NOEL KEMPFF MERCADO CLIMATE ACTION PROJECT

INTRODUCTION

The Noel Kempff Mercado Climate Action Project (NK-CAP) is preserving the rich, biologically diverse ecosystems of northeastern Bolivia's Noel Kempff Mercado National Park while preventing the release of millions of tons of carbon dioxide over 30 years. In late 1996, when the ecological integrity of almost 832,000 hectares of tropical forest adjacent to the park was threatened by both timber harvesting and unplanned deforestation, The Nature Conservancy and Bolivian conservation organization Fundación Amigos de la Naturaleza worked with the Government of Bolivia to terminate logging rights in the area. This land, along with three small existing conservation areas, was incorporated into the original national park.

NK- CAP was one of the world's first large-scale REDD (Reducing Emissions from Deforestation and Degradation) projects, and is addressing the drivers of both D's in REDD: deforestation from conversion to agriculture by local communities and degradation from logging activities in timber concessions. In 2005, NK-CAP was the first REDD project to be verified by a third party using rigorous standards based upon those developed for the Kyoto Protocol's Clean Development Mechanism. Investments from three energy companies helped to fund project activities, in exchange for rights to a share of the verified carbon benefits generated by NK- CAP.

The success of NK- CAP, demonstrated by the 3rd party verification of carbon benefits generated by the project through 2005, serves as an example of how well-designed REDD projects can result in real, scientifically measurable, and verifiable emissions reductions.

SUMMARY OF BENEFITS

- Verified to have avoided 1,034,107 metric tons of CO_2 emissions, which would have been caused by logging and deforestation between 1997 and 2005;
- Estimated to avoid a total of 5,838,813 metric tons of CO_2 emissions over the 30 year project lifespan;
- Preserves a rich and biologically diverse forest ecosystem, chosen as a UNESCO World Heritage Site for its outstanding biodiversity value;
- Facilitated indigenous communities achieving legal status as "Communities of Native Peoples" and in obtaining official land title;
- Provides alternative, environmentally sustainable economic opportunities for the local population via community forestry, ecotourism and biotrade;
- Raised $8.25 million in carbon financing, with additional financing possible upon sale of the Government of Bolivia's 49% share of the project's carbon offsets;
- Established an endowment which is used to fund project activities and preserve the park for future generations.

PROJECT TYPE

Reducing Emissions from Deforestation and Degradation (REDD)

PARTNERS AND CONTRIBUTORS

The Noel Kempff Mercado Climate Action Project is a joint effort, to which the following partners contributed:

Project Development

The Nature Conservancy (TNC), Fundación Amigos de la Naturaleza (FAN)

Project Management

Fundación Amigos de la Naturaleza (FAN)

Project Investors

Government of Bolivia (GOB), American Electric Power Company (AEP), BP America, and PacifiCorp

Carbon Measurement

Winrock International Institute for Agricultural Development and Fundación Amigos de la Naturaleza (FAN)[1]

Validation and Verification

Société Générale de Surveillance (SGS)

PROJECT OVERVIEW

Site Description

The Noel Kempff Mercado Climate Action Project (NK- CAP) was carried out in the northeastern section of the Department of Santa Cruz, Bolivia, in the Province of Velasco (see Figure 1).

[1] Winrock International was responsible for initial design of the measurement program; however, FAN has since taken on the responsibility of carrying out the actual measurements.

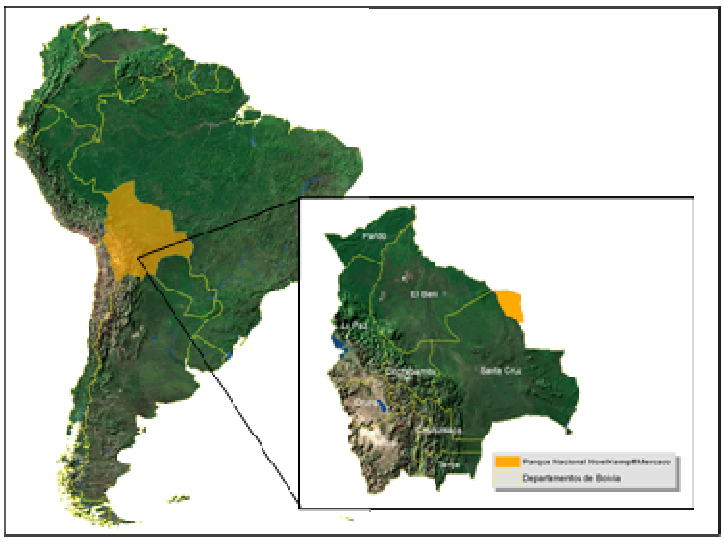

Figure 1: NKMNP (on the right in gold) is located in the Department of Santa Cruz, Bolivia in the Province of Velasco. Source: FAN

At the time of project scoping, a 750,633 hectare protected area called Noel Kempff Mercado National Park (NKMNP) was already in existence. Characterized by outstanding topographical features, the park was principally defined by the Huanchaca (or Caparú) Plateau. The immediate area of the park consisted of natural vegetation and was devoid of sizeable permanent human populations. Located in a climatic transition zone between the Amazonian, Chaco and Cerrado eco-regions, the park was considered one of the most biologically diverse areas of the world.

Approach

Project activities consolidated threatened areas just adjacent to the park with the park itself, creating one expanded protected area. On December 23 of 1996 the Noel Kempff Mercado National Park was extended to the Paraguá River (west), the Tarvo River (southwest), and the Itenez River (north) via presidential Supreme Decree #24457 (negotiated with the Government of Bolivia by TNC and FAN). In total, the park was expanded by 831,689 hectares, more than doubling the previous size to its current 1,582,322 hectares. The expansion incorporated ecosystems not represented in the original park perimeter and improved the park's protection by establishing natural boundaries. Between 1996 and 1997, FAN bought and retired a total of three concessions from companies that had rights to log the expansion area; the 187,554 hectare Moira concession, 152,345 hectare El Chore concession, and 239,017 hectare El Paso concession (see Figure 2). Additionally, the Paragua II concession was closed, as no legal concession title existed.

