

Noel Kempff Mercado Climate Action Project

Source(s):

[Noel Kempff Climate Action Project](#)

[Noel Kempff Mercado Climate Action Project - A Case Study in Reducing Emissions from Deforestation and Degradation](#) (*2)

[Combating Climate Change in Bolivia](#) (*3)

[Reducing Emissions from Deforestation and Degradation \(REDD\) – A casebook of on-the ground experience](#) (*4)

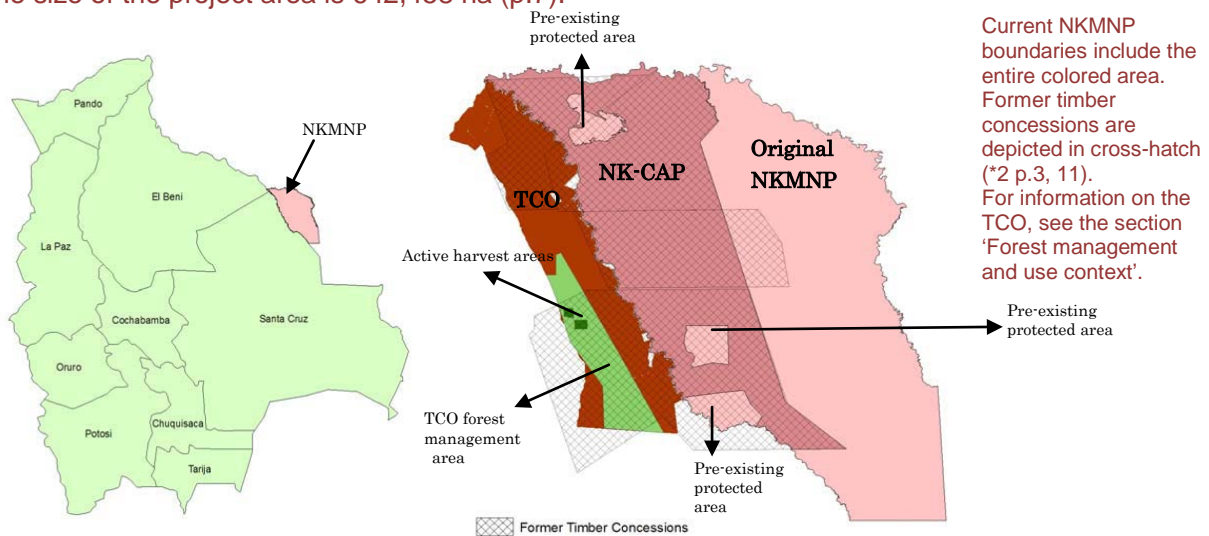
[Casebook of REDD Projects in Latin America](#) (*5)

Project location

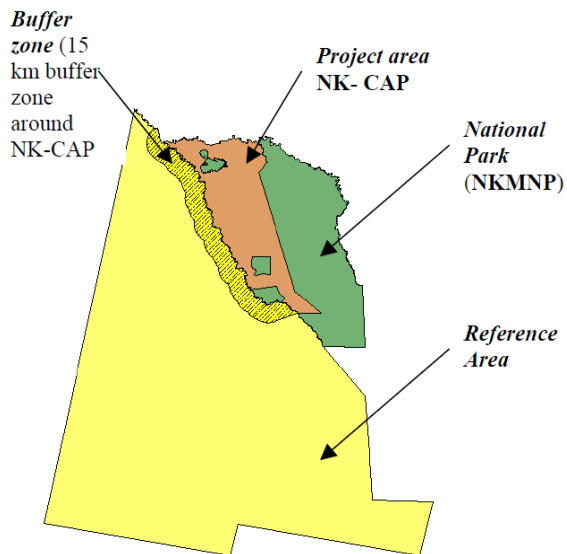
The Noel Kempff Mercado National Park (NKMNP) is located in Bolivia between latitudes 13°25' and 15°5' south of the Equator and between longitudes 60°14' and 61°35' west of the Greenwich Meridian. The NKMNP spans across Velasco Province, Department of Santa Cruz and Itenez Province, Department of Beni (p.6).

The Park was established on December 23, 1996 by Supreme Decree No.24.457, with a size of 1,582,322 ha. The “Park expansion area” is the difference between the Park area established on December 23, 1996 and the area established on August 31, 1988 by Supreme Decree No.21.997. The size of the Park expansion area is 831,689 ha (p.7).

The project area is the area inside the expansion area defined by the intersection between the expansion area and the logging concessions indemnified by the Noel Kempff Mercado Climate Action Project (NK-CAP), plus the north expansion area (between the north boundary of the Paragua II concession and the Itenez River), minus the existing conservation areas prior to the Park expansion. The size of the project area is 642,458 ha (p.7).



Map of Bolivia (*2, p.3)



Map of NK-CAP project area, original NKMNP, buffer zone (for leakage analysis), and reference area (for baseline monitoring) (p.50, *2, p.12).

