of indicators for each criterion will be selected. Some of the suggested indicators are:

a) changes in forest cover, fragmentation index, forest fragment size,

b) changes in bird and small mammal populations, changes in the number of tree species per hectare,

c) water quality, flow regulation, and

d) sediment charge in selected watersheds.

Baselines will be established using existing GIS data such as forest cover maps, high-resolution satellite imagery of the project area, and aerial photos of the region.

11. Please describe the possibility that project activities will be expanded in scale at some future date.

The National Forestry Commission (CONAFOR) will be responsible for monitoring the Project and for giving continuity to it. CONAFOR will guarantee the permanence of the stored carbon using the new PES models created with this project. The project can offer long term permanence of the carbon that will be stored in the forest generated by natural regeneration, because these forests can later apply to the CONAFOR's Payments for Environmental Services (PES) Program. Carbon stored in agroforestry and forest plantations could have permanence between 15 and 20 years. However, if market for carbon credits develops as it is expected, these forest plantations and trees in agroforestry systems can be replanted again.

The project may be expanded beyond projected area based on results and goals achieved, and replication of successful activities by other farmers is expected. Inside Los Tuxtlas Biosphere Reserve, an area of 8,000 to 12,000 hectares, with same conditions as current projected areas, could potentially be incorporated to a forestry carbon project. Enrollment of additional areas will be based on results and revenues once forestry and agroforestry systems are established in projected area. For PDD preparation, promotional efforts and outreach activities will be conducted to enroll additional areas beyond the 15,000 hectares already projected. Participating institutions and organizations are expected to gain knowledge and skills enough to manage a bigger area, while financial constrains could be tackled once new participants are getting interested.

Addendum 1. Los Tuxtlas Region list of studies and sustainable development initiatives

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Annex 5: Community Benefits and Risks

1. Please discuss the project's socioeconomic impacts on individuals, communities, and organizations.

Los Tuxtlas Biosphere Reserve was created to conserve, preserve and reach an ecological equilibrium between biodiversity and conservation over a total area of 155,122 hectares. By presidential decree the area has three core zones, which are named: San Martin, Santa Marta and Pajapan, covering a total area of 29,720 hectares. The rest of the area was classified as buffer zone of the core areas in a total of 125,401 hectares. Core areas are public lands subject to land use restrictions such as: land use change, hunting, poaching, etc. The buffer zones are private lands, and 99% of this area belongs to several "ejidos". In the buffer zones of the reserve landowners can:

- continue their production activities according to the Reserve Management Program, especially if these reduce soil erosion, and take into account land use capacity, and in general if they allow an equilibrium between conservation and production,
- build low density infrastructure compatible with the landscape and without the removal of existing vegetation,
- use agrochemical, and fertilizers according to existing public health and environmental legislation, and
- introduce exotic species if the purpose is to improve living conditions of the communities, and in accordance with the guidelines of the Reserve Management Program.

In the project nearly 4,226 farmers live in the 63 ejidos, communities and small properties located in the project area of influence (see Map 4). The project suggests a modification of existing ejidos´ land uses. In this way, communities participating in the project must learn to develop land use plans in order to optimize their use, and recognize the additional values (economic, environmental, and social) derived from the land uses promoted by the project. These externalities must be seen from three perspectives:

- The economic value of the environmental services generated when farmers decide to protect the existing forests, or when they plant new trees both in the form of forest plantations and agroforestry systems.
- The environmental and social benefits derived from the adoption of environmentally friendly land use practices.
- The optimization of the extra income generated from carbon credits in order to improve farmers' quality of life.

Project participants currently devote their land to agriculture, cattle-raising and forest harvesting. Project communication and outreach activities must show the value of the benefits, costs and risks derived from current activities and compare them with the forestry activities promoted by the project. Farmers usually take into account the needs of labor, equipment, the use of agrochemicals, climatic conditions, market conditions, and timing, when they choose the land use practices in their ejidos. Farmers will most likely do the same analysis in order to decide whether they will participate in the project or not. Thus project success will depend upon the flexibility given to farmers to decide which land they will incorporate into the project, and to compare carbon payments to an amount greater than the one they would receive from cattle-raising, giving that the project goal is to recover marginal pasture lands, and to protect the existing forests, which normally are cut down to introduce cattle.

2. Please indicate if project sites are already being used by local communities for economic or other activities, and how these activities will be affected by the project.

The main production activities in Los Tuxtlas Biosphere Reserve belong to the primary sector. These are based on the use of soil, water, and forests. Seventy eight percent of the population is dedicated to this type of production activities. The second greater segment is dedicated to tertiary activities (commerce, transport, and services), and finally the smallest segment works in third level type of activities, such as industry and agroindustry (Table 9).

The predominance of the primary production activities is stronger in the Sierra Santa Marta-Pajapan region, where the indigenous people population is greater. The cartographic analysis of the land uses in the project area of influence also shows that in this area there is more land dedicated to primary production activities.

Table 9. Type of production activities of the population in Los Tuxtlas Biosphere Reserve

Municipality	Total Population	Economically Active Population	Employed Population	Primary Production	Secondary Production	Tertiary Production
Angel R. Cabada	103	35	35	34	1	0
Catemaco	11,151	2,864	2,815	1,926	286	568
Mecayapan	2,634	728	716	628	22	60
Pajapan	38	11	11	11	0	0
San Andres Tuxtla	7,299	2,008	1,991	1,606	131	213
Santiago Tuxtla	1,528	336	335	215	35	80
Soteapan	3,307	802	799	742	12	40
Tatahuicapan de Juárez	5,600	1,297	1,272	1,107	51	98
Total	**31,660**	**8,081**	**7,974**	**6,269**	**538**	**1,059**

Source: INEGI. 2001. Primary: population dedicated to agriculture, cattle-raising, forest harvesting, hunting, and fishing. Secondary: mining, industry manufacture, oil exploration, construction, water, etc. Tertiary: commerce, transport, services, government.

Project activities do not modify directly the primary production economic activities of the people in the project area, but these will favor a better allocation of the land to different production activities. In this sense the ejidos will probably develop land use plans based on land use capacity. These land use plans will allocate marginal areas for cattle-raising into reforestation, both through natural regeneration and forest plantations. The trigger to move the reallocation of the primary production activities will be carbon payments. In this sense the forests and trees in agroforestry systems will be seen by the farmers differently: they will realize that they are able to produce new incomes to complement the traditional incomes that are not currently available under present base line conditions. Project activities are in agreement with the management plan of the Los Tuxtlas Biosphere Reserve, which indicate the following guidelines:

- Promote policies to regulate production activities and human settlements within the Reserve to maintain an adequate equilibrium between socio-economic development pressures and conservation of natural resources.
- Promote the organization of the communities in the Reserve to adopt economic activities based on the sustainable use of natural resources which will allow the improvement of the quality of life of the population.