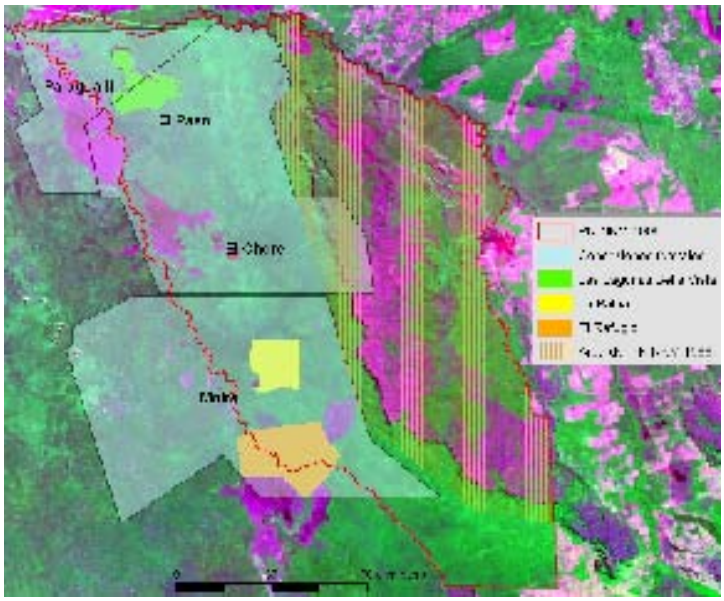

Figure 2: Figure 2: Park boundaries were expanded in December 1996- current NKMNP boundaries are demarcated in red. Timber concessions, depicted in light blue, were retired in January 1997 and incorporated into the expanded NKMNP. Note, portions of the retired concessions fall outside of the project boundaries- more discussion on this aspect in the "Leakage" section. Source: FAN

The expansion area covered the former concessions, two small protected areas, an existing private protected area to the south (called "El Refugio") and additional buffer zones. Inside the expansion zone, the area eligible for REDD (Reducing Emissions from Deforestation and Degradation) activities was 642,184 ha of forest that had been degraded by former logging activities, was slated for future logging or predicted to be deforested.[2] It is this area that constitutes the carbon benefit generating portion of the project and is what is referred to as NK- CAP (see Figure 3

[2] Please note that the three small pre- existing protected areas within the expansion area are not included in NK- CAP (areas eligible for REDD), as they would not qualify as additional.

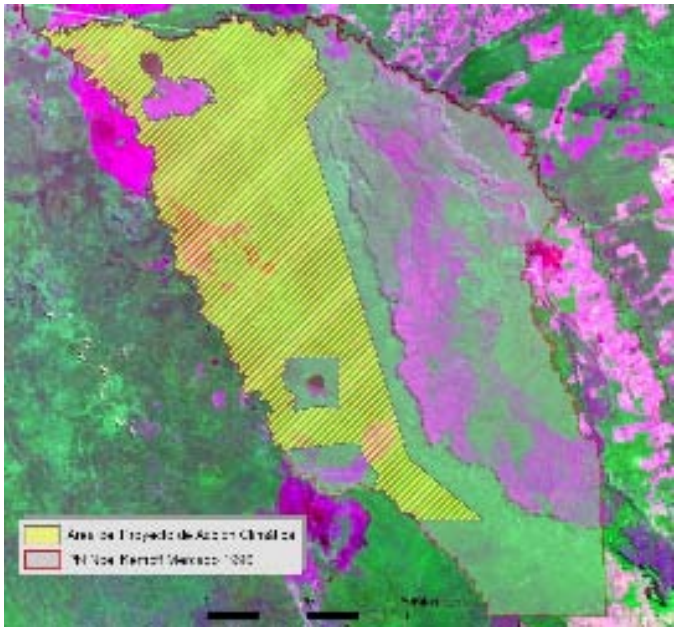

Figure 3: NKMNP current boundaries (outlined in red) and NK- CAP project section (yellow hashed). Source: FAN

On-going Protection and Monitoring

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. Project funds were used to hire 27 park rangers , new rangers' camps have been built, and equipment (motorcycles, boats, field and radios, etc.) has been provided, as have the necessary provisions (fuel, food) to execute the monitoring scheme. In 2008, as part of the monitoring plan, 664 river patrols, 9 airborne patrols, and 4 field monitoring trips were executed.

Remote sensing technology has been used to compliment field monitoring. To this end, Landsat satellite imagery taken between 1997 and 2005 shows that deforestation within NK- CAP is being effectively limited. A 237 hectare area has been lost on the right side of the Paragua River due to flooding and 17.5 hectares of land have been deforested near the community of Bella Vista (presumably by the community itself). This information was factored into the estimation of project carbon benefits (see "Carbon Benefits" section for more information on how they are determined).

Fires within NK- CAP are also being monitored using MODIS satellite imagery (Rapid Response System Fire Response products). A total of 115 fires were detected between 2001 and 2004, occurring mostly in savannah areas. Subsequently, estimates of biomass carbon stocks were discounted by 5% to cover potential carbon losses from fire.

PROJECT STRUCTURE

Various funding mechanisms exist for REDD projects, ranging from investment by project developers, grants, and philanthropic contributions to revenue generated from the sale of verified emission reduction credits. REDD and other forest carbon projects face the same obstacle of surmounting upfront costs. In the case of NK-CAP, carbon revenue was provided upfront by the three energy companies in a contracted agreement through which they were guaranteed 51percent of future certified offsets created over the 30-year project lifetime.[3]

Initial project investment for NK- CAP reached $10,850,000 over the years 1997-2006 (see Figure 4 for breakdown of contributions and Figure 5 for breakdown of expenditures).

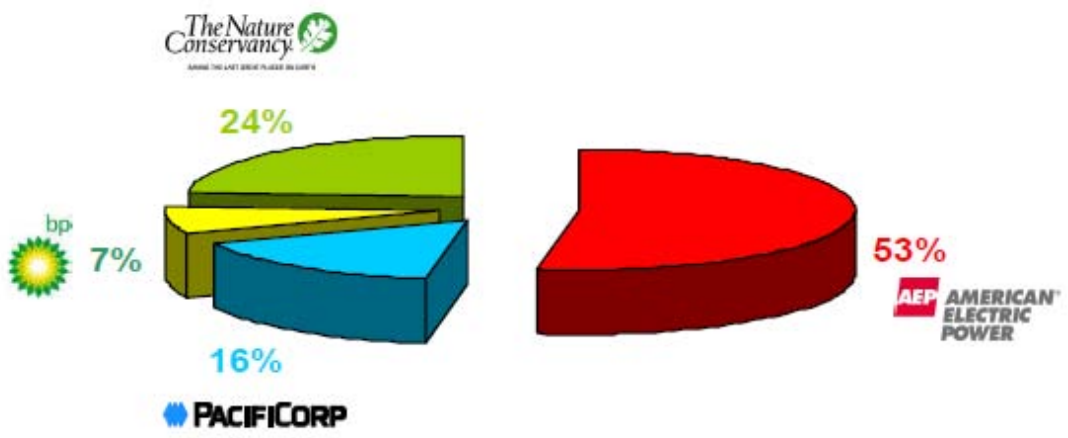

Figure 4: Breakdown of investor contributions from 1997- 2006, for a total of $10.85 million. Source: FAN

[3] Note that the word "certified" is used here instead of "verified", as this is the language use in the Comprehensive Agreement document. Generally, verification refers the official decision by an accredited 3rd party that a project both conforms to the chosen standard and carbon benefits claimed by the project are real. Certification generally occurs just after verification and is official acknowledgement of carbon credits generated from a project by the body that oversees the standard that the project conforms to.