Forest area and types

The NKMNP is located in one of the few areas in South America where several different ecosystems converge: the evergreen forest of the high lands, the cerrado's savannas, the savanna's wetlands and the forest's wetlands, making the park one of the richest areas for its heterogeneity of habitats and prompting its inclusion on UNESCO's list of World Heritage Sites. The biodiversity of the area is one of the highest in the neotropics, with 4,000 species of vascular plants, 139 species of mammals, 621 species of birds, 75 species of reptiles, 62 species of amphibians, 250 species of fish and 347 species of insects. Rare and endangered species include tiger, puma, Brazilian tapir, jaguar and caiman, among many others (*2, p.17).

The vegetation map applied is based on the map 'Formaciones Vegetales del Parque Nacional Noel Kempff Mercado' elaborated in 1998. The Kempff Mercado Expansion Area contains some 27 discernable land cover types that are organized into 9 general land cover classes (p.54).

Forest management and use context

On December 23 of 1996 the Noel Kempff Mercado National Park was extended to its natural boundaries: the Paragua River (west), the Tarvo River (southwest), and the Itenez River (north), via presidential Supreme Decree #24457, negotiated with the Government of Bolivia by The Nature Conservancy (TNC) and Fundacion Amigos de la Naturaleza (FAN). Between 1996 and 1997, the project bought and retired a total of three concessions from companies that had rights to log the expansion area: the 187,554 hectare Moira concession, the 152,345 hectare El Chore concession, and the 239,017 hectare El Paso concession. Additionally, the Paragua II concession was closed, as no legal concession title existed. The expansion area covered the former concessions, two small protected areas, an existing private protected area to the south ("El Refugio") and additional buffer zones. Inside the expansion zone, the area eligible for REDD activities was 642,184 hectares of forest that had been degraded by former logging activities, and was slated for future logging or predicted to be deforested (*2, p.3).

The Comprehensive Agreement between the Ministry of Sustainable Development, FAN, TNC, and

the international firms American Electric Power, British Petroleum Amoco and Pacific Corporation, for the implementation of the NK-CAP over a 30-year period (p.18) was signed on 9 March 1998.

Concession areas affected by indemnification (p.25)

	Moira	Paragua I	El Paso	El Chore
Area of the concession	531,097	155,409	261,744	212,426
Area affected by indemnification(ha)	238,722	71,516	239,017	152,345
Total Net Productive forest in area affected(ha)	189,978	42,250	217,648	109,088
Total volume of net productive area affected(m³)	2,190,937	1,513,933	7,726,430	3,872,725
Yield(m³/ha)=Total volume/Total net productive forest	4.98	9.76	14.38	11.31

As of 1996, there were 7 communities adjacent to the NKMNP – Florida, Porvenir, Piso Firme, Cachuela, Bella Vista, and Esperancita de la Frontera – with a total population of 1,025. Traditionally, these communities sustained themselves through subsistence agriculture; with women and children in charge of gathering firewood, fruits and medicinal plants, and men seeking income through seasonal work in sawmills, field clearing, hunting and fishing. Men working in sawmills could be expected to earn between \$66-\$133/month. Prior to project implementation, the communities generally did not have public services; rivers provided water, health centers were in poor condition, roads were seasonally impassable, public transportation was nonexistent and schools lacked adequate supplies, space and teachers (*2, p.14).

TCO Bajo Paraguá is the indigenous territory of four of the communities neighboring the NKMNP (Florida, Porvenir, Piso Firme and Cachuela) and covers 360,565 ha (p.7).

Rates and drivers of deforestation and degradation

The project is addressing the drivers of both Ds in REDD: deforestation from conversion to agriculture by local communities and degradation from logging activities in timber concessions (*2, p.2).

San Ignacio is one of the five 5 municipalities with the highest fire frequency in the country. Uncontrolled burning to maintain agricultural areas and to convert forest are the driving deforestation forces (p.61).

Deforestation inside the NK-CAP (p.50)

Period	Deforestation inside NK-CAP (ha)	Period	Accumulated deforestation inside NK-Cap (ha)
Before 1986	67.01	Before 1986	67.01
1986 till 1992	418.96	Up to 1992	485.97
1992 till 1996/97	416.36	Up to 1996/97	902.33

Project proponents

(p.3, *2, p.2)

- Fundacion Amigos de la Naturaleza
- The Nature Conservancy
- The Bolivian Government

Implementation timeframe 30 years, 1997-2027 (p.20)

Project goals

- Mitigate carbon dioxide emissions (p.3). The proponents estimates that 5,838,813 metric tons of CO2 emissions will be avoided over the 30 year project lifespan (*2 p.2).
- Preserve a rich and biologically diverse forest ecosystem, chosen as a UNESCO World Heritage Site for its outstanding biodiversity value, and promote sustainable development in local communities (p.3).

The project:

- Reduces carbon emissions,
- Doubles the range for species requiring large tracts of land including the Brazilian tapir (*tapirus terrestris*) and jaguar;
- Decreases soil erosion and future agricultural runoff into the park's rivers;
- Provides a community support program that aids in the development of sustainable management and use of natural resources, as well as job opportunities in the park; and
- Assists local communities in their efforts to attain legal status as indigenous people and to secure land tenure (*3, p.1).