Moreover, Operational Plan for 2001-2006 of National Commission for Natural Protected Areas (CONANP), which is the primary responsible for the management of the Reserve, indicates the need of having a solidarity, participative, and subsidiary management plan. The solidarity and participative principles focus on the production activities compatible with the objectives of the Los Tuxtlas Reserve, whereas the subsidiary principle implies the use of economic instruments to promote the incorporation of the lands to private conservation, such as the payments for environmental services.

3. **Please describe any socioeconomic development programs or studies you are aware of that have been undertaken in the project area[12], and highlight briefly any experiences/findings relevant to proposed project activities. As applicable, provide references for further information (e.g., citations, contacts).**

   A program for conservation and management was prepared for the Los Tuxtlas Biosphere Reserve (CONANP, 2004). It includes a synthesis of the studies developed for the establishment of the Reserve. Based on these studies specific economic development projects were prepared. Addendum 1 includes the list of the main studies prepared during the planning process of the Reserve.

4. **The terms "indigenous peoples," "indigenous ethnic minorities," "tribal groups," and "scheduled tribes" describe social groups with a social and cultural identity distinct from the dominant society that makes them vulnerable to being disadvantaged in the development process. Have socioeconomic survey efforts been undertaken to identify the permanent or intermittent presence of any such groups in the project area? If so, please describe the survey results.**

The Tuxtlas is a socio-cultural mosaic, where autochthonous ethnic groups with “mestizo” and “criollo” groups of different origin. Due this mosaic there is a complex mix of land use practices, production systems, tradition and religion in the Reserve. From the year 700 BC, and during 1000 years there was a predominance of Mixe-Zoques groups. The Zoques-Popolucas that now inhabit the region probably come from these groups. It is likely that these groups still maintain traditions from the Olmeca, Teotihuacana, Totonaca y Mayan. In addition to the Zoques-Popolucas, in the Tuxtlas inhabit the Nahuas. Both groups have a deep knowledge of the multipurpose use of the natural resources. However, the land use pattern has progressively changed due to economic and demographic pressures. The lost of forest to carry out other production activities is the driver in the region. As in many other countries there is a risk of lost of the traditional knowledge and the identity of the indigenous people. In this sense the project will help to stop this trend, because it will promote production alternatives compatible with the traditional knowledge of the forest resources.

Like many other farmers in the world, indigenous people in Los Tuxtlas are immersed in a double economy: they produce goods for the market and buy goods with cash while at the same time they produce basic goods for their own consumption. As a result, they are obliged to adopt a multi-use strategy of appropriation of nature, which encompasses their double role of subsistence and market producers.

Project activities, such as forest conservation, agroforestry, and reforestation, are compatible with the traditional multipurpose land use. Under indigenous rationale the Western rooted contradiction between conservation (of biodiversity) and production (for use and for exchange) tends to be reconciled through a strategy of complementary and multiple use of the natural space. Such landscape-use pattern represents a very suitable conservation strategy since it eases economic success while soundly managing natural resources. While the project site is the area in which project activities are actually taking place, the project area” might be thought as the greater area in which project activities will have a direct, foreseeable effect on the land, water, people, resources, etc. biological (and genetic) diversity. Moreover, it seems that under this indigenous strategy production efficiency and conservationist practices are two mutually dependent factors of a same purposeful action.

5. **Is the ownership of any of the areas affected by project activities disputed? Will project activities result in any resettlement of people, or, restriction of access to previously used lands? Have studies of land ownership and land use patterns in the project area been undertaken to identify these possibilities? If so, please describe efforts taken.**

The project does not consider re-location or displacement of local population. Farmers will develop the project carbon sequestration activities in their own land. There will not be land purchases in the

[12] While the project site is the area in which project activities are actually taking place, the “project area” might be thought as the greater area in which project activities will have a direct, foreseeable effect on the land, water, people, resources, etc.

project, and there will be no displacement of people, since the land included in the project is legally owned by 45 ejidos, 4 communities and 3 small properties in the project area of influence.

6. Please describe any anticipated impacts to cultural resources in the project area (e.g., social gathering areas, spiritual sites, burial grounds, etc.). Have survey efforts been undertaken to identify the presence of cultural resources in the project area? If so, describe the survey methods and results.

The region has been subject of diverse anthropologic and archaeological studies (see Addendum 1). The nature of the project will not affect the rich cultural resources in the region. There are significant examples of the long history of human settlements in the region, as the pre-Hispanic cities of Matacapan, which was built in the year 500 AC, located northeast of Catemaco City. As in many other areas in Mexico, in Los Tuxtlas the natural patrimony is closely related to the cultural values of the communities. The management plan for the Conservation and management of the Tuxtlas Biosphere reserve includes as one its objectives: "Conserve the cultural, archeological, historic resources promoting the protection of the landscape, their scenic beauty in the reserve".

No impacts are expected on the cultural resources in the project area, such as, social gathering areas, spiritual sites, burial grounds, etc. In the project area there are important archaeological sites, but it must be noted that project activities do not alter this type of cultural resources, because the project activities of reforestation (forest plantations, promotion of natural seed sources, and agroforestry), do not imply intense ground removal, since most of the tree planting and maintenance is done manually.

7. Please describe how potential participants in the project are initially identified, and the requirements for participation.

Participation will be voluntary; landowners will be encouraged to participate in project implementation; CONAFOR and CONANP has begun a process of public dissemination and communitarian assemblies to promote participation along with PES programs; a participatory approach will be used when applicable for ensure participation of landowners. The requirements for the participation of the farmers in the project are those established in the CONAFOR's Payments for Environmental Services (PES) program. These requirements are established by decree, which is published annually in the "Diario Oficial" (a federal government gazette-type publication) by CONAFOR. Landowners willing to participate will sign a PES agreement letter ("carta de adhesion") with CONAFOR. It will establish that landowners must adopt eligible land uses and management practices to receive payments. Payments will be delivered annually after a compliance monitoring process to ensure landowners have implemented land uses or management practices as established in contractual arrangement.

