

**RESTORING THE CANTAREIRA WATER SUPPLY SYSTEM: CARBON, COMMUNITY
AND BIODIVERSITY INITIATIVE**

CPA#1 REFORESTATION OF AREAS ADJACENT TO THE CACHOEIRA RESERVOIR

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**SECRETARIA DO
MEIO AMBIENTE**



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List of Acronyms

Afforestation and Reforestation	A/R
Brazilian Institute for the Environment and Renewable Resources	IBAMA
Brazilian Institute for Geography and Statistics	IBGE
Carbon dioxide	CO ₂
Carbon, Community and Biodiversity	CCB
Clean Development Mechanism	CDM
CDM Program Activity	CPA
Conservation International Brazil	CI-Brazil
Critical Ecosystem Partnership Fund	CEPF
Diameter at Breast Height	DBH
Geographic Information System	GIS
Global Position Satellite	GPS
Greenhouse Gas	GHG
Instituto BioAtlântica	IBio
Intergovernmental Panel on Climate Change	IPCC
Land Use, Land-Use Change and Forestry	LULUCF
Leakage	LK
Legal Reserve (<i>Reserva Legal</i>)	RL
Permanent Preservation Area (<i>Área de Preservação Permanente</i>)	APP
Program of Activities	PoA
The Nature Conservancy	TNC
United Nations Educational, Scientific and Cultural Organization	UNESCO
United Nations Framework Convention on Climate Change	UNFCCC
Voluntary Carbon Standard	VCS

A. GENERAL DESCRIPTION OF THE PROPOSED PROGRAM ACTIVITY (CPA)

A.1. Title of the PoA to which the CPA is added

Watershed Restoration in the Cantareira Water System: Carbon, Community & Biodiversity Initiative

A.2. Title of the CPA

Restoring the Cantareira Water Supply System: Carbon, Community and Biodiversity Initiative

CPA #1. Reforestation of areas adjacent to the Cachoeira Reservoir

A.3. Description of the CPA

Located along Brazil's Atlantic coast, the Atlantic Forest encompasses Latin America's largest population centers, including São Paulo and Rio de Janeiro, and generates 80 percent of Brazil's Gross Domestic Product. Coastal development, rapid urbanization, and large-scale agriculture and industry, especially over the last century, have reduced the forest to about 7 percent of its original extent¹. What remains, however, constitutes one of the greatest repositories of biodiversity on the planet, with more than 20,000 known species of plants alone².

The CDM Program Activity (CPA) described in this document will restore native vegetation to an area of 185.56 hectares (ha) surrounding the Cachoeira Reservoir, one of five major reservoirs in a water system known as Cantareira that supplies the city of São Paulo, Brazil, and its metropolitan area. The Cantareira water system supplies potable water to 9 million people in the city of São Paulo, Brazil, and to the largest industrial park in South America. The reforestation areas are located in the municipality of Piracaia, in the state of São Paulo.

Forests are fundamentally important to the maintenance of water quality, regular outflow, and sediment filtration of the reservoir. These are basic needs for the maintenance of the Cantareira System and thus, of direct and immediate interest to Sabesp, the company that administers this system. Agriculture, ranching, and, more recently, intense urban development have caused the deforestation of this region, even though many areas, particularly around rivers, creeks, lakes, and reservoirs, are identified as Permanent Protection Areas (APP, in Portuguese).

The program activity proposed here involves a number of institutions, each with a specific goal within the project. The institutions involved are The Nature Conservancy-Brazil (TNC-Brazil), the São Paulo State Water Supply (Sabesp, Companhia de Saneamento Básico do Estado de São Paulo), the Prefeitura de Piracaia, the São Paulo State Secretary for the Environment (SMA-SP) and the Dow Chemical Company Foundation. TNC-Brazil and Sabesp are project executors. All institutions involved understand the unique and lasting opportunity to restore and conserve forests on a massive

¹ Fundação SOS Mata Atlântica, 1998

² The Nature Conservancy

scale if resources from water-user fees can be leveraged by private funds and combined with financing from carbon funds.

This CPA will contribute to climate mitigation by increasing carbon stocks through the growth of trees, promote biodiversity conservation by restoring a native ecosystem, and bring community benefits in the form of increased water quality, direct work opportunities during the reforestation process, technology transfer and the dissemination of information regarding climate change.

The reforestation will take place on lands surrounding the Cachoeira Reservoir, all owned by Sabesp, which are currently under non-permitted use by neighboring cattle ranchers for grazing.

Program activities intend to reestablish the form and, above all, the natural function of the riparian ecosystem.

The main purpose of the program activity is to restore the environmental integrity of the area, specifically:

1. To contribute to climate change mitigation by increasing carbon stocks through the growth of planted trees and the enhancement of natural regeneration;
2. To support biodiversity through the reforestation of native forest species;
3. To improve the quality of water in the Cachoeira Reservoir;
4. To improve soil management.

This PoA will contribute to climate mitigation by increasing carbon stocks through the growth of trees. It will also promote biodiversity conservation by restoring and maintaining a native ecosystem. Finally, the PoA brings community benefits in the form of direct work opportunities during the reforestation process, technology transfer and dissemination of information regarding climate change and the value of standing forests, and improved water and soil quality in the region.

TNC provides funding for all costs associated with the reforestation and maintenance, as well as the resources necessary for drafting this PoA and certifying it for the voluntary market. A local cooperative will carry out the restoration activities, including planting and maintenance. The entire process will be monitored and documented following procedures based on CDM approved methodologies.

Reforestation techniques will depend on the current condition of the land, and will include assisted natural regeneration, collection and planting of seeds, and direct planting of seedlings of native species. Current land cover within the CPA boundary includes areas with several levels of degradation, from pasture lands with no regenerating individuals to very degraded forest fragments with a significant number of regenerating individuals.

Dow Foundation, as voluntary promoter of the carbon project, has agreed to provide financial support for organizational, technical and public awareness costs of this project and requires that the PoA DD be certified by CCB. Part of implementation costs will be paid for by Dow. Dow will not claim the credits to offset any of their emissions; instead, it will yield the rights for TNC and Sabesp to trade the credits and establish a revolving fund to promote similar initiatives in this watershed.

TNC and Sabesp agree to equally share the rights to any carbon offset credits generated by the reforestation activities. These credits will be negotiated in voluntary carbon markets, and the revenues

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will be destined completely to restoration around the Cachoeira Reservoir, including financing the reforestation activities proposed by this project.

A.4. PoA and CPA Participants

Role	Name of Entity	Private/public
Coordinating and managing entity/ CPA Implementer	The Nature Conservancy Brazil (TNC-BR)	Private
CPA Participant	Sabesp	Public/Private
CPA Participant	Prefeitura de Piracaia	Public
CPA Participant	Secretaria do Meio Ambiente – State of São Paulo	Public

A.5. Description of location and boundary of the CPA**A.5.1 Identification of the CPA****A.5.1.1. Host party(ies) of the CPA**

Brazil

A.5.1.2. Region, state, province, etc

The CPA will take place in the State of São Paulo, southeastern Brazil.

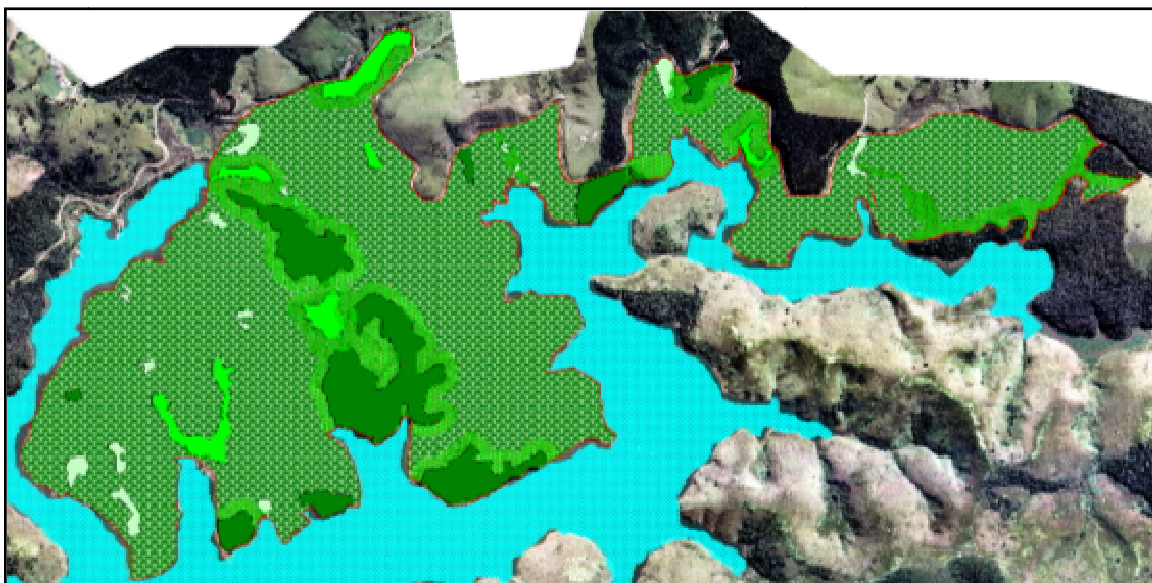
A.5.1.3. City, town, community, etc

Municipalities affected: Piracaia.