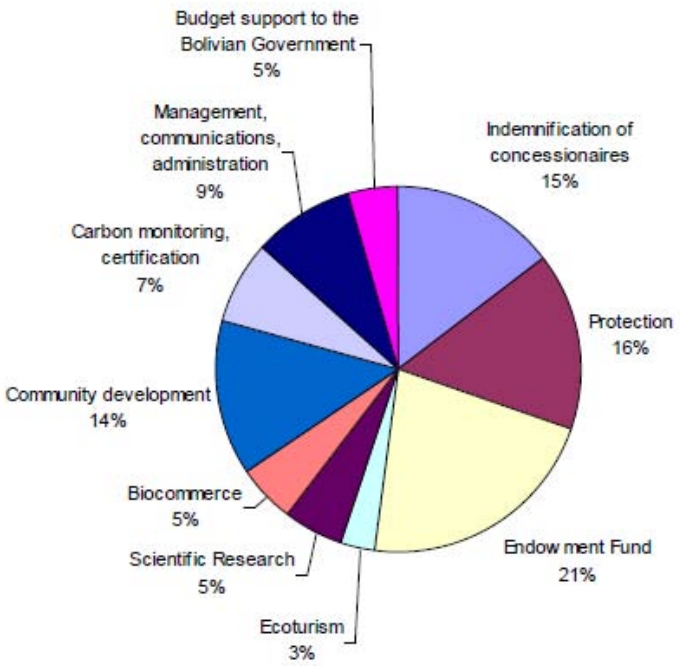

Figure 5: Project spending 1997- 2006: $11.55 million. The largest portions of funding went towards community development, timber concession buyout, park protection and the endowment fund. Please note, expenditure is greater than initial funding due to returns on the initial investment. Source: FAN

Deal Structure

Initial funding for NK- CAP was provided by The Nature Conservancy (TNC), American Electric Power (AEP), Pacificorp, and BP America. Investments, distributed by TNC to project partner FAN, financed various aspects of project implementation, including: the purchase and retiring of logging concessions, community development, carbon accounting, park management and protection (see Figure 6).

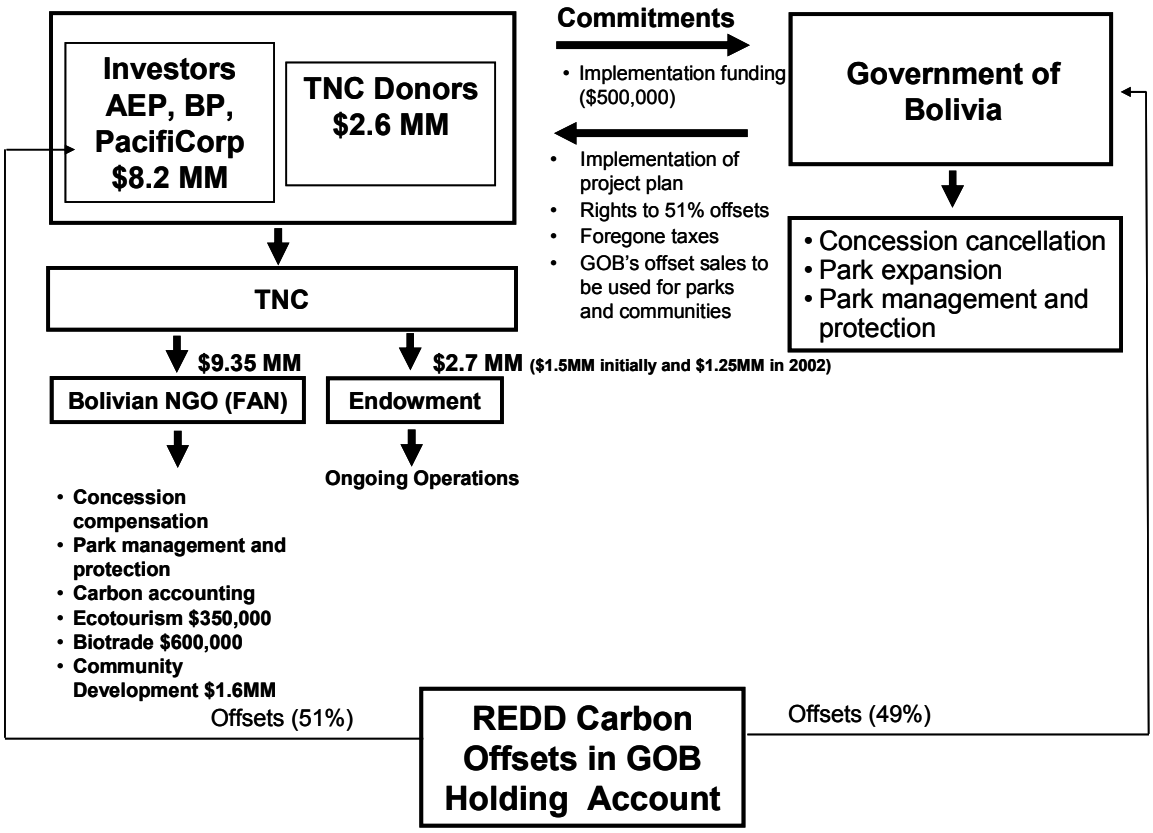

Figure 6: Deal structure for NK- CAP partners. Source: G. Fishbein

The Government of Bolivia pledged support for the project plan, closed the timber concessions, expanded the park, and agreed to use their 49 percent share of carbon benefits to fund community development, park management and protection. An endowment fund, established and managed by TNC for ongoing project operations, is detailed in the following section.