8. Please detail the community input process into the formulation of project goals, design, and implementation.

A regional committee for project implementation will be created will participation of the CONANP, CONAFOR, a delegate of the regional association of ejidos, and a delegate from the local NGO's existing Los Tuxtlas. This committee will help CONAFOR implement the project, by giving input about the field operation of the project. Ejidos will participate during the design and implementation of the project under a participatory approach. They will receive training to understand how carbon credits are generated, and the relationship between their production and other environmental services. Project implementation also includes training and promotion to inform people of the details of the project, including the participation of CONANP, CONAFOR and other related agencies and organizations.

A consultation process with legal representatives from ejidos inside project area, as well as representatives of local landholder's organization was performed in order to determine participating ejidos and to identify eligible areas and reforestation activities. This process was conducted by CONAFOR and CONANP with participation of local institutions and authorities. Until now, ejidatarios and other landholders inside project area have been very responsive and they are willing to participate; nevertheless they have pointed out that technical and organizational assistance, as well as financial support, will be required for a successful project implementation.

A more comprehensive and participatory consultation has begun to identify specific sites and define specific activities to be carried out, as well as suitable organization for project implementation. A participatory approach will be used for purpose of monitoring and dissemination of results; farmers,

landholder's organization and local professional will be supported to strengthen their technical and organizational capacities.

Recently, CONAFOR along with CONANP and local institutions and authorities have been promoting outreach activities in order to explain global environment benefits of the project as well as expected social and economic benefits for participating landholders. As a result of these activities, extensive media coverage of the project has been carried out to disseminate associated environmental and social benefits and to attract new participants supporting project implementation as well as potential carbon buyers (see annex files with media coverage). Outreach activities will be conducted on a regular basis as a part of CONAFOR and CONANP's institutional policy for public dissemination of results and achievements of this project.

9. Please discuss the potential negative social impacts community members may incur due to the project, including: legal liability, economic risk, and health and safety. How will these risks be managed and minimized? Describe the content and presentation of consultations that have or will be made to the community to assist them in understanding and evaluating the issues of hosting the project.

Negative impacts of the project may come from failures in the project design and implementation associated to:

- Deficiencies in the administration of the funds that would prevent timely and correctly payments from carbon production;
- Social mistrust due to past experiences with government projects;
- Inappropriate distribution of the funds within the ejidos;
- Lack of commitment from governmental agencies with the project due to low knowledge of objectives of the project or poor understanding of how to implement it; and
- Low farmer participation due to level and yearly distribution of the payments

To prevent and control adverse social impacts during project implementation, a risk management plan will be developed. This plan will consider:

a. identification and classification of the risks;

b. identification of sources of risk,

c. identification of alternatives to correct and mitigate the risk, and

d. implementation of corrective measures.

10. Please discuss what procedures, if any, are in place to determine informed consent.

The procedure to ensure informed consent inside communities will be undertaken through community meetings known as participative assemblies (asambleas participativas). Mexican legislation establishes specific rules and procedures to ensure participation of "ejidatarios" or "comuneros" in community assemblies in order to ensure informed decision-making processes.

11. Please provide an estimate of the total project budget, and estimate the percentage of the total project budget that will be spent in the project area[13]. Please also provide some indication as to how local investment decisions will be made and by whom, any concerns associated with this process, and how these are being mitigated.

The total project budget is US$ 39.55 million. This budget is composed of the following items: Preparation costs[14] US$ 0.16 million; Establishment costs[15] US$ 6.32 million; Operating costs[16] US$

[13] Local budget expenditures could include, e.g., wages for local personnel, infrastructure, training, supplies, food, equipment, investment in local institutions, etc. The total project budget should include *all* of the costs associated with planning, implementing, managing and monitoring the project.
[14] Baseline Study, Monitoring Plan, Due diligence by WB / CF Unit.
[15] Site and soil preparation, seedlings, planting, weeding until planting is completed.
[16] From planting onwards and for the duration of the project.

32.93 million; and Others[17] US$ 0.14 million. Approximately 99% of the total project budget will be spent in the project area[18].

Landowners/project beneficiaries will provide the labor input during the project establishment stage. During this stage they will also provide approximately US$2 million over a 5 year period (from 2008-2012), which will be income obtained from their participation in the PES program. Thus, landowners will develop the activities needed for each land use promoted in the project areas during the initial stage of the project (such as, seedling, area fencing, tree planting, etc). It is expected that most landowners will perform these activities by themselves or with the assistance of family members, but others may contract labor to help them in these activities. Investment decisions will made by landowners (which should be compatible with the PES program agreement letter); in this sense, farmers are free to take their own decisions, as long as they comply with the PES agreement letter. More details of the operation of the PES program may be found at www.conafor.gob.mx).

12. Please describe the extent to which the project will generate local employment (e.g., number of people, people/days, etc.), including a discussion of what labor practices will be used. Include a more specific discussion of the employment generated for marginalized groups in the community (e.g., indigenous people, low-income groups, youth, women), and the extent to which local community members will be in management and other upper-level positions. Contrast employment and wages under the project with other typical labor opportunities in the region.

The population of the area was estimated in 31,660 people in 2001, and there are 385 communities in the project area. Their main economic activities are based on agriculture and cattle-raising. The project will incorporate carbon as a new product in the farmers' economy, in order to diversify their sources of incomes. The agroforestry activities will alleviate poverty through improved crop productivity and development of alternative crops.

The project incorporates activities that energize the local economy, generating incomes from ESP payments, and employment. All the carbon incomes will be invested in the project area in the form of payments to the farmers for the environmental services produced by them. Reforestation and agroforestry activities will require labor that is normally supplied by the farmer and his or her family. The estimates of labor requirements for agroforestry activities depend of the type. For example, for windbreaks, it is 30.8, 7.8, and 8.7 (day persons/year) for the first, second, and third year respectively, for planting trees in fences it is 28.9, 6.7, and 7.2 (day persons/year), and for tree mixed with crops it is 6.2, 1.5, and 0.5 (persons/year). Labor requirements for forest plantation are higher: 24.3, 15.3, 15.4, 11.0, 6.9, and 5.5 (day persons/year/ha) for the first, second, third, fourth, fifth and sixth year respectively. The estimation of labor force for reforestation by natural regeneration is estimated in 10 to 12 day persons per year/ha. Due to the size of the farmer lands, and the diversity of landowners that will participate in the project, the risk of immigration into the project area is low.

13. How will benefits be distributed amongst and within the communities? Do you anticipate any real or perceived inequalities? How will inequalities or related grievances be handled?