Implementation activities

The Project has two GHG mitigating components: Component A mitigates the GHG emissions through avoiding and reducing the emissions of logging; Component B mitigates the GHG emissions through avoiding deforestation and land use change.

Cessation of logging (Component A) has been achieved by indemnifying the logging concessions. Deforestation is avoided (Component B) by the official expansion of the park, the community development component and general measures to protect the park from encroachment (p.3).

To enhance livelihoods in the communities adjacent to park, strengthen their organization and aid in leakage prevention, two sequential programs were initiated with project funds. The Program for the Sustainable Development of Local Communities (APOCOM) ran from 1997-2001 and improved access to basic services such as health, education, and communication. The Community Development Program (PRODECOM), undertaken from 2002-2006, emphasized community development by securing land titling, assisting self-organization, and supporting income generating activities such as community forestry and micro enterprise. A Community Development Action Plan was carried out from 2006-2008 with the goal of raising the standard of living for those communities affected by the project to levels at or above those at which they resided prior to project implementation (*2, p.14).

In the NK-CAP, a fundamental forest conservation concept is that the local communities participate in, are responsible for, and benefit from, forest conservation. This program included two phases. In the first five-year phase (1997-2001), the community work was initiated. The project provided support to solve primary and urgent needs such as those related to health, education, several access roads, etc. Efforts to strengthen the organization of the communities and to begin sustainable natural resource management projects were also initiated. By the beginning of the second phase (2002-2006) the communities were more organized, had diversified their capacities, and some projects had been initiated. Planning during the second stage resulted in more precise lines of action related more directly to the sustainable management of natural resources. The working areas of this program during both phases, and the most important results obtained, are (p.4):

Organizational strengthening and training: At the beginning of the Project the communities had a

weak organizational structure. With project support the traditional organization of the Cabildo has recovered. The Bajo Maragua Indigenous Organization (CIBAPA) was formed in 1998 to group the four indigenous communities that neighbor the Park (Florida, Porvenir, Piso Firme, and Cachuela).

Land ownership: The communities did not possess any type of legal title to the land they inhabited. They used natural resources in a traditional manner and eventually worked for logging companies in the zone. To overcome this restriction, they first obtained legal personalities in order to accredit the communities of Florida, Porvenir, and Piso Firme as Communities of Native Peoples. This allowed the communities to present a suit to the INRA (National Agrarian Reform Institute) for approximately 370,000 ha as Original Community Land (TCO, in Spanish). The process of obtaining land titles has proceeded through the clearance stage, indicating that the process has advanced about 80%.

Natural resource management: An integral natural resource management plan for TCO Bajo Paragua has been prepared in order to guide the sustainable development of communities, with the participation from the communities and the CIBAPA.

Additionally, the program **supported micro-enterprises** using resources to create a rotating fund within the communities for sustainable productive activities, **training and higher education** (4 community forest promoters and 1 forestry commercialization specialist, and 6 agricultural promoters were trained), and **elementary and high school education** (scholarships were given to 120 students). **Primary health** care was supported and **road improvements** and **general support** were carried out.

Action Program 2006-2008 (pp.165-169)

(1) Consolidate land tenure and property rights in the communities in and around the project area

Result	Indicator
A.1. The indigenous territory Bajo Paragua (TCOBP) legally registered	TCO BP titulated by INRA until 31.12.06
A.2. Land claims of two communities inside the park are determined, consolidated, and legally settled	Communal land use in Bella Vista and Remanso registered and titulated by INRA until 3.06.2007

(2) Integrate economic development, sustainable use of natural resources, and mitigation of leakage in communities

Result	Indicator
B.1. Consensus about sustainable use of land and natural resources established	Communal land use plans (Planes de Ordenamiento Predial Comunes, POP Coms) in the communities of Florida, Piso Firme, and Porvenir accepted
B.2. Options of sustainable land use in 3 communities enhanced	Restrictions in access to livelihood means caused by the NKCAP fully compensated until 2008
B.3. Incomes of communities affected by land use restrictions increased	Aggregated income in four selected communities increases 4% per year
B.4. Damage risk due to unsustainable land use reduced	Frequency and impacted area of collateral damage due to uncontrolled burning in two communities reduced by 20 % until 2008 based on year 2003
B.5. Timber harvesting practices improved	Sustainable harvesting practices implemented and guaranteed by the TCO

(3) Establish an environmental payments scheme generating incentives to conserve biodiversity

Result	Indicator
C.1. Carbon offsets assigned to enhance livelihood access in communities adjacent and inside the park	Mechanisms to provide and administrate benefits from commercializing carbon credits amongst stakeholders agreed and legally established until 2006
C.2. Incentive mechanism redistributing economic	Conditioned benefit sharing mechanism established until

benefits to conserve biodiversity established	30.06.2007
C.3. Financial sustainability of incentive mechanisms achieved	Financial sustainability of the mechanism secured

Actors' roles and responsibilities

(*2 p.2)

The Nature Conservancy (TNC)	Project development
Fundacion Amigos de la Naturaleza	Project development, Project management and Carbon Measurement. FAN serves as the executor of activities financed by the fund and submits yearly reports on the activities supported by endowment income (*2, p.4). On April 1995, the administration of the park was transferred to the FAN (p.18).
Government of Bolivia (GOB)	Country Partner
American Electric Power Company (AEP), BP America, PacifiCorp	Project investors
Winrock International Institute for Agricultural Development	Carbon Measurement. Winrock International was responsible for initial design of the measurement program.