A.5.2 Detailed geographic delineation of the boundary of the CPA, including information allowing the unique identification of the proposed CPA

The Cachoeira Reservoir, formed by damming the Cachoeira River, is part of the Cantareira System and is located in the municipality of Piracaia in the state of São Paulo, located about 90 km Northeast of the state capital (see Figure 1, which outlines the boundaries of the five watersheds that compose the Cantareira system). Opened in 1974, the reservoir collects water from the Cachoeira Watershed and contributes 5,000 liters per second to the system. Water comes mainly from the Cachoeira River

Figure 1: Location of the Cachoeira Reservoir (outlined in yellow) within the Cantareira System



Current Land Cover	hectare
Secondary Forest	37,00
Degraded Sec. Forest	12,00
Highly Deg. Sec. Forest	7,00
Non-Forest High PSR	62,00
Non-Forest Low PSR	238,00
TOTAL	356,00

Figure 2: Areas surrounding the Cachoeira Reservoir where the project will be executed



Figure 3: General view of the main body and banks of the Cachoeira Reservoir

Foto: Latã Cannabrava/ISA (Dec 2003)

A.5.3 Current environmental conditions of the land for the proposed CPA, including the geology, climate, and vegetation cover

A.5.3.1. <i>Geology</i>

Piracaia is located in the southeast of São Paulo State within the Mantiqueira Mountain Range. It is within the southern part of the Serra do Mar Plateaus, the region that divides the watersheds of the Paraná and the Paraíba Rivers (CETEC, 2000).

The CPA region is located in the Peripheral “Periférica” Depression and in the Atlantic Plateau of the Mantiqueira Mountains, located in the Mantiqueira geotectonic province (Amorim Filho, Rigotti, & Torres, 2002). The Cantareira System extends over mountainous terrain with steep, exposed cliffs, and varies in altitude from 880m to 1680m above sea level (Mazzei, 2007). This geomorphological region is characterized by evidence of tectonic movement, with marks of fault lines, block dislocations, and faults (IPT, 1981).

Piracaia is located in the western portion of the Mantiqueira Mountains, and according to Almeida (1964), this region includes reliefs of “connected cliffs with finger-like ridges, parallel hills, elongated mountain ranges, and mountains with deep valleys”, whose “highland frontal zone thoroughly receded from its original alignment because of the expansion of the Paraíba basin, through the erosion caused by its tributaries, the Jaguari and Buquira Rivers”, which also make clear the perfect adaptation of drainage in the direction of regional gneissic structures (Almeida, 1964). The drainage of the area includes trails laid out along a well-marked straight line, showing the strong influence of the direction of the important fracturing.

Further geological features of the PoA zone are described in the PoA DD.

A.5.3.2. <i>Climate</i>

The project area is located in a highland subtropical environment, falling under the Köppen classification of Cwb. This tropical location at high altitude is characterized by dry winters and temperate summers.

The average annual temperature of Piracaia is 24°C. Records in Piracaia show average annual rainfall is 1440 mm, with a dry season from June to August (DAEE/SP, 2008). However, precipitation is higher in the reservoir areas (east of the city) where averages can be higher than 1700 mm per year (CETEC, 2000). A dry season stretches from April to September, with the driest months from July to August (DAEE/SP, 2008).

The climate of the region is described further in the PoA document.

A.5.3.3. <i>Vegetation cover and land use</i>
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The Cachoeira Reservoir is located within the range of the Atlantic Forest, an extremely diverse and threatened biome that stretches along Brazil's Atlantic coast. Because of its isolation from other major rainforest blocks in South America, the forest structure of the Atlantic Forest contains multiple canopies that support an extremely rich vegetation mix.

Today, less than 10% of the Atlantic Forest remains, and the remaining fragments are interspersed between pastures, urban areas and fields used for crops. Today only about 21% of the Cantareira area is still covered with Atlantic Forest, and these remnants are very fragmented (Whately & Cunha, 2007).

All five watersheds of the Cantareira system have more than half of their territories occupied by human activities. The Cachoeira River basin, where the Cachoeira Reservoir is located, is in the worst situation with almost 80% of its area occupied by pasture lands, agriculture, silviculture and exposed soil. Remnants of Atlantic Forest cover only 17.5% of the area (Whately & Cunha, 2007). This is the situation today in spite of the fact that it is the only watershed in the system where the lands around the reservoir belong to a single owner, Sabesp.

In the project area around the Cachoeira Reservoir, only 49 ha of forest fragments (secondary and degraded secondary) remain, and the rest is covered with gramineous forage destined to raising cattle. According to the São Paulo State Environmental Agency, the municipality of Piracaia is located in a corridor of the Mantiqueira Mountains that is of high importance for restoration and has been designated a priority area (M.A. 224 Cantareira Corridor – Mantiqueira) because of its very high (*muito alto*, M.A.) importance for biodiversity and extremely high priority of action.

The land surrounding the Cachoeira Reservoir is classified into five different categories, based on current land use/cover, and therefore carbon content:

Secondary Forest

A secondary forest fragment is a forested area of more than five hectares with low edge effect, few or no invasive species and high number of native trees and shrubs. These forests have a well-defined canopy, with trees of up to 20 m of height. Under the canopy strata there is a dense forest understory with many late-successional trees and shrubs, distributed in several diameter classes. Typical woody species of this forest are *Cabralea canjerana*, *Cedrela fissilis* and *Machaerium villosum* in the canopy strata and *Mollinedia elegans*, *Psychotria vellosiana* and *Allophylus guaraniticus* in the forest understory. Density of trees with diameter at breast height (DBH) ≥ 5 cm is around 2.100 individuals per hectare, while estimated wood volume is approximately 400 m³·ha⁻¹. These are areas of very high carbon content.

Degraded Secondary Forest

A degraded secondary forest fragment is a forested area with two to five hectares, low to medium edge effect, low to medium number of invasive species and medium diversity of native trees and shrubs. These forests have a well-defined canopy of 12-16 m high and a forest understory with some late-successional trees and shrubs such as *Mollinedia elegans*, and *Psychotria vellosiana*. The most abundant trees in this type of forest are *Cupania vernalis*, *Myrcia splendens*, *Piptadenia gonoacantha* and *Croton floribundus*. Density of trees with DBH ≥ 5 cm is around 1.800 individuals per hectare, while estimated wood volume is approximately 350 m³·ha⁻¹. These are areas of high carbon content.

Highly Degraded Secondary Forest

A highly degraded secondary forest fragment is a small and usually isolated forest remnant with significant edge effect, high number of invasive species, and low diversity of native trees and shrubs. This forest has an undefined and relatively open canopy and an understory densely occupied by native bamboo species, with low regeneration of native shrubs and trees. Trees are no more than 12 m high and most of them belong to early-successional species such as *Vernonia diffusa*, *Piptadenia paniculata* and *Solanum pseudoquina*. Frequently, these forests also have an intensive growth of some liana species over the trees in the forest edge. Density of trees with DBH \geq cm is around 1.600 individuals per hectare, while estimated wood volume is under 300 m³·ha⁻¹. These are areas of medium carbon content.

Areas with High Potential for Self-Regeneration

These areas have a high potential for self-regeneration (PSR) due either to their proximity (less than 50 meters) to secondary and degraded secondary forest fragments (as described above), which can be sources of seeds, or to the existence of young regenerating individuals. These are areas of low carbon content.

Areas with Low Potential for Self-Regeneration

These areas have a low potential for self-regeneration (PSR) because they have very low natural supplies of forest propagules, due to either their distance from secondary or degraded secondary forest fragments, or to their land use history and current state of degradation. These areas have very low carbon content.