Endowment Fund

An endowment fund was created to finance long-term monitoring and protection of the park. The fund was initially begun with $1.5 million. As of 2006, it had reached nearly $3 million through philanthropic contributions and returns on investments. It has been managed by The Nature Conservancy since 1999 and finances park activities in accordance with a long-term financial plan, which is approved by the NK-CAP Board of Directors. FAN serves as the executor of activities financed by the fund and submits yearly reports on the activities supported by endowment income.

Carbon Rights

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. Of this 49 percent, the government agreed to earmark 15 percent for the protection of the park, 5 percent for the national system of protected areas, and 29 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. There are no specific allotments within this 29 percent and communities in the vicinity of Noel Kempff National Park are currently negotiating with the Bolivian Government to define their share.

The Bolivian government has expressed interest in selling part of their voluntary emission reductions (VERs) on the voluntary market. The sale of these VERs will help finance conservation and community development activities, per the comprehensive agreement.

BIODIVERSITY BENEFITS

Although the focus of REDD is carbon, forest carbon projects have the dual potential to both mitigate climate change and conserve important, biodiverse areas- if designed with this element in mind. As high biodiversity increases ecosystem resiliency in the face of climate change, the two strategies complement and enhance each other.

The Noel Kempff Mercado National Park is located in one of 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.[4] 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.[5]

The Noel Kempff Mercado Climate Action Project was designed to have beneficial impacts on biodiversity and habitats in both the expansion area and original park. Local information suggests that there are many species present in the expansion area which were not present in the original park area, including 64 species of birds, the maned wolf and marsh deer. This is likely due to major differences in habitat and vegetation between the two areas.

Despite these differences, there is general acknowledgment of an ecological interdependence between the original park and expansion area. Migration of fauna between the two areas is responsible for significant dispersion of flora. For

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[4] **IUCN**. 2000. World Heritage Nomination – IUCN Technical Evaluation Noel Kempff Mercado National Park (Bolivia). See UNESCO website: http://whc.unesco.org/en/list/967.

[5] Project Design Document Form for Afforestation and Reforestation Project Activities (CDM-AR-PDD): Noel Kempff Climate Action Project. May 2006.

example, it has been documented that parrots and macaws migrate between the areas on a daily basis, nesting in one and feeding in the other, and subsequently spreading seeds between both. Aquatic and marsh fauna are found in both areas and these populations are expected to increase significantly due to the added protection of marshlands and lagoons in the expansion area. Furthermore, several large species migrate annually between the areas, following the seasonal flow of water.

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 (Spanish acronym 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 (Spanish acronym SERNAP).

COMMUNITY BENEFITS

Well designed REDD projects can have associated community benefits, as sustainable development activities targeting local communities play an important role in lessening pressure on forest conversion. Many times it is these same local communities which are responsible for the unplanned deforestation project activities aim to prevent. Community development and involvement is often crucial to addressing root causes of deforestation and obtaining long-term buy-in and support for the project.

Over the course of NK- CAP's evolution, the importance of deeply involving communities in project design, ensuring adequate compensation for roles in projects, and respecting and bolstering indigenous rights became obvious. These elements are crucial for any REDD effort to succeed. In practice, this can be difficult if there is an initial lack of community structure, as was the case with Noel Kempff.

Communities were not well organized at the start of the Noel Kempff project; but became increasingly organized as the project proceeded (with support from the project developers). Thus, once organized, they were able to take a more active role in the project planning. Communities have been involved in the community development activities since 2001. They also fully participate in the management committee of the Park, where all operational aspects of the project are discussed.

The use of standards which support community involvement in climate change projects, such as the Climate Community and Biodiversity (CCB) standard, in the design of future projects can help safeguard adequate consideration of community concerns.

To enhance livelihoods in the 7 communities adjacent to the Noel Kempff Mercado National Park (Florida, Porvenir, Piso Firme, Cachuela, Bella Vista, and Esperancita

de la Frontera) and to strengthen their organization, two sequential programs were initiated with project funds. The Program for the Sustainable Development of Local Communities (Spanish acronym APOCOM: 1997-2001) improved access to basic services such as health, education, and communication. The Community Development Program (Spanish acronym PRODECOM: 2002 – 2006) emphasized community development by securing land titling, assisting self-organization, and supporting income generating activities such as community forestry and micro enterprise. As part of the project design, 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.

The following community development activities have been supported by the project (amongst others), resulting in overall community benefit:[6]

Organizational Empowerment

Prior to project implementation, communities surrounding the park had little to no organizational structure. Through APOCOM, the procedure for obtaining legal status for each community was carried out. Project developers assisted communities in accessing the correct government officials and preparing the paperwork to group themselves into the official Central Indígena Bajo Paraguá (CIBAPA). Today, CIBAPA is registered as an organization with legal standing and represents the indigenous communities around the park. As a group with legal standing, CIBAPA was also eligible to file for land tenure with the National Agrarian Reform Institute (INRA).

Land Tenure and Community Property Rights

Prior to project initiation, none of the communities bordering the park had property rights to the land on which they had historically resided. In 1998, FAN facilitated CIPABA's claim to 360,565 hectares of indigenous territory and this claim was accepted by the Instituto Nacional de Reforma Agraria (INRA- see Figure 7Figure 7). In June 2006, the official title for the indigenous territory was granted to CIBAPA (called "TCO"- Spanish acronym for indigenous territory).

[6] As per the 2005 socioeconomic impact assessment: Calderón Angeleri, Natalia. Livelihood Impact Assessment: NK- CAP, Bolivia, November 2005. Annex 6 of PDD.

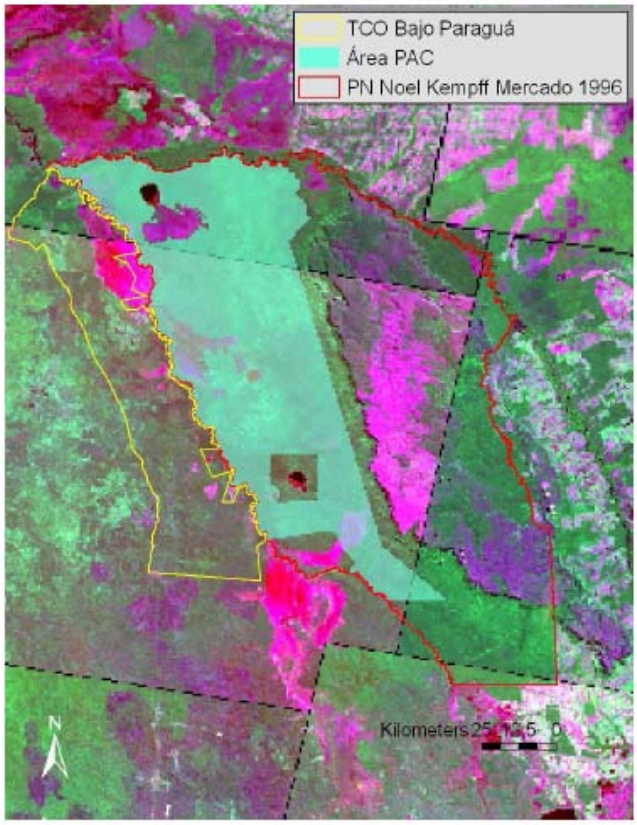

Figure 7: Indigenous Territory (or TCO), outlined in yellow, is located just adjacent to the expanded NKMNP. Source: FAN