Community participation

Organizational empowerment

Part of the project focused on assisting communities in creating an official indigenous organization with legal status. Project developers helped communities to access the correct government officials and prepare paperwork to group themselves into the official Central Indígena Bajo Paraguá (CIBAPA), a registered organization with legal standing representing the indigenous communities around the park. As a group with legal standing, CIBAPA was eligible to file for land tenure with the National Agrarian Reform Institute (INRA). As communities became increasingly organized, they were able to take a more active role in the project planning (*2, p.15).

Land tenure and community property rights

Article 6 of Supreme Decree #24457, which expanded the NKMNP, recognized and guaranteed the subsistence use and exploitation of renewable natural resources within the expansion zone by communities, subject to the park management plan. However, the park management plan was somewhat ambiguous as to activities allowed in the park. In order to further protect community members' access to timber, plants and animals, FAN facilitated CIBAPA's claim to 360,565 hectares of indigenous territory adjacent to the expansion area in 1998, and this claim was accepted by the INRA. In June 2006, the official title for the indigenous territory (TCO) was granted to CIBAPA (*2, p.15).

Land use planning and capacity training

Through the efforts of a consultancy team, FAN, CIBAPA and NKMNP, the Bajo Paragua Native Communal Land Natural Resources Management Plan was developed and 4 communities were trained in sustainable community forestry. Agricultural promoters were educated and 5 university scholarships in strategic areas (business administration, tourism, agricultural and forest engineering) were financed, along with 7 awards for polytechnic level study (*2, p.15).

Elementary and high school education

Schools in the communities of Florida, Piso Firme, and Bella Vista were refurbished and, through an agreement with the project, the Municipality of San Ignacio paid the salaries of two teachers. Significant quantities of educational supplies were also purchased. Scholarships were given to 120 primary and secondary school students to continue their studies in courses which were not available in the communities (*2, p.15).

Health outpost

Project developers refurbished and expanded a pre-existing health clinic in the community of Florida, which was in very poor condition, to include living quarters for a resident nurse. Another outpost, in Piso Firme, was expanded and converted into a micro-hospital, with a delivery room, laboratory, and dental services. Project funds were used to purchase medicine which is administered by community members, and a doctor was hired to live in Piso Firme and make periodic visits to all of the communities (*2, p.15).

Income generation

Alternative Employment

One of the more significant initial negative impacts of the project on the communities, particularly the community of Florida, was the loss of jobs from closed timber concessions and sawmills. In total, 20 men from Florida lost their jobs in the Moira sawmill. Project developers attempted to compensate for these losses by creating opportunities for alternative employment. For example, approximately 80 community members have worked surveying forest resources both inside and outside of the expansion area. Of the 26 full-time park guards, 10 are from the local communities. Furthermore, six community members were trained as tourist guides (*2, p.15). Protecting and monitoring the integrity of the park against fire and illegal activities (logging, land clearing, hunting, fishing with nets) is an on-going activity. To this end, project funds were used to hire 11 of the 27 park rangers. New rangers' camps have also been built, and equipment has been provided, as have the necessary provisions (fuel, food) to carry out the monitoring activities (*2, p.3).

Sustainable Forestry

Project developers supported the establishment of a sustainable community forest concession within the TCO. Community members have approval by the Superintendent of Forestry to exploit heart of palm on 11,000 ha of the TCO, as well as practice sustainable forestry in 90,000 hectares of the TCO. CIBAPA is running its own sawmill and is the first indigenous community with a timber selling point in the capital of the Department of Santa Cruz. Although the sawmill is not currently turning a profit, money generated from these activities are going directly back into the communities, and help to offset employment losses from the Moira concession (*2, p.16).

Ecotourism

A visitor center was constructed with the aim of fostering income generation through tourism activities, which would work in combination with the project endowment to fund post-project activities. Two communities participated in tourism activities by offering guidance, lodging, and other services. Unfortunately, it became apparent that the remote location of NK-CAP would make travel to the site by tourists both difficult and expensive. Thus, the realized benefits via ecotourism have been fewer than originally anticipated (*2, p.16).

Biotrade

A program was started aiming at expanding the scientific capacities of FAN, while identifying marketable wild plants and products. The GerMoFAN laboratory was established with the goal of producing in vitro native plants, such as orchids, that would generate income through their sale, to be funneled back into project activities and help fund post-project activities. GerMoFAN has commercially produced ornamental, medicinal and edible species. In addition, the largest scientific collection of live-plant ornamental Bolivian species was established through NK-CAP. It includes 2,500 species, 52

of which were identified as new to science, and 18 of which were sponsored for further research. Further enterprises in Biotrade have been carried out, but did not prove viable. This included the creation of “Canopy Botanicals,” a company whose aim was to develop products, supplied by the communities, in three market sectors: organic foods (coffee beans, cocoa, mushrooms, and Brazil nuts), botanicals (medicinal plants) and ornamentals (orchids). The company promoted sustainable development as well as the equitable distribution of economic benefits to supplier communities. Unfortunately, the venture ultimately failed due to low returns on its investments, and the investors incurred costs to dissolve the company. The NK-CAP experience underscores the need for robust advance business planning to determine the viability of economic development strategies and avoid losses on investments (*2 p.16).