Figure 4: View of the Jaguari-Jacaré Reservoirs at the height of a drought, showing exposed banks.

Photo: Iatã Cannabrava/ISA (Dec/03)

Figure 2 above delineates the areas where the project will take place and each type of current land cover. Only areas of high and low potential for self-regeneration will be reforested by the project activities described in this document (185.56 ha total).



Figure 5: Land Classifications showing High and Low Potential for Self-Regeneration (PSR) (Photo: Aurélio Padovezi, TNC)

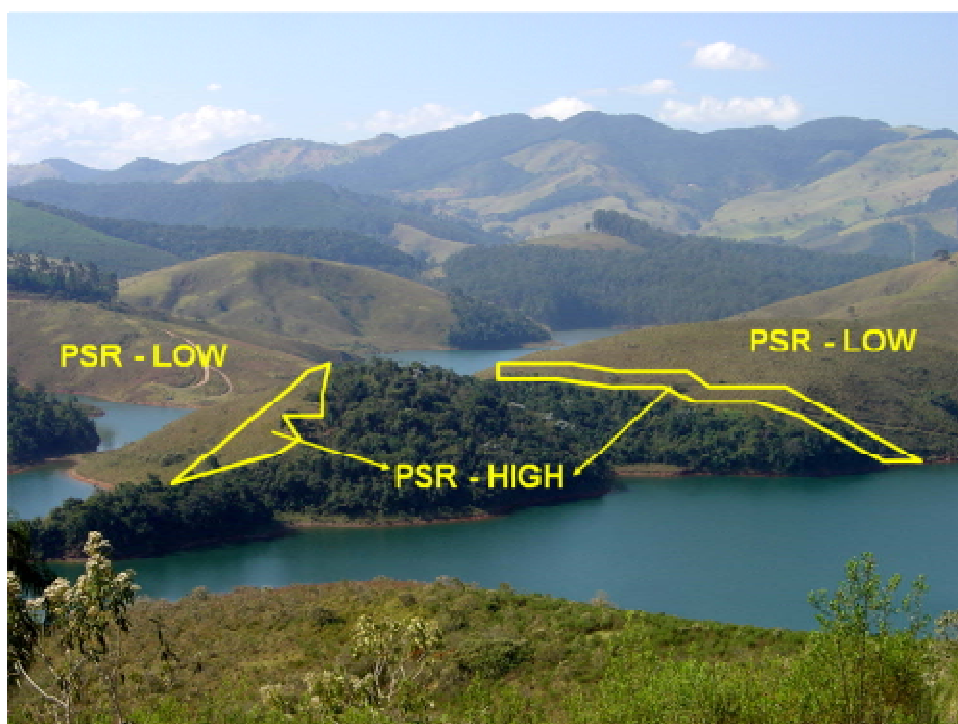


Figure 6: Land Classifications (Photo: A. Padovezi, TNC)

Land use

Sabesp is the legal owner of the land, but because the company leaves much of the land inactive and vacant to ideally support a healthy watershed, neighboring landowners use it for extensive cattle ranching, and a few spots are used for recreational purposes. Sabesp has been unable to prevent this illegal use of their property.



Figure 7: Bank of the Cachoeira Reservoir showing accelerated erosion and extensive pasture areas. Photo: Latã Cannabrava/ISA (Dec 2003) (Whately & Cunha, 2007)

A.5.4 Species and varieties selected for the proposed CPA
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See Annex #1 of the accompanying PoA Design Document.

A.5.5 A concise description of the presence, if any, of rare or endangered species and their habitats
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There is no record of endangered species in the CPA area. Regional endangered species are described in the PoA DD in Section D.2.1.

A.6. Legal title to the land, current land tenure and rights to carbon offset credits
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Legal title to the land

All the project areas belong to the *Companhia de Saneamento Básico do Estado de São Paulo*, Sabesp, a mixed capital company controlled by the State of São Paulo.

Sabesp has legal title, registry and tenure to the land, located entirely within the municipality of Piracaia, State of São Paulo.

Current land tenure and legal status

The private owner has absolute title to the land.

All lands in this CPA currently comply with labor, environmental, and tax laws. All relevant documents accompany this CPA.

Land use

Sabesp is the legal owner of the land, but because the company leaves much of the land inactive and vacant to ideally support a healthy watershed, neighboring landowners use it for extensive cattle ranching, and a few spots are used for recreational purposes. Sabesp has been unable to prevent this illegal use of their property.

Rights of access to the sequestered carbon

Sabesp and The Nature Conservancy (TNC) have signed a “Terms of Cooperation” contract through which the ownership of the rights to any carbon offset credits generated from reforestation activities in the project areas within Sabesp’s land are shared equally by Sabesp and TNC.

Any contract with buyers of those credits must be authorized and signed by both Sabesp and TNC. Any income generated by the sale of carbon credits must be used for activities related to restoration/reforestation in the Cachoeira watershed as described in this document. Any remaining funds may also be used in reservoirs upstream from the Cachoeira Reservoir.

This contract covers a total area of 350 ha which includes the 185.56 ha of eligible project area. Eligible areas are described in detail in Section A.7 below. The contract leaves open the possibility for this partnership to expand into other areas in the future, including other areas within the same reservoir.

A.7. CPA Land eligibility assessment

Based on CDM rules “Annex 16, Procedures to define the eligibility of lands for afforestation and reforestation project activities,”³ no forest can be present within the project boundaries between December 31, 1989, and the start of the project activity. Proof of forest absence could take the form of aerial photographs or satellite imagery from 1989 or before, or official government documentation confirming the lack of forests. Where proof does not exist, multiple independent, officially witnessed statements by local community members are sufficient.

The Brazilian Interministerial Commission for Climate Change (*Comissão Interministerial para Mudanças Climáticas*), in its resolution no. 2, defines forests as lands having growing trees with:

- A minimum tree crown cover of 30%;
- A minimum area of 1 hectare; and
- A minimum potential height of 5 meters at maturity.

These threshold values of the forest definition from the Brazilian governmental agency comply with the UNFCCC definition and are used for this A/R project activity.

³ http://cdm.unfccc.int/EB/022/eb22_repan16.pdf.

Following CDM procedures, it has been shown that the land where the project activities will be applied was not a forest (according to the definition above) in 1990, and is not a forest today. The methodology to assess the eligibility of the project area is described below.

Evaluation of Land Use Change through Multitemporal Analysis

Today, geoprocessing and remote sensing techniques are frequently used to identify and monitor landscape and environmental changes. One technique is multitemporal analysis, which consists of preparing, comparing, and interpreting images of the same area on different dates to identify land use change over time.

Multitemporal analysis is important for monitoring and managing natural resources and urban development because it provides a quantitative analysis of the spatial distribution of the population or resource of interest—forest, in this case. Remote sensing works by detecting changes in radiance values that result from land cover changes.

Satellite Images

To perform the multitemporal analysis for study area, images from Landsat 5 Thematic Mapper were processed, showing the following scenes:

219-076 – Landsat5 30 meters spatial resolution from 1999/Mar/19 and 2010/Apr/18

Image Processing

The analysis of eligible areas for carbon projects consisted of the application of a series of filters to select the pixels that correspond to little or no forest cover, and then to compare them. By superimposing the filtered images, the pixels of little or no forest cover for the entire period under analysis were identified, and are those considered eligible for carbon project implementation.

The images used as filters are derived from the processing of bands of Landsat5 satellite images. The soil brightness and wetness from the *Tasseled Cap* transformation, as well as the vegetation index NDVI were extracted and the group of images was generated for each date.

The selection of pixels showing no or little forest cover, such as pasture, agriculture and open areas, was made by determining limiars for each image. Pixels that fell within the established threshold were considered as potentially eligible for carbon projects.

Once the areas with little or no forest cover were identified for each group of images, the two groups were superimposed and the results from both dates were compared. Only pixels classified as having little or no forest cover in both dates were considered eligible, according to the VCS protocol.

Once the selection process was finished, image processing was applied in order to remove small and isolated areas. Each pixel or group of pixels on the map received an identification, enabling the calculation of its area. For areas less than 1 ha, the classification of the pixels was substituted by the classification most frequently found in the adjacent areas. The final map presents the areas greater than 1 ha considered eligible for the implementation of carbon projects, according to the VCS protocol.

* Tasseled Cap transformation – an image processing technique to reduce the original number of satellite bands into smaller number of components that emphasize some aspects of landcover, such as soil brightness, wetness, greenness.