Landuse Planning and Capacity training

To enhance livelihoods and to mitigate leakage, the project financed the creation of a land use plan for the newly titled indigenous territory (TCO). Through the efforts of a consultancy team, FAN, CIBAPA and NKMNP, the Bajo Paragua Native Communal Land Natural Resources Management Plan was developed and four 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.

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.

Health Outpost

In the community of Florida, a pre- existing health clinic, which was in very poor condition, was refurbished and expanded 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. An ambulance is running as part of an agreement with the Municipality of San Ignacio and money was invested to purchase medicine which is administered by community members. Also, a doctor was hired to live in Piso Firme and make periodic visits to all of the communities.[7]

Income Generation

Sustainable Forestry

Amongst other income generating activities, the project supported the establishment of a sustainable community forest concession, guided by a sustainable management plan, within the TCO. Today, 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.[8]

Ecotourism

A visitor center was constructed with the aim of fostering income generation through tourism activities. Cabins were built and repaired in several communities, boats and equipment purchased, and a pontoon bridge constructed for vehicle transportation. Two communities participated in tourism activities by offering guidance, lodging, and other services. Unfortunately, it became quickly apparent that due to the remote location of NK- CAP, travel to the site by tourists would be both difficult and expensive. Thus, the realized benefits via ecotourism have been fewer than originally anticipated.

Botanical Research and Development

A program aimed at expanding the scientific capacities of FAN, while identifying marketable wild plants and products, was started. The GermoFAN laboratory was established with the goal of producing in vitro native plants, such as orchids, that would generate income through their sale. 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. Today, 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, as returns on the initial investments were too small and a strong market didn't exist. This included the creation of "Canopy Botanicals", a company whose aim was to

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[7] Calderón Angeleri, Natalia. Livelihood Impact Assessment: NK- CAP, Bolivia, November 2005. Annex 6 of PDD

[8] Carbon emissions from timber extraction and agriculture within the TCO was NOT subtracted from the carbon benefits of the project. Since it lies within a former timber concession, extraction would have been the BAU state. Furthermore, since this land is now being managed with sustainable forestry practices, emissions from the tract would actually be less than BAU. Hence, this does not count as leakage and needs not be deducted.

develop products in three market sectors: organic foods, botanicals and ornamentals. The company promoted sustainable development as well as the equitable distribution of economic benefits to supplier communities but ultimately failed due to low returns.

CARBON BENEFITS

Carbon benefits resulting from REDD project activities are calculated as the difference between what would have been lost without project activities (the baseline) and the emissions attributable to the project, minus any deductions for leakage, uncertainty and impermanence buffers. The carbon benefits achieved between 1997- 2005 by the Noel Kempff Mercado Climate Action Project were verified by Société Générale de Surveillance in 2005, using rigorous standards based upon those described in the Kyoto Protocol's Clean Development Mechanism. This verification made NK-CAP the first forest emissions reduction project to achieve such a standard, and demonstrates that REDD activities are capable of generating scientifically measurable, real, and verifiable carbon benefits.

Two distinct project components are generating carbon benefits within NK- CAP:

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 (GEOMOD) land use change model (see "Baseline" section for a detailed description), using Landsat imagery to estimate historic deforestation rates and modifying these rates based on monitoring from a reference area with comparable socioeconomic characteristic demands. As a result of the project, 763 ha were saved over the 1997- 2005 verification period, corresponding to 371,650 tCO^2e.

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. 468,474 square meters of timber slated for harvest were protected over the 1997 – 2005 verification period, corresponding to an avoided 791,443 tCO^2e. The baseline harvest was modeled using an advanced statistical model (see "Baseline" section for a detailed description), simulating domestic/international timber supply and demand at different scales: national, regional, and project level.[9]

Thus, the project (through both activities) generated a total carbon benefit of **1,034,107 tCO^2e over the 1997- 2005 verification period.** The annual breakdown of these benefits is shown in Figure 8.

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[9] Sohngen, B. and Brown, S., 'Measuring leakage from carbon projects in open economies: a stop timber harvesting project in Bolivia as a case study', Canadian Journal of Forest Research 34 (2004), 829 – 839.

Year	Carbon Offsets Component A (tCO2)	Carbon offset* Component B w/o leakage (tCO2)	Leakage Component B (tCO2)	Total Carbon Offsets (tCO2)	Emissions from Project Activities (tCO2)	Net Carbon Offsets (tCO2)
1997	56,401	48,180	7,264	97,317	168.59	97,148
1998	40,304	59,374	9,141	90,539	210.71	90,328
1999	39,783	69,931	10,960	98,753	281.81	98,472
2000	43,417	79,889	12,731	110,578	204.43	110,373
2001	41,158	89,298	14,454	116,003	166.81	115,836
2002	40,238	98,190	16,130	122,298	132.34	122,166
2003	33,972	107,081	17,589	123,462	108.65	123,353
2004	31,684	115,632	18,971	128,347	102.2	128,244
2005	44,693	123,867	20,277	148,282	96.39	148,186
1997 till 2005	371,650	791,443	127,516	1,035,578	1,471.93	1,034,107

Figure 8: Carbon benefits generated by NK- CAP. Source: Noel Kempff PDD

History of Estimated Lifetime Carbon Benefits

The total carbon benefits from NK-CAP are expected to reach 5,838,813 tCO^2e over the life of the project (1997-2026).

The estimate of lifetime carbon benefits has been recalculated several times since the project began, resulting in considerable reductions from initial estimates and increases in accuracy. These changes, driven primarily by adjustments to the avoided deforestation and avoided degradation baselines, are a result of the pioneering nature of the project, which broke ground on methodologies for estimating baselines.