Project financing

The costs of design, implementation and maintenance were estimated at US\$ 11.5 million over 1997 to 2006 (*5, p.27).

Carbon revenue was provided upfront by three energy companies: American Electric Power Company (AEP), BP America, and PacifiCorp. In return, they were guaranteed 51 percent of future certified offsets created over the 30-year project lifetime. These investors assumed the risk that the estimated quantity of verified carbon benefits might not be fully realized. The Government of Bolivia pledged support for the project plan, closed the timber concessions, expanded the park, and received 49 percent of the carbon benefits, which it agreed to use to fund community development, park management and other activities (*2, p.4).

Funding Sources: The three companies (AEP, BP America and PacifiCorp), and TNC invested a total of US\$10,850,000. A part of these funds are destined for project programs and another part to a fiduciary fund (*5, p.27).

While investor contributions to NK-CAP were not structured on a per-ton basis, the cost of implementing NK-CAP, in 2009 dollars, has been estimated at \$18 per metric ton of CO₂e. This estimate was based on an analysis of project financials, and several key assumptions, including: that 20% of the carbon benefits would be retained in a permanence buffer, that offsets from the project would be generated and sold at routine intervals, and that investors would seek a reasonable rate of return on the project (*2, p.5). Offsets generated from 1997-2000 were assumed to be verified and sold in 2001. A sale in 2006 of 2001-2005 offsets was assumed, and so on for five year periods, with a final sale in 2027 of offsets from 2021-2026 (*2, p.5). A nominal discount rate of 15% was assumed as a reasonable rate of return on the project, based upon various benchmarks (*2, p.5).

Benefit sharing

As per the NK-CAP Comprehensive Agreement, 51 percent of the certified emission reductions were assigned to corporate investors (AEP, BP and PacifiCorp) and 49 percent to the Bolivian government. The assignments of the certified offsets established by the Project’s Comprehensive Agreement indicates that as long as one Party is not lacking in the fulfillment of its obligations under the Agreement, the Certified Offsets will be assigned in the following manner (p.19):

Assignment to AEP: AEP will be assigned the equivalent of 2% of the accumulated offsets each year during the Project Term.

Assignment to the Industrial Participants: The Industrial Participants (prorated, in proportion to their respective financial contributions to the Project) will be assigned the equivalent of 49% of the accumulated offsets each year during the Project Term.

Assignment to the Government of Bolivia (GOB): The GOB will be assigned the equivalent of 49% of the accumulated offsets each year during the Project Term. The funds obtained from the sale of 20% will be contributed to Protected Areas National System Trustee (CF/SNAP), 75% of this contribution must be dedicated to support the Park's management and its management programs; the residual 25 % could be used to support the Protected Area National System. Funds from the remaining 29% of the accumulated offsets will be used to: a) ensure that financial resources would exist to guarantee the GHG mitigation over the Project duration and the issuance of certified offsets; b) support biodiversity protection activities in the Park; c) support activities consistent with the Sustainable Development National Strategy of Bolivia that contribute to improve the livelihoods of the local communities which are neighbours of the Park; d) support biodiversity protection activities in other parts of Bolivia; and e) to support current and future climate change mitigation activities in Bolivia.

The government agreed to earmark proceeds from the sale of its share of the offsets in the following manner: 31 percent for the protection of the park, 10 percent for the national system of protected areas, and 59 percent for other purposes, including biodiversity protection activities both inside and outside the project area, improving the livelihoods of the indigenous communities adjacent to the park, and supporting other greenhouse gas mitigation strategies throughout Bolivia. Specific allocations of this 59 percent were not negotiated upfront and communities in the vicinity of Noel Kempff Mercado National Park are currently negotiating with the Bolivian Government to define their share. The Bolivian government has not yet sold its share of the verified emission reductions (VERs) (*2, p.4).

Emissions and removals with and without project

It is estimated that 5,838,813 metric tons of CO₂ emissions will be avoided over the 30 year project lifespan (*2, p.2)

Two distinct project components are generating carbon benefits within NK-CAP (*2, p.6):

Component A: Reducing Emissions from Deforestation

By implementing an economic development program and an extended protection scheme, the project is avoiding deforestation by communities inside the project area. Baseline deforestation was modeled with a spatially explicit land use change model (GEOMOD), using Landsat imagery to estimate historic deforestation rates and modifying these rates based on monitoring from a reference area with comparable socioeconomic characteristics. As a result of the project, 763 ha were saved over the 1997-2005 verification period, corresponding to 371,650 tCO₂e.