The project will be implemented using Payment for Environmental Services (PES) program managed by CONAFOR. The rules for implementing the PES program are published annually in the "Diario Oficial", and they included the definition of eligible zones, operation rules, characteristics of the farmers, and monitoring and evaluation. Considering that the project includes the participation of 52 ejidos, communities and small properties and those forest plantations, agroforestry, and promotion of natural regeneration activities will be developed by themselves, and in their own lands, no inequalities are anticipated. The benefits of the project will be widely distributed among at least 4,226 farmers, and their communities, creating equal labor opportunities in the communities were farmers live.

[17] Validation, Annual verification.

[18] Assuming that only Administration and Carbon costs (Baseline Study, Monitoring Plan, Validation Due diligence by WB / CF Unit, Annual Verification) will be spent outside of the Project area.

14. Please describe how the community benefits will be maintained and sustained after the project is completed. Who will be responsible for this? How will it be verified?

The project will be implemented through CONAFOR's PES program and operation rules. A regional committee for project implementation will be created, that will include a delegate from the CONANP, CONAFOR, a delegate of the regional association of ejidos, and a delegate from the local NGO's existing in Los Tuxtlas. This committee will help CONAFOR to implement the project, by giving inputs about the field operation of the project. This committee will also establish the mechanisms to monitor the environmental and social impacts of project, and will provide CONAFOR recommendations to improve the implementation of the project.

15. Please describe any plans to periodically measure, verify, and adaptively manage socioeconomic project impacts. Will affected communities be engaged in determining these indicators and in implementing the monitoring and adaptive management plan? If so, describe this involvement.

Project impacts will be measured by CONAFOR, which will contract periodical technical and social evaluations for the operation of the project. The results of the evaluations are public, and if there were any community affected, it will able to provide inputs for the design of alternative measures to correct the implementation of the project. However, given the wide participation of farmers in the project, and that it will be implemented through the payments for environmental services (ESP) program, we do not anticipate negative socio- economic impacts. The monitoring plan of social impacts will consider the evaluation of socio-economic indicators, including:

- Annual income of farmers participating in the project (Conservation, agroforestry, and reforestation) and for those that are not participating in the project.
- Financial analysis for each forestry activity and different farmer types
- Farmers´ perception regarding the benefits of the project

The results of this annual evaluation will help CONAFOR to perform adjustments to the ESP program to maximize the production of carbon credits, social benefits, and the participation of farmers in the project. These adjustments may be: level of the payments to the farmers, distribution of the payments, types and term of the ESP agreement letters.

An adaptive management strategy will be implemented for preventing potential project problems. The main potential problems for the project are:

1. May not be enough "ejidatarios" willing to participate in the project,
2. One or more selected species do not grow as expected in some specific sites,
3. Landowners establish the plantations but they do not provide adequate maintenance.

In the first case, the project design includes promotion and dissemination activities. However, if there is not enough participation, it is possible to extend the scope of the project to include other farmers of the region, or to adjust the level of payments to meet farmer's needs using CONAFOR budget. In the second case, it is possible to use other species. Finally, if farmers are not willing to provide an adequate management of the forest plantations, it is possible that they do not produce the expected carbon offsets, and wood products of high quality. To prevent this potential problem, the project must implement from the beginning a training program for the farmers, and the development of mechanism to link the incomes from carbon credits to adequate and timely application of forest management practices. A second alternative is to establish a reserve of carbon credits in order to cover any potential problem in the implementation of the project.

16. **Please describe the kind of training of community members undertaken by the project, and how this training relates to the capacity and opportunity of community members to actively design, implement, and monitor specified project activities. Contrast the range of human resources needed for the project with the range of training being offered to community members.**

CONAFOR and the "ejidos" have internal training programs. Through these the project will provide training to farmers. The training program includes two themes: forestry technical training, and administration and organization. A specific training program and calendar will be designed in accordance with the local population training needs.

17. **Please describe outreach activities, including efforts to advertise and share information about the project with communities beyond the project area. Describe how the project intends to communicate its results with other parties.**

An outreach strategy will include activities to advertise and share information to provide information about the project in the Los Tuxtlas Reserve and in other communities in Mexico. The material will be shared with the public through CONAFOR website. In addition, CONAFOR through its frequent publications will make certain that communities beyond the project area are informed about the advances of the project, and the potential of the carbon forestry projects. The communication plan would include information about:

- Operation rules designed for to the PES program in Los Tuxtlas,
- Project implementation results,
- Project environmental impacts in biodiversity protection, carbon capture, protection of water resources,
- Project social impacts giving emphasis to reduction of poverty, participation of groups in disadvantage, women participation, and community perception about the project.

The project can be expanded in the same area and replicated in many tropical areas, in Asia and Africa, but also in the within the tropical regions of Mexico and Central America, that have similar environmental, and socio-economic characteristics.

18. **Please describe scientific experiments being undertaken as part of the project activities, if any. What questions are being addressed? What is the experimental design? Who will benefit from the activity and how will the results be made accessible?**

    There are no scientific experiments being undertaken as part of the project.