As a result of methodological advances, estimated lifetime carbon benefits were ratcheted down from the initial estimate of 53,093,442 tCO2e calculated in 1996, to the current estimate of 5,838,813 tCO2e calculated in 2005. The large decrease in the lifetime carbon benefit estimate is due primarily to a shift in reliance on interviews, secondary data sources, and reference documents from other parts of the world, to site specific studies, field measurements and advanced models, which are more robust and accurate.

See the "Baseline" section for a more in depth discussion of the current methodology being used to determine baselines for both the avoided deforestation and avoided degradation components of the project.

ADDITIONALITY

A project is termed "additional" if the emissions reductions experienced through project activities would not have been possible without the project. Determination of additionality is based upon the business-as-usual (BAU) scenario (in other words: what would have happened without the project?) and requires that the with-project

scenario result in fewer emissions than BAU. Additionality is a requirement for the verification of carbon benefits and must be proven for verification to be granted.

Several tests are typically used to demonstrate a project's additionality, specifically: Were project activities required by law? Would project activities have been financially possible otherwise? Were the project activities common practice? An answer of "no" to all three questions helps to establish additionality. NK-CAP met these tests of additionality on all three grounds.

NK- CAP was not required by Bolivian law to occur. Although there was a pre-existing park adjacent to the expansion area, expansion was not planned or required. A feasibility study, conducted prior to project implementation, demonstrated that the Government of Bolivia did not have the necessary funds or political will to close the forest concessions and expand the park. The funds provided by the project enabled changes to the status quo, by financing the buyout of timber concessions, the expansion of the park, and the community development activities aimed at reducing forest conversion. Without the project, logging would have continued in the concessions and deforestation would have spread around new settlements and communities lacking land titles, as this was the common practice.

As the Noel Kempff Mercado Climate Action Project fulfilled these requirements, the final, and most important, step to demonstrate additionality was to establish the business as usual emissions from the deforestation and degradation scenario and show that the project would reduce emissions below this baseline.

Baseline

A project baseline is the "without-project" or business-as-usual scenario; predictions of what would have happened had the project not been put into place. Methods of determining baselines range from the simple (basic historical data) to the complex (sophisticated computer models). The difference between the baseline and "with-project" scenarios is the first step in determining the carbon benefits of a project.

As the emissions reductions achieved through the Noel Kempff Mercado Climate Action Project were the result of a two-pronged strategy (avoiding deforestation and degradation), they were treated separately in the calculation of the project baseline. Both baselines have been re-estimated several times over the course of the past 10 years as new information, methods and technology became available, increasing the accuracy with each revision. Moving forward, the project baseline will be reevaluated every 5 years to maintain optimal accuracy.

Avoided Deforestation

The creation of an avoided deforestation baseline in NK-CAP involved 3 steps: 1) determination of deforestation rates, 2) determination of likely locations for future

deforestation, and 3) determination of emissions resulting from anticipated deforestation.

Using satellite imagery from 1986, 1992 and 1996, it was possible to calculate historical deforestation rates in the project area. The location of future deforestation was simulated with the spatially explicit GEOMOD land use change model[10] using historical deforestation information as input. The model identified lands within the project that were statistically the most likely to be cleared, based on several deforestation drivers (distance to roads, towns, rivers, forest edge and prior disturbance). GEOMOD outputs provided a forecast of the forest area likely to be cleared over the following 30 years.

While remote sensing technology and modeling like GEOMOD can provide the estimated *area* of forest loss, estimating *emissions* from that forest loss involves measuring the carbon stock of the vegetation in the area. In NK-CAP, in order to quantify the emissions associated with the deforestation predicted by GEOMOD, it was necessary to assign vegetation classes to the areas predicted by GEOMOD to be cleared and to determine the carbon stocks associated with each vegetation class (different vegetation classes have different associated carbon stocks).

To this end, 625 permanent plots were established in NK- CAP to measure and monitor carbon stocks associated with the various vegetation classes found within project boundaries (including all carbon pools: aboveground and belowground biomass, litter, dead wood, and soils to 30 cm depth). Once these carbon stocks were estimated, the areas predicted to be cleared by GEOMOD were assigned a vegetation class (using Landsat imagery and on-the-ground observations). These carbon stocks, which were presumed cleared in the baseline scenario, were then converted into avoided carbon emissions.

Monitoring the Baseline

The avoided deforestation baseline will be re-evaluated every 5 years to capture any changes in institutional structure, law, national deforestation rates, etc. that would reduce the estimate's accuracy. 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 field samples 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.

[10] Myrna Hall, Geographical Modeling Services Inc.

Avoided Degradation

The avoided degradation baseline was determined using an econometric model of Bolivian timber markets, developed by Brent Sohngen and Sandra Brown[11], which projected the expected pathway of future harvests in Bolivia, both within the project area and the country as a whole (important for leakage analysis). 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. The baseline scenario predicted the volume which would have been harvested in the former concessions had the project not been undertaken. Within this baseline estimation of carbon emissions, damage due to logging, decomposition of dead wood, carbon storage in dead wood products and the difference in regrowth between logged and unlogged areas were all considered. Aboveground biomass and dead wood were the only carbon pools included in the calculations. For the calculation of carbon benefits and leakage estimation, the model was also run for the "with-project" scenario, both within the project area and for the country as a whole.

Monitoring the Baseline

Economic data for the Bolivian timber market was monitored through 2006 for use in re-implementation of the dynamic optimization model. In order to accurately estimate damage due to logging activities and to detect potential differences in regrowth rates between logged and unlogged areas, 102 plots (dubbed Carbon Impact Zones or CIZs) were established in a logging concession adjacent to the project area (named Cerro Pelao). From this, it was determined that the difference in regrowth between logged and unlogged areas was not statistically significant.

LEAKAGE

Leakage comes in two forms: activity-shifting (or primary) leakage and market (or secondary) leakage. Activity-shifting leakage occurs when a project causes carbon-emitting activities to be shifted to another location, canceling out some or all of the project's carbon benefits. Market leakage, on the other hand, occurs when changes in supply subsequent to project initiation affect market prices, thus increasing activity intensification elsewhere. Projects must analyze the risk of, compensate for, and monitor leakage as part of project management in order to accurately predict carbon benefits.

Since it was possible that project activities could displace emissions elsewhere, every attempt was made to account for the quantity of potential leakage, while specific safeguards were also built into the NK-CAP project design to help avoid leakage. As there were two emissions reduction activities occurring in the project (avoided deforestation and degradation), they were treated separately in the leakage analysis.