Limitations of the classification

The analysis has a few limitations concerning the type of sensor used, these being Landsat5 satellite images. These are the existing images available for the period in question – an image for 2010 and another previous to 2000. However, due to seasonal differences and spatial resolution, it is possible that the actual eligible area is greater than that which is presented in this analysis. As a result, this analysis is conservative. Mapping performed with a sensor of higher resolution may indicate a greater eligible area.

Legend definition

The eligible areas are shown in the table below – only pixels classified as Non-forest in both years were considered eligible for carbon projects.

Table 1. Eligibility Classification

Landcover in 1999	Landcover in 2010	Elegibility
Forest	Forest	No
Non-Forest	Non-Forest	Yes
Non-Forest	Forest	No
Forest	Non-Forest	No

Results of the Eligibility Analysis

The eligible area mapped for the period in question (1999-2010) was 1342 ha within the limit of the Cachoeira Reservoir. The total area analyzed was 3261 ha, including the water surface of the reservoir.

The eligibility assessment of areas potentially suitable for carbon forestry projects (open areas) was made according to Resolution #2 of the Brazilian Interministerial Commission for Climate Change, as explained above.

Table 2: Eligible / Non-eligible areas within the Cachoeira Reservoir boundary

Category	Area Ha
Eligible	1341.99
Non-eligible	1918.98
Total	3260.97

Regarding the area currently under restoration/regeneration within the property, which comprises 354 ha, the eligible and non-eligible areas mapped are shown in Table 3.

Table 3: Eligible / Non-eligible land in the restoration/regeneration area of Cachoeira Reservoir boundary

Category	Area Ha
Eligible	200.34
Non-eligible	153.27
Total	353.61

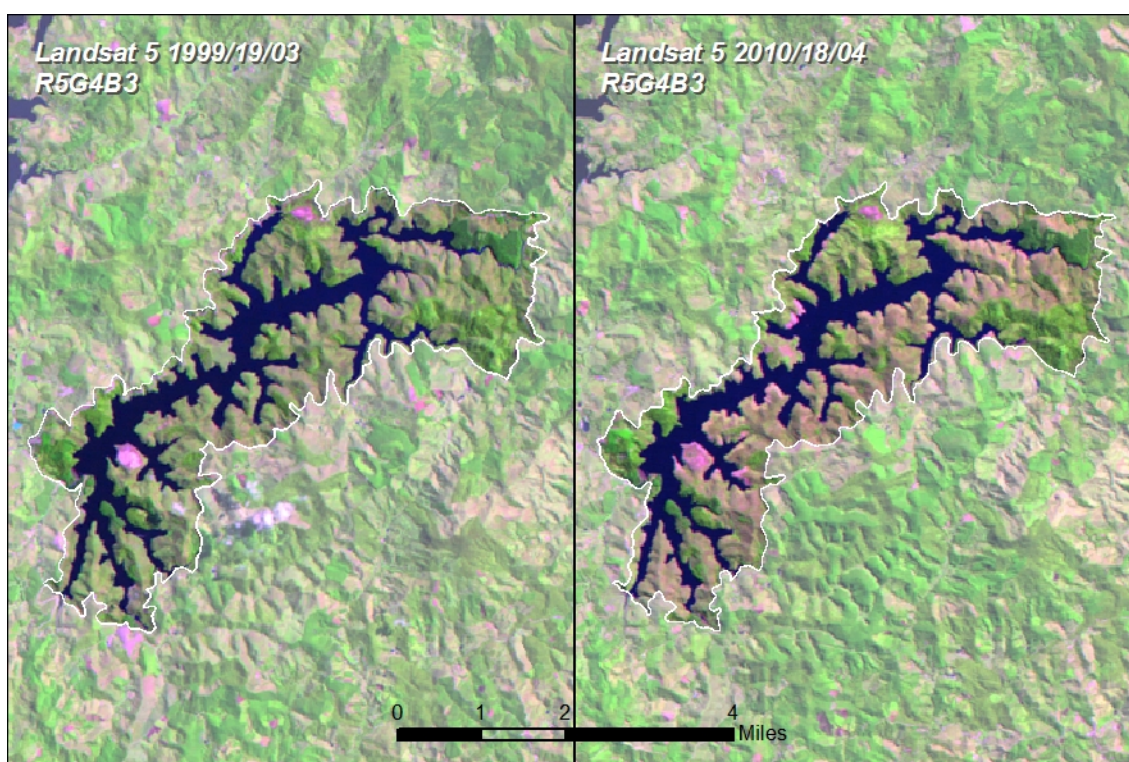


Figure 8 – Landsat 5 imagery used for identification of eligible area for carbon projects implementation.

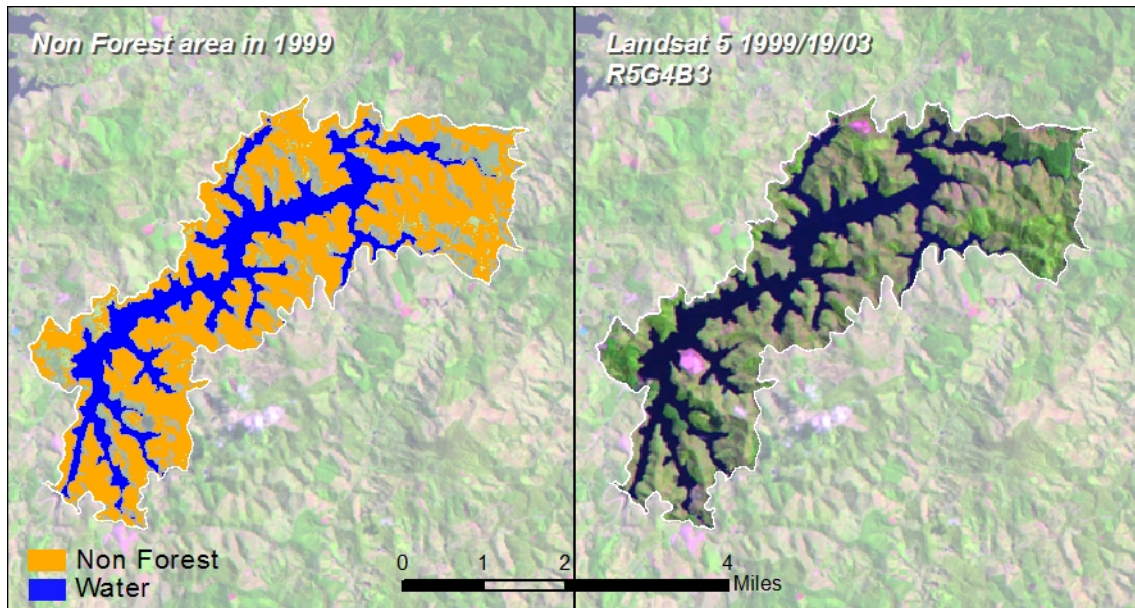


Figure 9 – Deforested area in 1999.

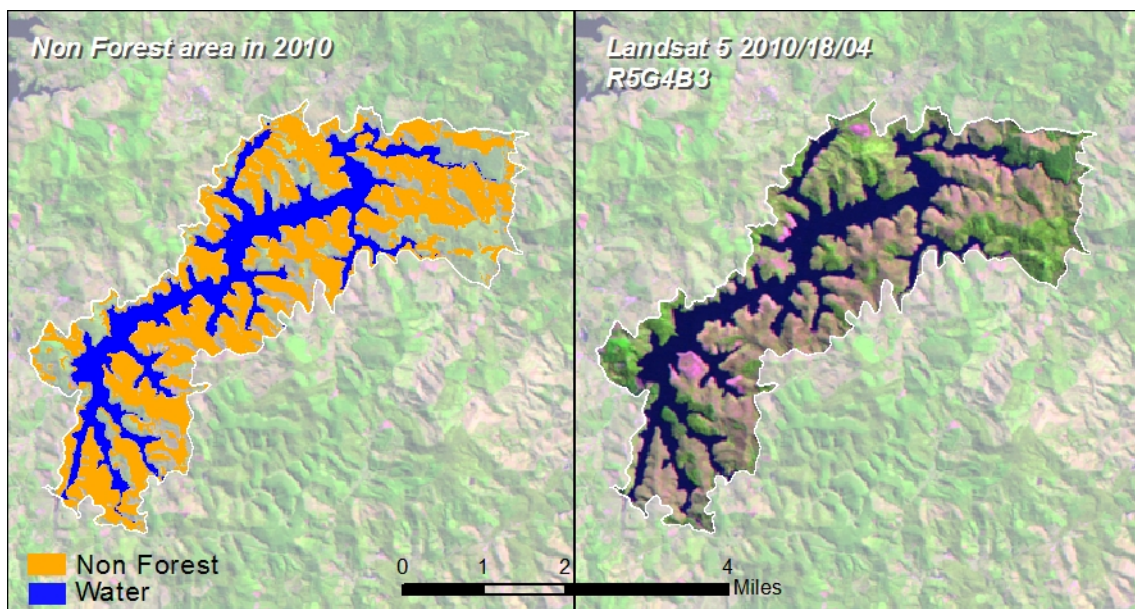


Figure 10 – Deforested area in 2010.