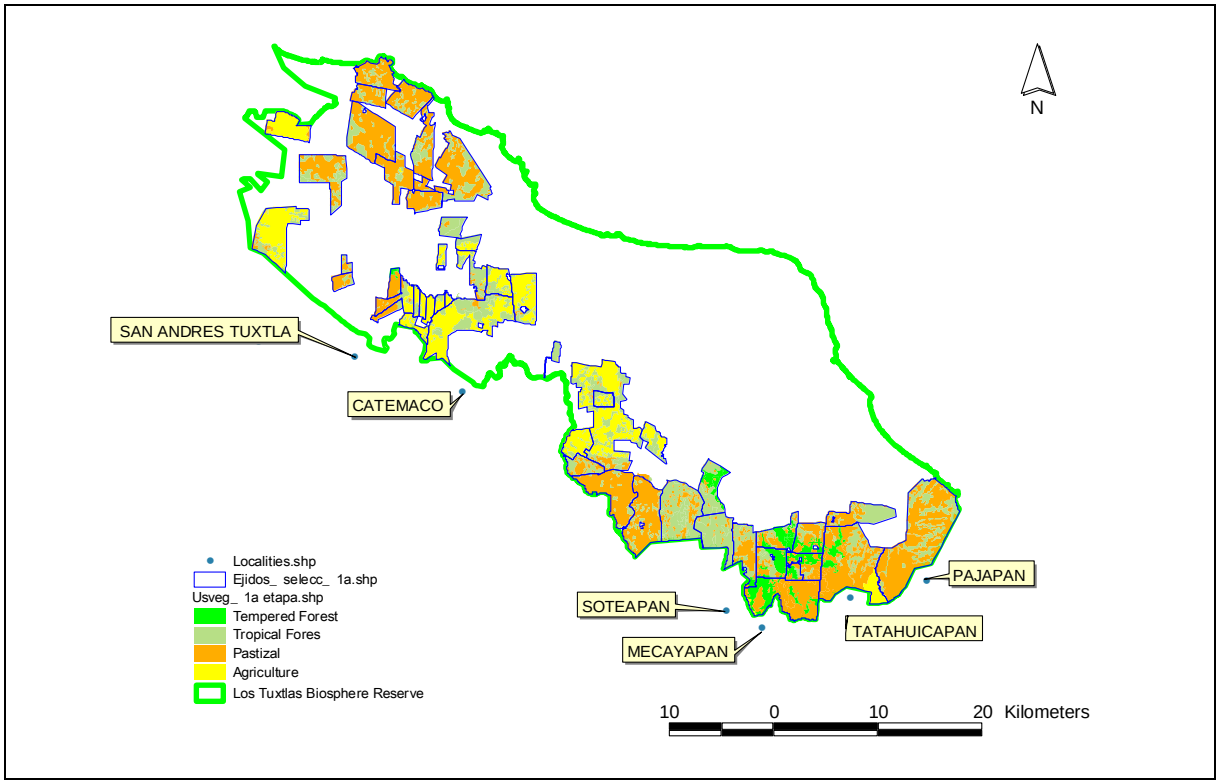
Annex 6: Detailed List of Project Sites

Please provide detailed list of sites (where applicable, i.e. for projects with multiple sites)

No.	Name	Municipality	Area (hectares)				
			Agricultural land	Grassland	Temperate forest	Tropical forest	Total
1	0150 (Col. Huatusco)	San Andres Tuxtla	0.00	1,486.97	0.00	417.47	1,904.43
2	A.Ruiz Cortinez Col.	San Andres Tuxtla	0.00	1,387.63	0.00	659.38	2,047.02
3	A.Ruiz Cortinez EJ.	San Andres Tuxtla	122.35	0.99	0.00	60.55	183.89
4	Amayaga	Catemaco	9.96	3.75	0.00	140.42	154.13
5	Amp. Ej. Caleria	San Andres Tuxtla	199.41	0.00	0.00	2.72	202.13
6	Amp. Ej. Sihuapan	San Andres Tuxtla	65.49	0.01	0.00	15.92	81.43
7	Arroyo Texizapan	Tatahuicapan	0.00	81.61	119.03	30.81	231.46
8	Belem Chico	San Andres Tuxtla	151.56	273.63	0.00	166.89	592.08
9	Belen Grande	San Andres Tuxtla	0.00	167.33	0.00	39.14	206.47
10	Benigno Mendoza Ventura	Tatahuicapan	0.00	433.79	1.08	601.74	1,036.61
11	Benito Juarez	Catemaco	13.18	229.70	0.00	287.15	530.04
12	Buena Vista	Soteapan	0.00	1,536.68	0.00	319.57	1,856.25
13	Col. Adalberto Tejeda	Catemaco	2,194.36	211.97	0.00	1,420.59	3,826.91
14	Col. Loma Linda 2a. Sección	Catemaco	0.00	0.00	0.00	0.01	0.01
15	Col. Salvador Diaz M. (p.p.)	San Andres Tuxtla	0.00	0.00	0.00	0.00	0.00
16	Coyame (San Rafael)	Catemaco	0.00	0.00	0.00	0.00	0.00
17	Cuetzalapa	Catemaco	511.28	0.00	0.00	107.81	619.08
18	Dos Amates	Catemaco	776.28	26.08	0.00	230.35	1,032.71
19	Ej, La Victoria	San Andres Tuxtla	724.59	69.61	0.00	0.97	795.17
20	Ej. Arroyo de Liza Roca P.	San Andres Tuxtla	0.00	719.48	0.00	127.44	846.92
21	Ej. Barrio Lerdo de Tejada	San Andres Tuxtla	0.00	227.06	57.90	7.76	292.72
22	Ej. Cuauhtemoc	San Andres Tuxtla	133.79	81.54	0.00	418.54	633.87
23	Ej. Cuestalapa (Cuesta G.)	Catemaco	0.00	0.00	0.00	0.00	0.00
24	Ej. El Diamante	San Andres Tuxtla	7.92	714.99	0.00	165.57	888.47
25	Ej. Gustavo Díaz Ordaz	Catemaco	122.74	0.00	0.00	157.74	280.48
26	Ej. Lazaro Cárdenas	San Andres Tuxtla	0.00	0.00	0.00	0.01	0.01
27	Ej. Lic. Mario Souza	Catemaco	345.54	12.56	0.00	236.71	594.80
28	Ej. Los Manantiales	San Andres Tuxtla	0.00	422.68	0.00	123.74	546.42
29	Ej. Los Organos	San Andres Tuxtla	0.00	658.91	0.00	344.23	1,003.14
30	Ej. Miguel Hgo. y Costilla	San Andres Tuxtla	0.00	515.82	0.00	82.19	598.01
31	Ej. Montepio	San Andres Tuxtla	0.00	729.36	0.00	162.78	892.14
32	Ej. Perla de San Martin	Catemaco	0.00	27.17	0.00	390.33	417.50
33	Ej. Tepancan	San Andres Tuxtla	0.00	197.58	0.00	57.80	255.38
34	Ej. Ursulo Galvan	San Andres Tuxtla	0.00	155.22	0.00	16.10	171.32
35	Ejido Catemaco P11	Catemaco	1,560.03	0.00	0.00	0.00	1,560.03
36	Ejido Catemaco P12	Catemaco	0.00	64.69	0.00	0.00	64.69
37	Ejido Catemaco P13	Catemaco	0.00	0.00	0.00	1,055.26	1,055.26
38	El Bastonal (p.p.)	Catemaco	266.46	1.30	0.00	248.05	515.81
39	Emiliano Zapata Otapan	San Andres Tuxtla	114.21	0.85	0.00	41.91	156.96
40	Encino Amarillo	Mecayapan	0.00	411.57	227.24	165.57	804.38
41	Enrique Colonna	San Andres Tuxtla	124.54	0.50	0.00	33.04	158.08
42	José María Morelos	San Andres Tuxtla	6.69	66.65	0.00	59.23	132.57