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[11] Sohngen, B. and Brown, S., 'Measuring leakage from carbon projects in open economies: a stop timber harvesting project in Bolivia as a case study', Canadian Journal of Forest Research 34 (2004), 829 – 839.

Avoided Deforestation

Estimation and Prevention of Leakage

Since the establishment of the project, the largest short-term risk for activity shifting leakage existed from the communities living along the border of the extended park area. As such, these communities were the focus of leakage prevention activities associated with the project design, including educational campaigns, workshops in sustainable agriculture, application for land tenure and development of a management plan for ancestral lands. It was estimated that there was no risk of activity shifting leakage from avoided deforestation activities if the prevention activities detailed below were carried out.

Perhaps the most successful aspect of the community development leakage avoidance activities was the creation of a 360,565 hectare TCO (officially titled indigenous territory). Border communities helped design the Bajo Paragua Native Communal Land Natural Resources Management Plan for this area and sustainable forestry activities undertaken in the TCO lessened pressure to deforest within project boundaries.

The sustainable harvesting activities occurring in the TCO are NOT counted as primary leakage. As the TCO's forestry use lies almost completely inside the area of former timber concessions (see Figure 9), this is not an increase in emissions as a result of the project- logging would have occurred there anyway as it was BAU within the former concessions. The community forestry activities actually result in fewer emissions than would otherwise occur, due to the switch to sustainable management.

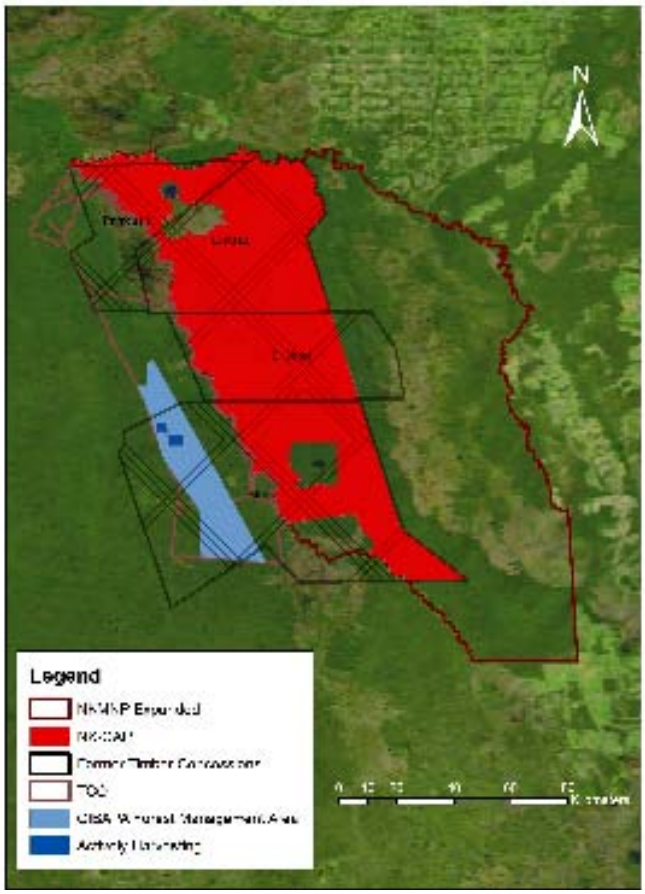

Figure 9: The sustainable forestry activities carried out by border communities fall almost entirely within the former timber concessions (black hatched). Source: FAN

Monitoring Leakage

The project used a geographically based method to detect leakage, employing a 15 km buffer around the borders of the NK-CAP zone to capture possible activity shifts (see Figure 10). 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, without access to cars or other personal transportation, would travel large distances to deforest elsewhere.

A baseline deforestation scenario for the buffer zone was created in the same manner as for the NK-CAP itself. If leakage were occurring, the deforestation rate in the buffer area would be higher than in its baseline scenario and the difference between the two would be the leakage, after standardizing for any changes in overall deforestation rate represented by the reference area.

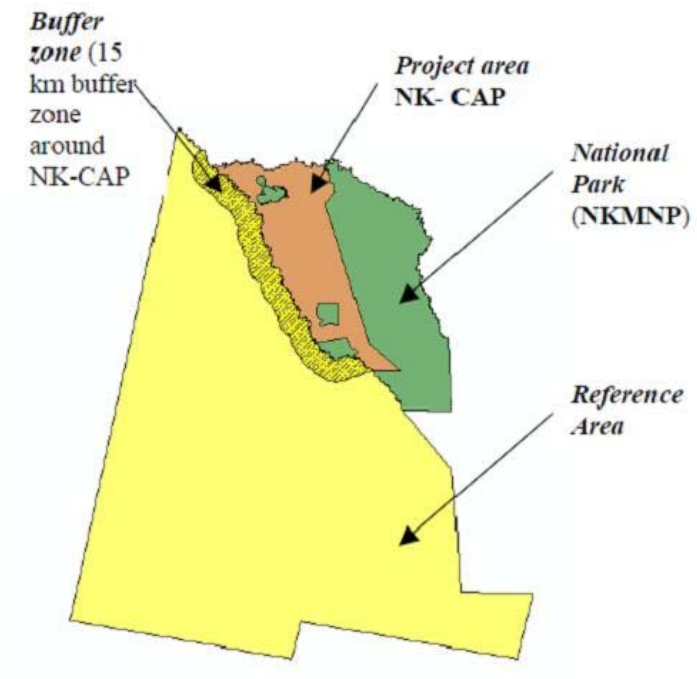

Figure 10: Map of NK- CAP project area, original NKMNP, buffer zone (for leakage analysis), and reference area (for baseline monitoring). Source: NK- CAP PDD

Subsequent monitoring has revealed that deforestation in the buffer zone is actually lower than that which was predicted in the buffer baseline, leading to the conclusion that no activity- shifting leakage is currently occurring for the avoided deforestation aspect of the project.

Avoided Degradation

Estimation and Prevention of Leakage

In estimating potential market leakage, project developers ran into difficulties teasing out the effects of project activities from the overall 75% reduction in timber concessions mandated by the Bolivian government in 1996, as well as insufficient data on harvests and prices prior to 1996. For this reason, it was decided not to compare harvests in other concessions over time, but to instead employ the dynamic optimization timber model developed specifically for Bolivia by Brent Sohngen and Sandra Brown (see "Baseline" section for a detailed description). The difference between the modeled total annual timber production for all of Bolivia "without-project" was compared with the modeled total annual timer production for all of Bolivia "with-project". Various scenarios of price elasticity and capital constraints were explored, resulting in estimates of 14-44% leakage. The higher leakage scenario illustrates one that prices are highly sensitive to supply changes. Because timber prices in Bolivia are not highly sensitive to supply changes (the country is considered a "price-taker" not "price-setter"), a final leakage estimate of 14% was used. Calculated leakage from 1997- 2005 totaled **127,515 tCO^2e** and was subtracted from the carbon benefits for that verification period.