Component B: Reducing Emissions from Degradation

Cessation of logging in the former concessions that were incorporated into the project area avoids future timber extraction and collateral damage due to logging. 468,474m³ of timber slated for harvest were protected over the 1997-2005 verification period, corresponding to avoided emissions of 791,443 tCO₂e. The baseline harvest was modeled using an advanced statistical model of the Bolivian timber market, simulating domestic/international timber supply and demand at different scales: national, regional, and project level.

As a result of both activities, the project generated a total carbon benefit of 1,034,107 tCO₂e over the 1997-2005 verification period, and is projected to generate a carbon benefit of 5,837,341 tCO₂e by 2026. The annual breakdown of these benefits is shown in the table below.

Estimating the change of carbon in the carbon pools within the project area

When the project started in 1996, 625 plots were installed in the NKCAP area using the methods and procedures given in Winrock's methods manual (cf. MacDicken, 1997). With Winrock's method

manual and the methodological details further developed, carbon stocks were estimated for the following: all trees to a minimum dbh of 5 cm, palms, understory, litter, standing and lying dead wood, and soil to 30 cm depth. With these results, the total carbon stock per forest strata and an overall area-weighted mean was estimated (p.83).

Verified carbon benefits generated by NK-CAP (p.154,*2, p.6)

Year	A Emissions Avoided from Deforestation (tCO2)	B Emissions Avoided from Degradation (tCO2)	C Leakage Deduction (tCO2)	D=A+B-C Total Carbon Offsets (tCO2)	E Emissions from Project Activities* (tCO2)	F=D-E Net Carbon Offsets (tCO2)
1997	56,401	48,180	7,264	97,317	169	97,148
1998	40,304	59,374	9,141	90,539	211	90,328
1999	39,783	69,931	10,960	98,753	282	98,472
2000	43,417	79,889	12,731	110,578	204	110,373
2001	41,158	89,298	14,454	116,003	167	115,836
2002	40,238	98,190	16,130	122,298	132	122,166
2003	33,972	107,081	17,589	123,462	109	123,353
2004	31,684	115,632	18,971	128,347	102	128,244
2005	44,693	123,867	20,277	148,282	96	148,186
Total	371,650	791,443	127,516	1,035,578	1,472	1,034,107
Total 1997-2026				5,838,813	1,472	5,837,341

*From transportation fuel use etc.

Additionality

The Government of Bolivia did not have access to the necessary resources nor the political will to terminate the forest concessions and expand the park without the Noel Kempff Climate Action Project's funds and activities. Without the Noel Kempff Climate Action Project, the concessionaires would have continued exploiting the forest for the remainder of the concession period. And, these concessions would likely have been renewed as they had been in the past. Encroachment and deforestation would also have occurred as people moved into the area (p.73).

Baseline

Avoided deforestation baseline

The creation of an avoided deforestation baseline in NKCAP required 4 steps: 1) determination of deforestation rates, 2) prediction of likely locations for future deforestation, 3) determination of carbon content in areas predicted to be cleared, and 4) calculation of emissions resulting from anticipated deforestation. Using historical satellite imagery from 1986, 1992 and 1996, it was possible to observe deforestation and calculate deforestation rates in the project area. The location of future deforestation was simulated with the spatially explicit GEOMOD land use change model using this historical deforestation information. The model identified lands in the project area that were statistically the most likely to be cleared in the future, based on several deforestation drivers (distance to roads, towns, rivers, forest edge and prior disturbance). GEOMOD results provided a forecast of specific forest areas likely to be cleared over the following 30 years (*2, p.8). The driver maps are categorized maps which show the distance to roads, towns, rivers, and forest edge disturbance prior to 1992. Based on these driver maps and a land use map, GEOMOD creates a suitability map where each Pixel has a likelihood value to be deforested. The used model is calibrated as described in the following table (p.52).

While remote sensing technology and models like GEOMOD can estimate *areas* of forest loss, estimating *emissions* from that forest loss involves measuring the carbon stocks of the vegetation in the area, since different types of vegetation (e.g. tropical forest vs. temperate forest) contain different amounts of carbon. In NK-CAP, the areas predicted to be cleared by GEOMOD were assigned one of

5 vegetation classes using Landsat imagery and on-the-ground observations. The carbon content of each vegetation class was determined through field research, using techniques such as measurement of tree diameter and soil analysis. To this end, 625 permanent study plots were established in and around NK-CAP to measure and monitor carbon stocks. All carbon pools – aboveground and belowground biomass, litter, dead wood, and soils to 30 cm depth – were analyzed for their carbon content. Once carbon stocks were determined for each vegetation class, the areas presumed cleared in the baseline scenario were then converted into carbon emissions using established formulas (*2, p.8).