No.	Name	Municipality	Area (hectares)				
			Agricultural land	Grassland	Temperate forest	Tropical forest	Total
43	La Magdalena	Soteapan	0.00	1,478.06	0.00	152.05	1,630.11
44	Mecayapan	Mecayapan	39.39	1,505.12	600.80	10.71	2,156.01
45	Metacapa	San Andres Tuxtla	92.03	0.00	0.00	47.65	139.68
46	Ocotal Chico	Soteapan	0.00	465.49	52.16	513.96	1,031.60
47	Ocotal Grande	Soteapan	0.00	273.54	337.22	205.76	816.51
48	Ocotal Texizapan	Tatahuicapan	0.00	330.54	255.95	52.61	639.11
49	Ocozotepec	Soteapan	0.00	431.30	0.00	1,570.72	2,002.02
50	Pajapan RTBC	Pajapan	14.36	3,168.22	0.00	1,231.13	4,413.70
51	Perla de San Martín P.1	San Andres Tuxtla	0.47	0.00	0.00	0.00	0.47
52	Perla de San Martín P.2	San Andres Tuxtla	0.00	0.00	0.00	1.63	1.63
53	Plan Agrario	Mecayapan	0.00	232.01	366.15	218.85	817.01
54	Primero de Mayo	San Andres Tuxtla	0.00	883.68	0.00	591.85	1,475.53
55	San Fernando	Soteapan	0.00	71.57	0.32	1,056.50	1,128.39
56	San Martin	Soteapan	0.00	40.66	0.00	9.67	50.34
57	Santa Rosa Abata	San Andres Tuxtla	248.33	0.00	0.00	56.73	305.07
58	Santiago Tuxtla	Santiago Tuxtla	1,260.67	72.64	0.00	394.99	1,728.30
59	Sierra de Santa Marta	Soteapan	0.00	50.65	317.51	580.81	948.96
60	Tatahuicapan	Tatahuicapan	350.22	2,136.63	268.10	615.75	3,370.70
61	Tebanca ej.	Catemaco	109.93	5.64	0.00	160.52	276.09
62	Tepancan	San Andres Tuxtla	4.26	0.00	0.00	9.34	13.60
63	Z.U. (Costa de Oro) P.P.	San Andres Tuxtla	0.00	2.59	0.00	0.00	2.59
	Total		**9,570.01**	**22,066.01**	**2,603.46**	**15,876.71**	**50,116.19**

Municipality	Area (hectares)				
	Agricultural land	Grassland	Temperate forest	Tropical forest	Total
Catemaco	5,909.76	582.85	0.00	4,434.92	10,927.53
Mecayapan	39.39	2,148.69	1,194.19	395.13	3,777.40
Pajapan	14.36	3,168.22	0.00	1,231.13	4,413.70
San Andres Tuxtla	1,995.62	8,763.10	57.90	3,710.58	14,527.20
Santiago Tuxtla	1,260.67	72.64	0.00	394.99	1,728.30
Soteapan	0.00	4,347.94	707.20	4,409.04	9,464.18
Tatahuicapan	350.22	2,982.58	644.17	1,300.91	5,277.87
Total	**9,570.01**	**22,066.01**	**2,603.46**	**15,876.71**	**50,116.19**



Map 6. Land use of the Project in Los Tuxtlas Biosphere Reserve and selected sites for project implementation. CONAFOR-CONANP, 2007

Annex 7: Carbon Ownership

The BioCF must ensure the ownership of carbon sequestered can be identified and effectively assigned to the Fund. In most countries, legislation specifically addressing ownership of sequestered carbon has not been introduced. The BioCF must therefore work within existing legal frameworks and may need to supplement any deficiencies through government and community consultation, land tenure arrangements, legal due diligence and risk mitigation techniques. Please fill out the questions below.

Property Law Issues

Rights and interests in the land where the project is located will have significant impact on the project. In particular, the land on which carbon sinks projects are developed and the degree to which it can be encumbered by property based instruments will impact both the ownership of carbon and risks associated with the permanence of the sequestration.

It is critical to ascertain all relevant interests in the land, both formally registered legal rights, encumbrances and interests, in addition to any customary or traditional uses of the land. In many developing countries where sink projects are being developed, land property systems can be extremely complex or non-existent and often there are no formal recordings of land ownership and no legislative arrangements under which non-land owners use land. Commonly developing country property systems rely heavily on long term leases of land, and therefore it will be imperative to ensure that the lease does not expire within the time frame of the project.

As sink projects rely on maintaining the carbon sequestered, it will also be critical that the Seller or project entity has continued access and monitoring rights in relation to the maintenance of any forestry rights.

1. **Is the project based on one block of land or several blocks of land?**

   Project will involve 63 ejidos, communities and small properties in Los Tuxtlas (see Map 4)

2. **Who has legal title to the land?**

   Every “ejido” in the project area has the legal title to its land; recently “ejidos” and “comunidades” have been incorporated to a Federal Program for Regularization of Land Tenure (PROCEDE); this program included legal recognition of boundaries and, if existing, solving land tenure conflicts between neighbors. Results were discussed and approved in a general meeting of "ejidatarios" or “comuneros” (people with a legal right inside “ejidos” or “comunidades”), and registered in a Nacional Agrarian Registry (RAN). PROCEDE took place in every “ejido” or “comunidad” at different dates. Nevertheless, before PROCEDE were in place, a presidential decree supported legal tenure of “ejidos” and “comunidades”.

3. **What sort of legal title to the land do they have? E.g. absolute ownership, a lease, some other type of right or title?**

   A presidential decree was the original legal title to the land. Incorporation of ejidos to PROCEDE, gives them new legal titles of their land, approved by “ejidatarios” and results are registered in a National Agrarian Registry. Every ejido has absolute ownership of common use lands, such as forests. It means, there are no individual rights over forest and other common lands (as water, for example); only land dedicated to agriculture or urban uses is owned by individuals; in this case, individuals have a title for their land.

4. **Who has current tenure of the land?**

   Every ejido has current tenure of common lands (forest included); agricultural lands are owned individually.

5. **Are there any additional rights or interests in the land?**

   NO

6. **Does any third party hold security over the land? (i.e.: a bank or other lender such as a micro-finance facility).**

   NO

7. **If so, is consent of the third party security holder required to carry out sequestration activities?**

   It does not apply. There is no third party security holder.

8. **Does the security holder have any entitlement (such as "step in" or "resumptions rights") that may interfere with the carbon sequestration activity?**

   It does not apply. There is no third party security holder.

9. **If interest in the land is contracted by virtue of a leasing arrangement, what are the terms of the lease, in particular when does the lease formally expire and what are the terms of renewal?**

   It does not apply. Leasing of land has not been identified in project area

10. **Are there any indigenous claims on the land?**

    NO. PROCEDE program has assured the solution to any land tenure conflict or dispute, including indigenous claim of land, when they existed.