The purchase and retiring of harvesting equipment from concessionaires was a key leakage prevention activity undertaken for NK-CAP. Many concessionaires take out loans when purchasing equipment, thus must harvest to generate income and pay off the loans. Purchasing and retiring the equipment took away the need for concessionaires to continue with harvest activities. Furthermore, it prevented the possibility for equipment to be sold inexpensively to other harvesters when the indemnified concessionaires left the business. Otherwise, the equipment could have contributed to the expansion of harvest activities elsewhere.

Monitoring Leakage

In order measure potential activity shifting leakage, it was necessary to follow the activities of the concessionaires after they relinquished their holdings. The Agreement to Prevent the Displacement of NK- CAP Environmental Benefits, signed on January 16, 1997 by the former concessionaires, prevented them from initiating new logging activities for a period of five years, as well as allowed FAN to track their activities outside the project area.

FAN closely tracked the expenditures of indemnification funds made by these individuals, most importantly to determine if funds were reinvested into other concessions. This monitoring revealed that the majority land holder left the timber industry entirely, while the minority holder re-invested a small amount (7.3% of the indemnification funds) into a nearby concession, which underwent harvests in 1997 and 1998. This was not counted as primary leakage in the analysis because a portion of the harvests had already been modeled in the Bolivian timber model, thus to count them here would be double-counting.

As explained in the previous section, community forestry activities in the TCO (indigenous territory) were not considered leakage, since activities occur within former timber concessions and are planned to be far less intense than harvest regimes previously used. However, timber extraction is still being monitored in the area to assure that communities harvest according to the sustainable management plan.

PERMANENCE

Permanence refers to how robust a project is to potential changes that could allow for stored carbon to be released at a future date. Although all sectors have the potential for impermanence, forest carbon projects face particular scrutiny due to a perceived risk that poor management, fire, pests, etc. can lead to the destruction of forest and the subsequent release of emissions. Various strategies can be used to safeguard against impermanence, including the purchase of conservation easements, creation of protected areas, community development, establishment of project management and monitoring endowments, the use of carbon buffers, etc. Ultimately, strategies must be tailored to the particular project site and situation.

Permanence of carbon benefits generated by the Noel Kempff Mercado Climate Action Project is safeguarded by legal, financial and institutional means. The project area has been incorporated into a national park, as legally designated by the Government of Bolivia, with effective protection under the auspice of the National Service of Protected Areas (SERNAP) and FAN Bolivia as the project administrator. Through the project, an endowment has been established to fund the protection and management of the expanded Noel Kempff Mercado National Park in perpetuity, including rangers, equipment, and infrastructure to protect the park. After the project ends, the endowment fund must be used for the benefit of the Noel Kempff Mercado National Park according to the endowment fund agreement. Risk of fire was considered in the calculation of project carbon benefits as a 5% discount, using the actual occurrence of fires prior to the first verification to determine this number.

VALIDATION AND VERIFICATION

A two-step process exists for independent, third-party review of carbon projects. The first step, validation, is a process designed to confirm that the Project Design Document (PDD) meets the stated requirements and identified criteria of the specific voluntary or compliance market project standard under which the project has been designed. Verification is the second step, a process by which claimed carbon benefits from a validated project are confirmed. These procedures were created to ensure that projects are of high quality and the benefits generated by them are real and measurable.

When the Noel Kempff Mercado Climate Action Project was first begun in 1996, there were not any specifications for carbon project design or validation. However, the United States, as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), had begun a program called the United States Initiative on Joint Implementation. The project was submitted under these guidelines, and received approval in 1996. After the U.S. failed to ratify the Kyoto Protocol, this system became obsolete. Since REDD projects were also excluded from the Kyoto Protocol's Clean Development Mechanism, it was not possible to validate or verify NK-CAP under a compliance regime.

Thus, the NK-CAP PDD underwent an ex-post validation assessment in August 2004. The validation was executed by Société Générale de Surveillance (SGS), registered as a Designated Operational Entity to the Clean Development Mechanism (CDM). As no official REDD voluntary standard existed at the time of project initiation, SGS, in coordination with TNC, created their own methodology based upon the CDM, and validated/verified against this protocol. SGS applied the CDM guidelines for afforestation/reforestation-projects (as defined October 2005). In particular, the project's additionality, baseline, potential leakage, monitoring plan and environmental and social impacts were assessed against the relevant UNFCCC and Kyoto Protocol requirements (where appropriate), host country criteria and the guiding principles of completeness, consistency, accuracy, transparency and scientific appropriateness.

The first attempt at validation resulted in several Corrective Action Requests (CARs) to improve the PDD. These corrections were made and the project received validation from SGS in 2005. It is important to note that although the project standards were *based on* the CDM guidelines, Reducing Emissions from Deforestation and Degradation (REDD) does not currently represent an eligible emissions reduction activity under the CDM.

Validation Findings

SGS' opinion is that the project does currently meet the relevant criteria for CDM project activities and fulfils the principles detailed above.

SGS validation statement, Executive Summary, November 2005

Project Design Document (PDD)

The Project Design Document (PDD) of NK-CAP, including all methodologies applied and related annexes can be downloaded at:
http://conserveonline.org/workspaces/climate.change/ClimateActionProjects/NoelKempff/NKPDD/PDDZip/view.html

The Noel Kempff Mercado Climate Action Project had the same entity, SGS, complete the verification processes. During an initial site visit in 2004, several findings were made that required additional data and clarification of methodologies. The requested changes were subsequently made, and additional information provided, leading to verification of the emission reductions in 2005 for the period of 1997-2005 (see Figure 8 in the "Carbon Benefits" section for the annual breakdown). A total of **1,034,107 metric tons of CO^2** were verified.

Verification Findings

SGS' opinion is that the project has implemented a monitoring plan and prepared a monitoring report that determines additional sequestration and emissions reductions due to the project's activities in a manner consistent with the principles detailed above. Consequently, SGS verifies the voluntary emissions reductions claimed by this project as outlined in the Schedule of Achieved Voluntary Emissions Reductions (SAVER) that accompanies this verification opinion.

SGS verification statement, Executive Summary, November 2005

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