Driver maps

Drivers	Weights	Category widths	Maximum distance	Raw data source
Itenez and Paragua Rivers	0.1667	250m	10km	Manual digitalization
Natural forest edge	0.1667	250m	10km	Classification of Landsat images(1992)
Roads	0.1667	250m	10km	Manual digitalization from Landsat images(1992)
Towns with pop<100 hab	0.1667	250m	10km	INE*, corrected with Landsat image(1992)
Towns with pop>100 hab	0.1667	250m	10km	INE*, corrected with Landsat image(1992)
Deforestation up till 1992	0.1667	250m	10km	Classification of Landsat images(1992)

Avoided degradation baseline

Because timber harvesting is impacted by market conditions, the avoided degradation baseline was determined using an econometric model of Bolivian timber markets, developed by Brent Sohngen and Sandra Brown, which predicts the volume of future harvests in Bolivia, both within the project area and the country as a whole (important for leakage analysis), and the carbon impacts of those harvests. The model was based on the assumption that Bolivia is a small open economy which is a price taker on global timber markets and, therefore does not significantly control or effect global prices. Aboveground biomass and dead wood were the only carbon pools included in the calculations, as soil carbon and belowground biomass (roots) were not expected to change significantly due to harvesting activities (*2, p.9).

The potential pathway of future harvests in Bolivia both in the project area and within the entire country are simulated within a dynamic optimization model implemented in GAMSTM 2.50, an algebraic modeling system for mathematical programming and optimization. The maximization problem is solved dynamically by non-linear programming using the CONOPTTM-Solver (p.23, 30).

Leakage

Market impacts (degradation)

Leakage would be estimated as the difference in net national carbon emissions from timber harvesting between the baseline case and a scenario in which some of the land is removed from the concession base, within the baseline methodology for degradation. The baseline methodology assumes that a country's responsibility for carbon leakage stops at its border, and the export demand is modeled as perfectly elastic. This assumption means that no potential leakage outside of Bolivia is calculated (p.137).

Displacement of activities to areas outside the project

Degradation

Since 1996, the majority owner of the concessions that were indemnified left the industry entirely. The majority owner received 78% of the total \$1.69 million. The minority owner invested his portion of the proceeds in three activities. Of the total value of the indemnification, 12.3% went to purchase a

property near Santa Cruz, 2.6% was invested in new plantation forests, and 7.3% was invested in a nearby concession (Oquiriquia). According to the monitoring data, 34,433m³ were harvested in Oquiriquia from 1997 to 2001. These harvests could be considered leakage, but there are a number of reasons not to count these here. First, this specific form of leakage is implicitly included in the estimation of leakage for market impacts by the dynamic optimization model, so counting then in total here would be double counting. Second, it is likely that at least some of these harvests would have occurred regardless of the indemnification. Third, some of the funds were invested in planting, which would offset the carbon losses. Fourth, much of the equipment used for harvesting by the concessionaires was retired from use, and the direct movement of capital from the indemnified region to either existing concessions or other concessions appears to be fairly limited. The monitoring data collected has provided enough information to conclude that leakage due to displacement of activities of the existing concessionaires is minimal, and is implicitly included in the calculation of the market shifts leakage (p.131).

Deforestation

Leakage occurs when communities continue to deforest at the same rate as before with the only difference that the deforestation is taking place outside the project area instead of inside. The area affected is defined as the buffer zone which forms a 15 km buffer around the borders of the NK-CAP. If leakage occurs, the deforestation rate must be higher than in the baseline scenario. Therefore a baseline scenario for the buffer zone was created in the same manner as for the NK-CAP itself, using a reference area to calculate the proportional change and comparing this result with the true deforestation occurring in the NK-CAP. If the deforestation is in reality higher than the baseline scenario, the difference is leakage (p.51).

As the true deforestation that occurred in the buffer zone is lower than that predicted by the baseline scenario, there is no leakage. The conclusion that the baseline scenario is overestimating the reality is not valid, because compensation mechanisms were implemented in the buffer zone to generate alternative income. These activities are due to the implementation of the project (p.140).

Staff travel associated with the project activity

The activities implemented by the project may cause leakage from the travel and displacement of the staff outside (and in some cases inside) the project boundary. The major leakage is due to fossil fuel emissions associated with the travel outside the project boundary (p.133).

Monitoring

Monitoring the Baseline related to avoided deforestation

The avoided deforestation baseline will be re-evaluated every 5 years to capture any changes in institutional structure, local deforestation rates, and socioeconomic circumstances that might affect the estimated emissions for the remaining years of the project. A reference area was chosen adjacent to the Park to serve as a “control” for the estimated baseline. This area will be monitored over time using Landsat data and compared to the predicted baseline for the avoided deforestation component of NK-CAP. Differences between the two will be investigated and adjustments to the baseline will be made where appropriate to maintain accuracy (*2, p.9).

Monitoring the Baseline related to avoided degradation

In order to accurately estimate damage due to logging activities and to detect potential differences in regrowth rates over time between logged and unlogged areas, 102 survey plots (dubbed Carbon Impact Zones or CIZs) were established in the Cerro Pelao logging concession adjacent to the project area. From these plots, it was determined that over time, the difference in regrowth between logged and unlogged areas was not statistically significant. Economic variables for the timber market model (e.g. timber prices, inflation rates) are being monitored annually to every 5 years, depending on the

particular parameter (*2, p.9).