11. **Who is currently using the land? (this may be occurring separate from any legal right)**

    "Ejidatarios" or farmers are currently using the land, but has been identified some non-ejidatarios (people living inside ejidos without any legal right) using some lands for agriculture; most of the time this situation has been approved in "ejidatarios meetings", allowing creation of some "rights" on land use, but without providing legal property rights.

12. **Is the project land subject to any land-use plans or zone that restrict the capacity of any entity involved in the project in the manner in which it utilizes the land?**

    Ejidos are close to Los Tuxtlas' Biosphere Reserve (RBLT), but project land is not included in the core zone of this protected area. A RBLT's program for conservation and management is been developed by the National Commission of Natural Protected Areas (CONANP). The project area is included in areas where traditional uses (recollection, for example), sustainable management (tree harvesting included) and agroecosystem sustainable management are allowed. Proposed activities in the project are consistent with Management and Conservation Program of RBLT.

13. **How is title to land evidenced?**

    Every ejido has its legal documents compiled in a "basic file"; it includes documents as a presidential decree, boundary delimitation acts and map(s) endorsing legal property of land. Recently, most of the ejidos have been incorporated to PROCEDE program, to update boundaries and maps and to include new members of ejidos. This program seeks to solve, if existed, any land tenure conflict or claim of land. Results of this program are presented, discussed and, if is the case, approved in a general meeting of "ejidatarios". Once these results are approved, the agreement minute of this general meeting of ejidatarios is registered in a National Agrarian Registry and a new "basic folder" is compiled.

14. **How is title to land transferred?**

    Common lands in ejidos cannot be sold or transferred, this include forestlands. Common lands are property of "ejidatarios", not individually but in a common way. Only agriculture or urban lands inside the "ejido" can be sold or transferred, but only if PROCEDE program has been instrumented. These lands can be sold or transferred as a private property.

15. **Under what circumstances can the Host Country alter, seize or repossess land or land rights?**

    Government can only alter, seize or repossess land or land rights by an expropriation decree. It means, government has to pay for expropriated lands.

<u>Legal Nature of the Carbon</u>

International rules are silent on who has the right to sequestered carbon and currently it is left to the host country to determine who has the rights to carbon in forest sinks. At present, many countries have yet to address the legal status of carbon as a valuable asset and the issue is yet to be conclusively resolved at law.

Carbon stored in forest sinks may be considered a "natural resource" and therefore property of the government. For instance, the New Zealand government has claimed ownership of all carbon stored in existing plantations, and in Zimbabwe a number of planned CDM projects (sugar mills) have been nationalised by the government. In other, jurisdictions, the carbon may be considered a part of the tree and therefore the property of the person who owns or is entitled to harvest and sell the trees. If a government was to nationalize carbon, there may be legal avenues in some jurisdictions to claim compensation on the basis of compulsory acquisition of private property. However, this is something that is required to be assessed on a jurisdictional specific basis, and may vary even according to the state or province.

16. **Is there any government policy/legislation on the legal status of carbon as a natural resource?**

    YES. Although, current environmental, forest and natural resources legislation recognizes carbon sequestration of forest ecosystems as an environmental service of forest, not as a natural resource by itself. Applicable laws are:

    a) General Sustainable Forest Law.

    b) General Ecologic and Environment Protection Law.

    CONAFOR's Strategic Forest Program 2025 and National Forest Program 2001-2006 establish recognition of environmental services of forests, carbon sequestration included, and strategic policies for developing projects for carbon sequestration and market promotion. Recently CONAFOR has launched a program to promote capacity building and development of projects for carbon sequestration.

17. **Has a letter of objection or approval been requested or issue by the Host Country'?**

    YES. Letter of no-objection has been recently issued by Inter-ministerial Commission for Climate Change, as Mexico's Designated National Authority (see attached files).

18. **Are there any other instances of natural resources been nationalized?**

    NO

<u>Legal title to Carbon</u>

Securing clear title to the sink credit is the critical legal risk.

Some non-Annex I countries have adopted English property law systems and with "profit a prendre" (a legal right to take from the land) which can be applied to deal with carbon sequestered as a separate right from the physical land and forestry asset to which it is attached.

Environmental covenants are another legal instrument under which requirements to maintain carbon can be legally established and secured.

19. **Is there any ability to own or register right to the carbon separate to the timber and the land?**

    NO. Currently rights on carbon cannot be separated to the timber and the land.

20. **Has there been any other carbon sink project undertaken in the host country and if so how was the carbon ownership issue addressed?**

    a) **CONAFOR's Payment of Environmental Services Program**, currently undertaken, for carbon sequestration and environmental services for biodiversity protection and derived, works with federal budget. In this case, ownership of carbon is linked to legal tenure of trees and land. Every project must ensure legal rights or property in land where project is proposed. Upfront payments are made and proposed activities for carbon sequestration are verified every year in a five-year period. This is a national program.

    b) **Scolel-Té Project**, financed through Fondo Bioclimático (FBC), a non-incorporated body run under Mexican banking law. When the host organization receives an order for a carbon sale it must first identify from which communities it will source the carbon. Carbon sales are allocated to these organizations based on consultation with farmers' representatives taking into account the number of farmers available in each organization and past experience with working with these groups. The allocation of sales to communities within farmer's organizations is decided by the same process of consultation with advice from the FBC social assessors. If a new community is involved the FBC takes advice from social assessors to ensure that the community has the necessary organizational and technical capacity and social stability to successfully implement forestry activities and work with the FBC. This program is undertaken in some areas of Chiapas state only (southeast of Mexico).

    c) **Seawater Foundation Project**, currently undertaken in Sonora (north of Mexico), there is little information available in this matter. Only some technical data about project. Project was seeking finance of World Bank's BioCarbon Fund.

Parties to the Contract

We need to ensure that the Seller of sink credits is authorized to do so and has unencumbered title to the credits.

21. **Is the Seller the owner of land where the project is located? Or a third party intermediary?**

    Sellers are the owners of the land. There will not be a third party intermediary.

22. **Are there contractual arrangements to ensure that the Seller has unencumbered legal title to the credits with any other party involved in the project?**

    NO

23. **Who are all the players in the project and all the groups that will be affected by the project? (Note: this could include land owners, foresters, planters, investors, mortgagees, rural communities, indigenous people).**

    Project will involve 52 ejidos, communities and small properties in the proposed area; CONAFOR will be principal federal agency in the project, and also a set of federal agencies will be involved: Secretary of Environment and Natural Resources (SEMARNAT), National Commission for Natural Protected Areas (CONANP), National Commission for Knowledge and Use of Biodiversity (CONABIO), Federal Environment Protection Agency (PROFEPA); State Government Agencies of Agriculture, Ecology or Natural Resources; Organizations of rural owners and producers, NGO's, Educational and Investigation institutions (universities and investigation centers). Indigenous communities are part of ejidos, so they will be involved in project as landowners.