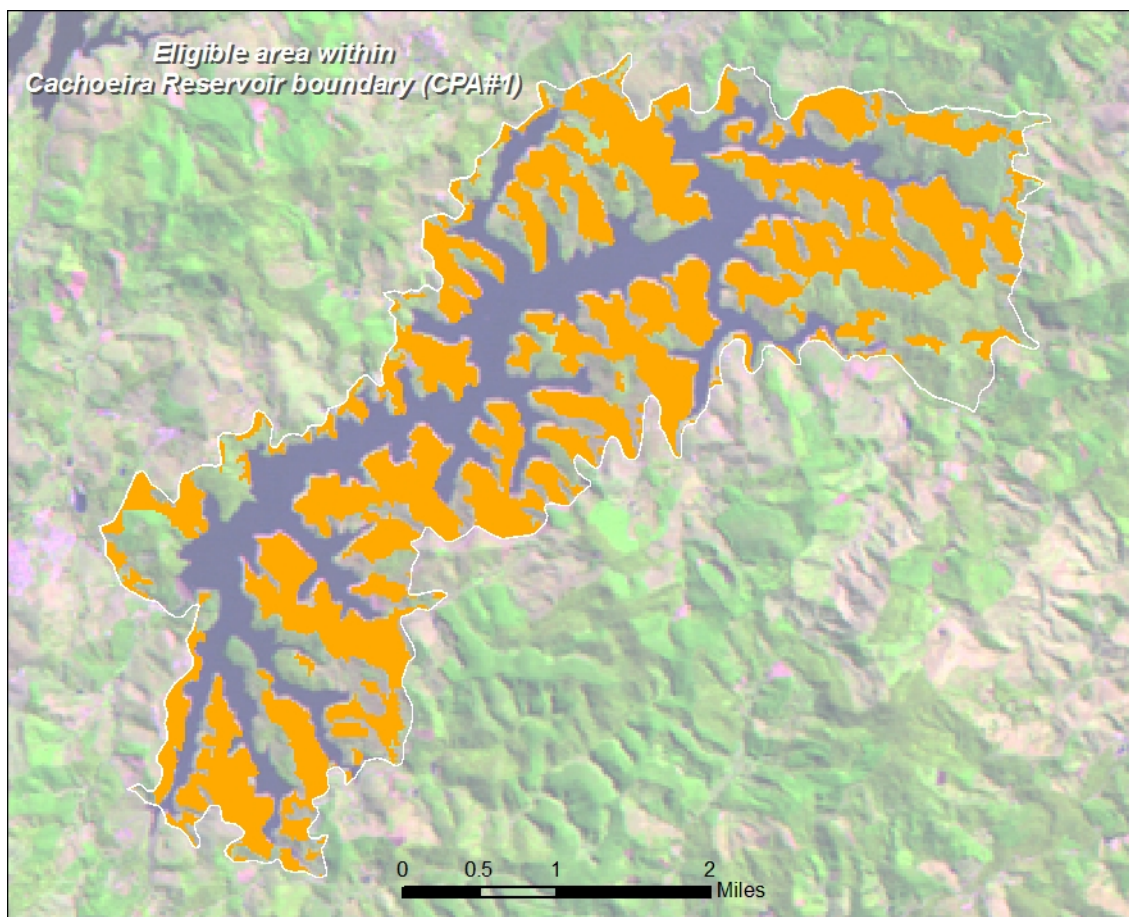


Figure 11 – Eligible area for carbon project implementation according with VCS protocol.

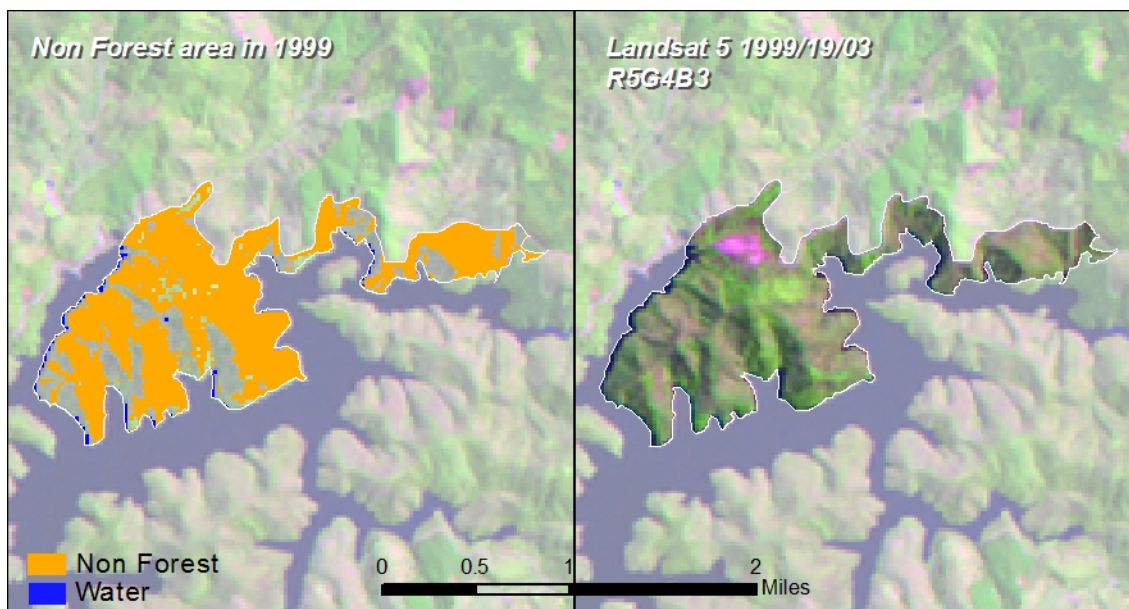


Figure 12 – Deforested area in 1999 within the project site.

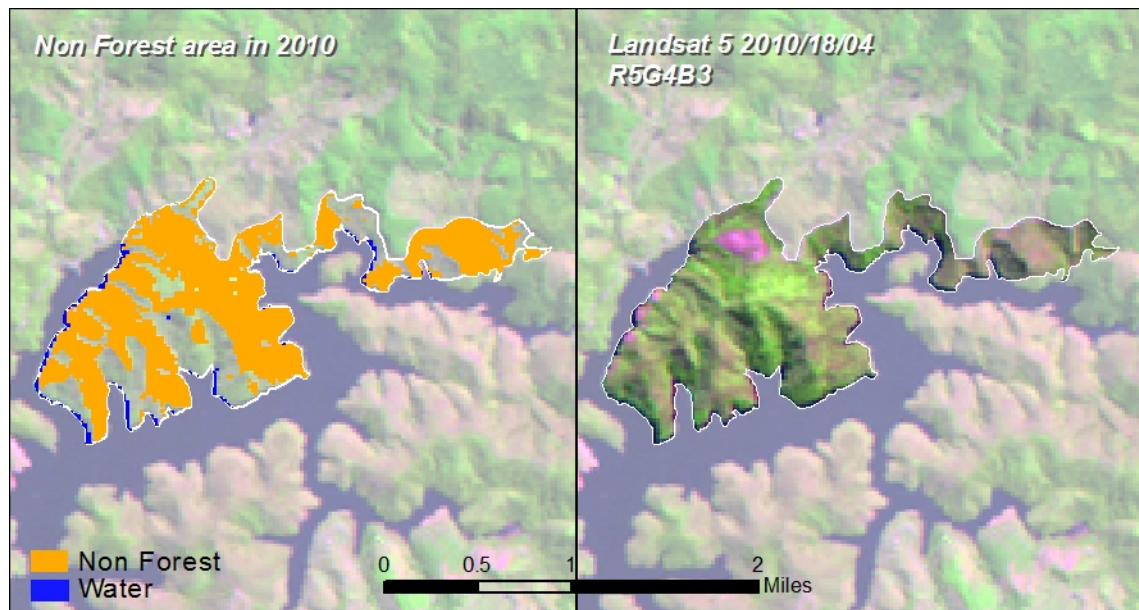


Figure 13 – Deforested area in 2010 within the project site.