Monitoring Leakage from avoided deforestation activities

Although no leakage was expected from this aspect of NK-CAP, project developers still monitored for any unanticipated activity shifts. The project designed a 15 km control area around the borders of the NK-CAP zone to capture possible activity shifts. The rationale behind the chosen buffer width was based on behavioral theory; it was highly unlikely that subsistence farmers who were originally deforesting within the project area (*2, p.12).

Monitoring Leakage from avoided degradation activities

Although no activity-shifting leakage was estimated from the avoided degradation component of the project, the activities of the concessionaires were tracked after they relinquished their holdings. FAN closely tracked the expenditures of former concessionaires, most importantly to determine if indemnification funds were reinvested into other concessions (*2, p.13).

Monitoring and remedial measures to address the negative impacts on livelihoods

The communities of Florida, Porvenir and Piso Firme were the most impacted by the project. The communities of Cachuela, Bella Vista, Remanso and Esperancita de la Frontera were minimally impacted, positive impacts have been identified but most of them of short-term, showing that the situation of these communities is almost identical to the situation before the project. It is essential to address any possible future leakage within a new action plan that includes these communities (p.158-159). The following negative impacts have been identified: loss of access to the resources, abatement of the use of the fauna for hunting, loss of transport and roads' infrastructure, and the loss of income from employment and services provided to Moira sawmill. The project has offered alternatives to minimize these negative impacts (p.159).

Monitoring Biodiversity

Key species populations (aquatic turtles, endemic wolves, amongst others) are monitored in the park through a Site Conservation Plan (SCP), which identifies key conservation sites and targets. The Integral Plan of Protection (PIP) follows the guidance of the SCP and monitoring is carried out by park guards as well as external entities, with the authorization of the National Service of Protected Areas (SERNAP) (*2, p.17).

Reporting

The Government of Bolivia, American Electric Power, BP, and PacifiCorp share the reporting rights to the emission reductions associated with the project (*3, p.2).

Verification

The carbon benefits achieved between 1997-2005 by NK-CAP were verified by Societe Generale de Surveillance (SGS) in 2005, using standards based upon those described in the Kyoto Protocol's Clean Development Mechanism (*2, p.6).

In 2004-2005, NK-CAP underwent an ex-post validation and verification assessment for the voluntary market. The validation and verification processes were executed by Societe Generale de Surveillance (SGS), registered as a Designated Operational Entity to the Clean Development Mechanism (CDM) (*2, p.18).

Risks and risk management

Permanence

The risk of fire was considered in the calculation of project carbon benefits, using the actual occurrence of fires from 1997-2005. As a result, 5% of the estimated avoided deforestation carbon benefits were deducted as a safeguard against the risk of fire (*2, p.13).

Implementation of activities and measures to minimize leakage

Degradation

In order to minimize leakage, the project developed some protocols to follow-up the concessionaries, as it removed selected concessions by indemnifying their owners and preventing them by contract, not to initiate new logging activities for a defined period (5 years). The NK-CAP tracked the activities of former forest concessionaires with respect to how the indemnification funds were used. The NK-CAP also worked with one of the ex-concessionaires who went into partnership with another concessionaire to incorporate sustainable forestry practices. The legally binding Agreement to Prevent the Displacement of the Environmental Benefits achieved by the NK-CAP was signed on January 16, 1997, by the indemnified logging companies' representatives and FAN acting as the project manager of the NK-CAP. In the agreement, the parties agreed upon measures to preserve and protect the environmental benefits resulting from project implementation, and to provide guarantees and commitments to present and allow review of reports on the concessionaires' activities outside the park expansion area (pp.145-146).

Deforestation

In order to address any possible source of leakage, produced by the potential increase of deforestation activities in the communities, the Community Development Program was designed to minimize the leakage attributable to the project (p.146).

Progress and plans

It is expected that the Government of Bolivia will carry on future community development activities with a portion of the income it receives from marketing its share of verified carbon benefits from the project. Thus far, however, the government has not commercialized its share nor has it designated how much of the proceeds will go back to the communities bordering the park. Project developers and community leaders are working with the Bolivian Government to resolve these issues (*2, p.14).

It is important to note that although all Climate Action Reserves associated with the first validation and verification review were closed out to SGS's satisfaction, future verifications may be in jeopardy. As of 2010, key milestones in the community development action program have not been reached. The program called for the Government of Bolivia to establish the necessary legal instruments to commercialize their share of the carbon credits and to assign carbon credit revenue according to the earmarks set out in the Noel Kempff Comprehensive Agreement. Given turn-over of government officials and other obstacles, the Government of Bolivia has yet to complete these milestones (*4, p.42).

Links:

Project-related documents

[SGS \(2005\). Validation and Verification Report: Programa Nacional de Cambio Climatico Noel Kempff Climate Action Project](#)

Others

[Is the carbon market the best way to preserve the world's forests?](#)

[Greenpeace \(2009\): Carbon Scam - Noel Kempff Climate Action Project and the Push for Sub-national Forest Offsets](#)

[Greenpeace: Noel Kempff Mercado Climate Action Project](#)

[Noel Kempff Mercado Climate Action Project Position of Fundación Amigos de la Naturaleza \(FAN -Bolivia\) on Greenpeace's Report](#)

[Forest Carbon Portal](#)