24. **Is the project managed by a single entity?**

Yes, only for financial resources management, it is proposed that CONAFOR, through Mexican Forest Fund, will work as a holder of resources for project implementation; these will be assigned with participation of a technical advisory committee and technical criteria, under a payment for

environmental services scheme, similar to those currently implemented by CONAFOR (ESP-Hydrological and ESP for carbon, biodiversity and agroforestry).

25. Does that entity have the relevant expertise and local knowledge?

Yes, CONAFOR has been implementing ESP programs since 2003 for water environmental services, and in 2004 begun implementation of ESP program for carbon sequestration, biodiversity protection and agroforestry. Some local entities, including CONAFOR's Regional Office, have local knowledge; other important entities are NGO's, educational and investigation centers and government state agencies.

Forestry Rights

We must ascertain if any person has a right to harvest trees, and whether the exercise of any such right is dependant upon the permission of the land owner (or relevant security holder).

The right to harvest the trees can be express (e.g. through registration on legal title) or implied or established by custom (e.g. through a long pattern of allowing others to harvest trees or crops from the land). Often forestry rights are found in concession agreements issued by governments under which a government may permit a private entity to harvest timber on government land but not to take any other benefits from the land.

In many countries, a forestry right may be held jointly by a community. Depending on the arrangements with the land holder, there may be an ability for the holder of this right to assign it to somebody else.

26. Who has a legal right to harvest the timber? Is it separate from the legal owner of the land?

Owners of land have the legal right to harvest and sell timber; this is not separated from land property.

27. Can forestry rights be transferred separately to a transfer of land?

Ejidos and communities cannot sell forestland nor transfer forestry rights of this land. In case of private properties, forestry rights cannot be transferred separately to a transfer of land.

28. How does a transfer of harvest or other forestry rights occur?

Forest owners, including ejidos and communities can sell timber to a third party (timber enterprises or individual contractors) subscribing a selling contract, which is regulated under commerce law and, in the case of ejidos and communities, agrarian law also. Timber harvest is only possible having an authorization given by Environment and Natural Resource Ministry; timber harvest and authorizations are regulated by Sustainable Forest Law

29. Who owns the timber? Is it separate from the legal owner of the land and /or the person with legal right to harvest timber?

Timber is owned by the legal owners of the land, and they also have legal rights to harvest timber. There is no separation between forestland property and legal rights to harvest timber.

30. Is there a customary right to access and utilize the timber?

Only when timber is for domestic use as fuel; in this case, only dead or fell wood can be used for domestic purposes. Timber produced in pruning activities can also be used for domestic purposes.

31. Is this right an individual right or community-based right?

In the case of ejidos and communities, it is a community-based right; domestic use is almost every time approved in a community meeting.

32. Under what circumstances can the Host Country alter, seize or repossess harvest or other forest related rights?

In the case of ejidos, government can alter, seize or repossess land property by expropriation; in this cases government must have to pay to change land property. There are no more grants of land in Mexico.

33. Is the relevant land subject to a concession agreement with the government? If so, are dealings with the carbon sequestration on the land permitted?

No, there is no concession agreement with the government; land is owned by ejidos.

34. Can the planting of trees exclude others from using the land?

No, even agricultural uses can be practiced if they have been programmed in the project. Grazing, non-timber production and agroforestry can be combined with tree planting.

Permanence

Under the CDM, the risk of the non-permanence of carbon sequestration, has been addressed by two accounting approaches: tCERs or lCERs. However, both types of credits are subject to verification and certification of the levels of sequestered carbon on a five yearly basis and any decreased in carbon stocks must be accounted for by the replacement with other valid credits. This will ultimately be the responsibility of the buyer, or the Fund in this case.

While the issue of "permanence" is treated very differently in JI projects, JI projects encounter similar risks for the duration of the purchase agreement.

35. What risk management procedures are their in place to prevent:

- fire? CONAFOR's coordinates implementation of a Fire Protection Program, which includes participation of local owners, state and municipal governments, other federal agencies and NGO's. The fire Protection Program includes prevention activities such as prescribed burnings, construction of fire breaks, controlling use of fire for agricultural or grazing purposes, and a media campaign to reduce fire risk. This program also includes fire detection and suppression activities with camps, vehicles, fire fighters and, some times, use of aerial equipment. Forest fires in Mexico are generally associated with agriculture and grazing, as they are used for soil preparation and promoting grass re-growth; evidence from communitarian management suggest presence of fires as well as area affected are reduced when forest are under management. Project will replicate successful lessons from communitarian management through technical and organizational assistance to carry out activities to reduce presence of fires, controlling its use for agricultural or grazing purposes reducing; this assistance will be coordinated between CONAFOR, CONANP and regional landholder's organization, as well as local authorities. PES is expected to influence land use and management practices so forest fires and other disturbance factors will be reduced, as a condition for payments.
- pest? CONAFOR implements monitoring of critical areas, as well as diagnoses and controlling activities such as felling and other physical treatments; chemical treatments can be used depending on pest type, but they will be carried out only if necessary.
- illegal logging? In 2004, Federal Environment Protection Agency (PROFEPA) identified 15 areas within 18 states as high-priority areas of illegal logging estimating as much as 60% of illegal logging in Mexico coming from such areas. In 2006, PROFEPA expanded priority areas to a total of 32 within 24 states; these areas were classified from medium to very high priority for its attention. Los Tuxtlas Reserve Biosphere is included within those priority areas with a medium priority of attention of illegal logging[19], although no estimation of amount or percentage of illegal logging is provided. This activity is considered as a result of land use change and only timber products from very a few valuable species are sold. A coordinated program between federal agencies like PROFEPA, CONANP and CONAFOR, as well as state

[19] PROFEPA (2007). Informe Anual 2006.de la Procuraduría Federal de Protección al Ambiente. SEMARNAT. México.

and municipal agencies, is carried out to prevent illegal logging, it includes monitoring of critical areas, roads, industrial centers and selling points; activities with participation of landholders involved in project implementation will be undertaken to prevent illegal logging insider project areas.

36. Are there any local insurance products that cover these risks?

NO

37. Any restriction on land use or other legal claims to the sequestered carbon may impact the ability of the Seller to create emission reductions.

Not identified.