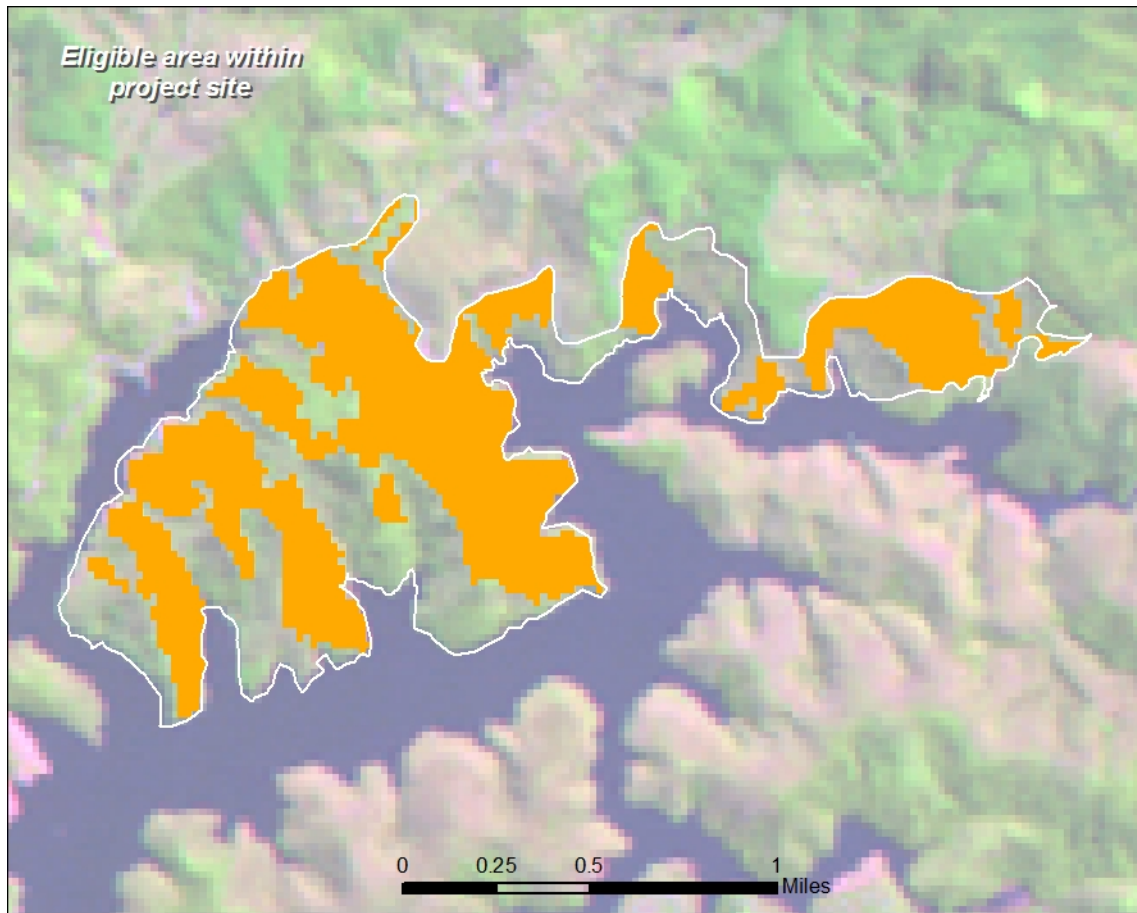


Figure 14 – Eligible area identified within the project site for carbon project implementation.

Figure 15. Areas by planting techniques

Table 4. Areas Phase I / Phase II

Technique	Phase I (area in ha)			Phase II (area in ha)			Total (area in ha)		
	Not Eligible	Eligible	Total	Not Eligible	Eligible	Total	Not Eligible	Eligible	Total
Planting area	14.99	17.82	32.81	18.20	54.12	72.32	33.19	71.94	105.13
Forest thickening	-	-	-	11.54	44.64	56.18	11.54	44.64	56.18
Natural regeneration	-	-	-	10.68	11.55	22.23	10.68	11.55	22.23
Natural regeneration + nucleation	23.20	46.45	69.65	-	-	-	23.20	46.45	69.65
Biodiversity island	1.31	3.69	5.00	-	-	-	1.31	3.69	5.00
Corridor	4.15	7.29	11.44	-	-	-	4.15	7.29	11.44
Forest	13.27	0.00	13.27	54.60	0.00	54.60	67.87	0.00	67.87

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remnant									
Marsh *	-	-	-	1.41	3.39	4.80	1.41	3.39	4.80
Eucalyptus plantation *	-	-	-	1.36	0.03	1.39	1.36	0.03	1.39
Bamboo *	-	-	-	0.07	0.45	0.52	0.07	0.45	0.52
Degraded area*	-	-	-	0.09	9.36	9.45	0.09	9.36	9.45
Total	56.92	75.25	132.17	97.95	123.54	221.49	154.87	198.79	353.66

Area not suitable for forest restoration, even though partially classified as eligible for the carbon project, should not be counted for carbon project in the Cachoeira Project. Thus, the total eligible area for the carbon project is 185.56 ha.

A.8. Implementation Costs of the proposed CPA

Table 5: Project Implementation Costs

Restoration Techniques	FY09 – FY11			FY12 – FY13 (to Dec/2012)			Total Cachoeira Project		
	Area (ha)	Cost/ha (R\$)	Total cost (R\$)	Area (ha)	Cost/ha (R\$)	Total cost (R\$)	Area (ha)	Cost/ha (R\$)	Total cost (R\$)
Nucleation and assisted natural regeneration	60.36	3,190.00	192,548.40	-	-	0.00	60.36	3,190.00	192,548.40
Corridor	10.62	7,249.00	76,984.38	-	-	0.00	10.62	7,249.00	76,984.38
Biodiversity Island	5	9,242.00	46,210.00	-	-	0.00	5.00	9,242.00	46,210.00
Direct planting	10	3,966.00	39,660.00	-	-	0.00	10.00	3,966.00	39,660.00
Assisted natural regeneration	-	-	0.00	22.23	2,000.00	44,460.00	22.23	2,000.00	44,460.00
Forest thickening and assisted natural regeneration	-	-	0.00	56.18	5,000.00	280,900.00	56.18	5,000.00	280,900.00
Total planted area	32.81	7,249.00	237,839.69	74.63	7,249.00	540,992.87	107.44	7,249.00	778,832.56
TOTAL	132.11	-	593,242.47	153.04	-	866,352.87	271.83	-	1,459,595.34

A.9. Duration of the CPA/crediting period

A.9.1 Starting date of the CPA and of the crediting period

The starting date for the PoA is February 1, 2009.

A.9.2 Expected operational lifetime of the CPA

30 years.

A.9.3 Choice of the crediting period and related information
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Fixed 30 year crediting period, following the CDM rules for the defined maximum crediting period for afforestation/reforestation projects.

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A.10. Timeline

Table 6		2009				2010				2011				2012			
		J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D	J-M	A-J	J-S	O-D
Fiscal Year 1	Restoration of 9 ha of low PSR																
	Restoration of 23 ha of medium-high PSR																
	Maintenance of 9 ha of low PSR																
	Maintenance of 23 ha of medium-high PSR																
Fiscal Year 2	Restoration of 30 ha of low PSR																
	Restoration of 38 ha of medium-high PSR																
	Maintenance of 30 ha of low PSR																
	Maintenance of 38 ha of medium-high PSR																
Fiscal Year 3	Restoration of 39 ha of low PSR																
	Restoration of 48 ha of medium-high PSR																
	Maintenance of 39 ha of low PSR																
	Maintenance of 48 ha of medium-high PSR																
Fiscal Year 4	Restoration of 25 ha of low PSR																
	Restoration of 30 ha of medium-high PSR																
	Maintenance of 25 ha of low PSR																
	Maintenance of 30 ha of medium-high PSR																

B. ELIGIBILITY OF CPA

B.1. Justification of eligibility of the CPA to be included in the CPA

B.1.1.1. Justification of the baseline scenario of the CPA as per eligibility criteria listed in the PoA

Baseline scenario criteria for including a CPA into the PoA are:

- The proposed CPA must be within the Cantareira Water System.
- Current land use/cover on the CPA areas must be one or more of the types described in the PoA: pasture or degraded pasture.
- The only current or planned commercial use of the CPA areas is cattle ranching, despite the fact that the properties can have other commercial uses as well in other areas that are not the CPA.
- Each CPA area is along steep slopes and riparian zones. Any flat areas within each CPA will not make up a significant part of the restoration area and can be used as part of the landowner's legal reserve.
- The landowner must follow the Brazilian labor law requirements as described in Section E.4 of the PoA.

B.1.1.2. Justification and demonstration of additionality of the CPA as per eligibility criteria listed in the PoA

Additionality assessment criteria for including a CPA into the PoA are:

- The proposed CPA must be within the Cantareira Water System.
- Current land use/cover on the CPA areas must be one or more of the types described in the PoA: pasture or degraded pasture.
- The only current or planned commercial use of the CPA areas is cattle ranching, despite the fact that the properties can have other commercial uses as well in other areas that are not the CPA.
- Each CPA area is along steep slopes and riparian zones. Any flat areas within each CPA will not make up a significant part of the restoration area and will be used as part of the landowner's legal reserve.
- The landowner must follow the Brazilian labor law requirements as described in Section E.4 of the PoA.
- The combined tool for assessing baseline and additionality described in the PoA associated with this document (Section C.4) has been applied to the CPA, and the results are within the range defined by the PoA.

B.1.1.3. Justification of the methodological choices applied to the CPA as per eligibility criteria listed in the PoA

All methodological choices for the CPA will follow exactly the pattern described in the PoA.

B.2. Confirmation that the CPA is located within the geographical boundary of the PoA

See CPA location in Section A.5.2 – *Detailed geographic delineation of the boundary of the CPA, including information allowing the unique identification of the proposed CPA.*

C. ESTIMATION OF NET ANTHROPOGENIC GHG REMOVALS BY SINKS

C.1. Description of strata applied for *ex-ante* estimations

The starting point for stratification of the project area was the actual land cover/use information. As described above, we find two types of existing land cover in the project restoration areas:

Areas with High Potential for Self-Regeneration (113.62ha)

These areas have a high potential for self-regeneration due either to their proximity (less than 50 meters) to *secondary* or *degraded secondary* forest fragments (as described above), which can be sources of seeds, or to the existence of young regenerating individuals. These are areas of low carbon content.

Areas with Low Potential for Self-Regeneration (71.94ha)

These areas have a low potential for self-regeneration because they have very low natural supplies of forest propagules, due to either their distance from *secondary* or *degraded secondary* forest fragments, or to their land use history and current state of degradation. Typically, these are pastures with very few regenerating individuals. These areas have very low carbon content.

Figure 2 delineates the areas where the project will take place and each type of current land cover. Only areas of high and low potential for self-regeneration will be reforested by this project (185.86 ha total).

This results in two main strata. Details of the stratification are presented in Table 7 below, while Figure 5 and 6 show current pictures of each stratification.

Table 7: Area for each stratum

No.	Stratum	Area(ha)	%
1	Low potential for self-regeneration	71.94	38.8
2	High potential for self-regeneration	113.62	61.2
	Total	185.56	100

Because two strata exist in this CPA (areas with high and low potential for self-regeneration), two reforestation technologies will be used, as described in the PoA in Section A.5.3.1: *Activities and technology to be employed by the proposed program activity (CPA).*

C.2. Estimation of the *ex-ante* baseline net GHG removals by sinks

Zero.

C.3. Estimation of *ex-ante* actual net GHG removals by sinks, leakage, and estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period

C.3.1 Estimate of *ex-ante* actual net GHG removals by sinks

The actual net greenhouse gas removals by sinks represent the sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in non-CO₂ GHG emissions measured in CO₂ equivalents by sources that are increased as a result of the implementation of an A/R project activity, while avoiding double counting, within the project boundary, attributable to the A/R project activity.

The *ex-ante* estimation of these values is based on equation 12 as described in AR-ACM0001. The change in carbon stocks can be calculated using the formula below. Here it represents the annual changes. The values are presented in Section C.3.5 of each CPA for every year of the first crediting period, as well as the totals for the whole period.

$$\Delta C_{ACTUAL} = \Delta C_P - GHG_E$$

Where:

ΔC_{ACTUAL} = Actual net greenhouse gas removals by sinks; (tons CO₂-e)

ΔC_P = Sum of the changes in above-ground and below-ground biomass carbon stocks in the project scenario; (tons CO₂-e)

GHG_E = Increase in non-CO₂ GHG emissions by sources within the project boundary as a result of the implementation of the A/R project activity (tons CO₂-e / year).

C.3.2 Estimate of the *ex-ante* leakage

Leakage (LK) represents the increase in GHG emissions by sources that occurs outside the boundary of the A/R CPA activity that is measurable and attributable to the A/R CPA activity. Two sources of leakage are covered by methodology AR-ACM0001: GHG emissions due to activity displacement and GHG emissions due to increase in use of wood posts for fencing.

Of these sources of leakage, not one applies to this reforestation project activity. However, GHG emissions caused by vehicle fossil fuel combustion due to transportation of seedling, workers, staff and harvest products to and/or from project sites will be carefully monitored and controlled by the developers of this PoA. Therefore, these emissions will be accounted for but not estimated or included in the calculation of net anthropogenic GHG removals by sinks.

The first source considered in the methodology is the displacing of pre-project activities such as grazing and wood gathering. In this PoA, wood gathering does not generally occur in the CPA areas, and this fact will be monitored during the monitoring events at the site. Typically, landowners do use the CPA areas, especially those belonging to the “pasture” stratum, for cattle grazing.

When the carbon option was presented to the owners of the property, they saw reforestation based on carbon credit financing as an opportunity to regularize their property to the existing APP and RL law without any investment on their part.

The areas to be reforested are used today mainly for cattle operations of low productivity. Property owners in the PoA are willing to absorb the relatively small opportunity cost of eliminating cattle in those areas in exchange for a “clean environmental record” for the property.

Property owners will gradually remove the cattle currently grazing in the CPA areas, and this fact will be monitored through monthly site visits and interviews with the landowner. During these site visits, the monitoring agent will also verify that the property owner is complying with the contract. In addition, indirect monitoring will be used for verification, by checking that the forest cover outside of the CPA areas within the PoA boundary does not decrease, monitored using satellite images. These satellite images will be used to generate land-use maps in the PoA area, which will allow for analysis of land-use changes over time in the PoA region. The PoA proponents will analyze any deforestation detected by these satellite images to ensure that it has no link to the PoA. The PoA proponents will perform this land-use monitoring every 5 years using their own resources.

Therefore, there is no leakage related to the displacement of grazing activities. In fact, there is an additional reduction of emissions due to the elimination of some cattle heads. In any case, to remain conservative, those reductions in emissions will not be calculated.

The second source covered by the methodology, the use of wood posts for fencing, does not apply. Although some fencing will be used in each CPA area, all the wood posts will come from Eucalyptus from planted forest operations, and therefore no leakage from this source needs to be accounted for.

This PoA will control and monitor fuel consumption for implementation, maintenance and monitoring activities. The developers of this PoA will keep track of fossil fuels used during vehicle transport to and from the CPA areas, but these GHG emissions are not part of the leakage emissions calculations. Based on the equations proposed by previous methodologies⁴, annual emissions due to leakage can be calculated.

C.3.3 Proposed measures to be implemented to minimize potential leakage

The only source of leakage in this project is combustion of fossil fuels due to transportation, which is insignificant and not part of methodology AR-ACM0001. Even so, educational activities will be performed to inform project participants of the importance of minimizing fuel consumption in transportation activities for the benefit of the environment and for the PoA. Personal preference has a direct influence on the amount of GHGs emitted due to vehicle transportation.

⁴ Equations 31, 32, 33 and 34 in approved methodology AR-AM0003, version 03

Wood gathering that might occur within the CPA boundary during the growth of the planted trees is a minimal risk to this PoA and will be accounted for during monitoring of biomass stock. Cattle removal will be monitored during monthly site visits, community monitoring events, and indirectly through satellite images, as described in the previously.

C.3.4 Summary of the <i>ex-ante</i> estimation of net anthropogenic GHG removals by sinks

The net anthropogenic GHG removals by sinks is the actual net GHG removals by sinks minus the baseline net GHG removals by sinks minus leakage. The following general formula, based on AR-ACM0001⁵, can be used to calculate the net anthropogenic GHG removals by sinks of the PoA, in tons CO₂-e:

$$C_{AR} = \Delta C_{ACTUAL} - \Delta C_{BSL} - LK$$

where

C_{AR} = Net anthropogenic greenhouse gas removals by sinks; (tons CO₂-e)

ΔC_{ACTUAL} = Actual net greenhouse gas removals by sinks –as described in Section C.5.3 of the PoA; (tons CO₂-e)

ΔC_{BSL} = Baseline net greenhouse gas removals by sinks –as described in Section C.5.2 of the PoA; (tons CO₂-e)

LK = Leakage –as described in Section C.5.4 of the PoA (tons CO₂-e)

Note: $\Delta C_{BSL} = 0$ for this PoA.

This formula is used to calculate annual values of net anthropogenic GHG removals by sinks. The values for every year of the crediting period are shown in Section C.3.5 below, as well as the totals for the whole period.

⁵ Equation 39 of the AR-ACM0001, version 02

C.3.5 Estimated amount of net GHG emissions reduction over the crediting period

Table 8. Net GHG Reductions

Year	Anthropogenic Net Removals (tons CO ₂ e)	Change Carbon stock (tons CO ₂)	Leakage (tons CO ₂ e)
1	1,096.32	1,109.60	13.28
2	1,830.05	1,843.32	13.28
3	2,563.77	2,577.05	13.28
4	2,577.05	2,577.05	0.00
5	2,577.05	2,577.05	0.00
6	2,577.05	2,577.05	0.00
7	2,577.05	2,577.05	0.00
8	2,577.05	2,577.05	0.00
9	2,577.05	2,577.05	0.00
10	2,577.05	2,577.05	0.00
11	2,577.05	2,577.05	0.00
12	2,577.05	2,577.05	0.00
13	2,577.05	2,577.05	0.00
14	2,577.05	2,577.05	0.00
15	2,577.05	2,577.05	0.00
16	2,577.05	2,577.05	0.00
17	2,577.05	2,577.05	0.00
18	2,577.05	2,577.05	0.00
19	2,577.05	2,577.05	0.00
20	2,577.05	2,577.05	0.00
21	2,577.05	2,577.05	0.00
22	2,577.05	2,577.05	0.00
23	2,577.05	2,577.05	0.00
24	2,577.05	2,577.05	0.00
25	2,577.05	2,577.05	0.00
26	2,577.05	2,577.05	0.00
27	2,577.05	2,577.05	0.00
28	2,577.05	2,577.05	0.00

29	2,577.05	2,577.05	0.00
30	2,577.05	2,577.05	0.00
TOTAL	75,055.89	75,110.21	39.83
Number of crediting years		30	
Annual average over the crediting period of estimated net anthropogenic GHG removals by sinks (tons CO ₂ e)		2,501.86	

Table 9: Permanence risk buffer and total certified emissions reductions to be sold by this CPA.

28% Buffer:	21,015	tons CO ₂
Total credits for sale:	54,040	tons CO ₂

C.4. Application of the monitoring methodology

C.4.1 Sampling design and stratification

Monitoring of Strata

Details of the initial stratification of the project area are presented in Section C.1 of this document. However, post stratification will be conducted after the first monitoring event to address the possible changes of project boundary and planting year in comparison to the project design.

Sampling Framework

a) Calculation of the number of sample plots

The initial stratification led to two strata and the number of sample plots for each stratum will be estimated as dependent on required accuracy, following the standard procedure described by methodology AR-ACM0001.

The entry data:

- Total size of all strata (A), e.g. the total project area. Initial projection A = 185.56 ha.
- Size of each stratum (A_i). Initial projection: A₁ = 113.62 ha; A₂ = 71.94 ha;
- Sample plot size (a). a = 200 m² (see below);
- Standard deviation (st_i) for each stratum. To be determined based on field measurements.
- Approximate value of average of the estimated quantity (Q). To be determined based on field measurements.
- Desired level of precision (p): p = 10%;
- z_{α/2} = value of the statistic z (normal probability density function), for α = 0.10 (implying a 90% confidence level): z_{α/2} = 1.645

This data will be entered in the equations proposed in AR-ACM0001:

$$N = A / a$$

$$N_i = A_i / a$$

$$E = Q \cdot P$$

where

N = Maximum possible number of sample plots in the project area

N_i = Maximum possible number of sample plots in stratum i

E = Allowable error

And the number of sampling plots would be calculated using the equations:

$$n = \frac{\left[\sum_{i=1}^L N_i \cdot st_i \right]^2}{\left(N \cdot \frac{E}{z_{\alpha/2}} \right)^2 + \sum_{i=1}^L N_i \cdot (st_i)^2}$$

$$n_i = \frac{\sum_{i=1}^L N_i \cdot st_i}{\left(N \cdot \frac{E}{z_{\alpha/2}} \right)^2 + \sum_{i=1}^L N_i \cdot (st_i)^2} \cdot N_i \cdot st_i$$

All necessary rounding will be made towards the nearest higher integer number.

b) Size of the sampling plots

The sampling plot area has major influence on the sampling intensity and time and resources spent in field measurements. The area of a plot depends on the stand density. Therefore, increasing the plot area decreases the variability between two samples. According to Freese (1962), the relationship between coefficient of variation and plot area can be denoted as follows:

$$CV_2^2 = CV_1^2 \sqrt{a_1 / a_2}$$

where a_1 and a_2 represent different sample plot areas and their corresponding coefficient of variation (CV). Thus, by increasing the sample plot area, variation among plots can be reduced permitting the use of small sample size at the same precision level. Usually, the size of plots is between 100 m² for dense stands and 1000 m² for open stands.

The sampling plot size for the proposed reforestation project has been set at 200 m².

c) Random plot allocation

Following the recommendations in AR-ACM0001, the permanent sample plots shall be located systematically with a random start. This is accomplished with the help of a GIS script.

d) Monitoring frequency

Although the verification and certification shall be carried out every five years after the first verification until the end of the crediting period (paragraph 32 of decision 19/CP.9), monitoring interval may be less than five years. However, to reduce the monitoring cost, the monitoring intervals shall coincide with verification time, i.e., five years of interval.

C.4.2 Description of the monitoring plan

The monitoring plan is described at the PoA level. See Section C.5.6.9 of the accompanying PoA Design Document.

D. BIODIVERSITY IMPACTS OF THE PROGRAM ACTIVITY

D.1. Indicate if the environmental analysis has been undertaken at the PoA level

Environmental analysis is described at the PoA level. See Section D of the accompanying PoA Design Document.

D.2. Notes on Biodiversity Impact

This CPA has been designed for very limited or no negative environmental impact. There is no burning or overall tillage for soil preparation and all operations will be conducted manually without the use of any mechanical means. The most sensitive areas, such as riparian zones, do not receive any chemical treatment.

Net Impact

The planting model developed for this project integrates various components that directly contribute to restore habitats and enhance local biodiversity. All species to be planted are native to the project region.

By contributing to the reestablishment of several native species in the project areas, the integrated planting system creates diverse habitats for the local fauna and flora and connects remaining patches of primary and secondary forests of the project area. This CPA fosters the creation of diverse ecosystem structures similar to native forests by using a variety of native species in a mosaic, irregular, planting pattern.

This PoA directly contributes to the reestablishment of permanent forest cover within the PoA boundary.

The PoA region is located in biologically diverse Mata Atlântica areas as with high conservation value. The reforestation activities directly contribute to regulate regional hydrologic regimes and reduce fluvial erosion, significantly mitigating negative impacts on such sensitive ecosystems.

The program activity directly contributes to regulate the water regimes, reduce fluvial erosion, and protect the watershed ecosystems of the Cachoeira River. In addition, the CPA contributes to restoring ecosystem habitat functions for several endangered species. Restored CPA areas will function as biological corridors for animals and plants.

Conservation Status

This status quantifies the status of conservation or biodiversity in a region. It is useful for projects with large geographies, such as this one. The status is a conservation monitoring system that allows TNC to measure conservation progress across the entire⁶continent. This geographical information system is able to connect site conservation project results to continental and global results using an integrated tracking tool. Now TNC is able to measure the impact of each conservation project and consolidate this information to gain a better understanding of how each major habitat type is faring worldwide.

We will use this new methodology in the CPA areas to evaluate the status of landscape conservation and to monitor the results of actions on the ground.

Assessing Conservation Status in the Sub-Watersheds of the Cantareira Water System

The sub-watersheds are located in the Serra da Mantiqueira Corridor, an area with high biodiversity value. To assure a good conservation status it is necessary to have habitats with good integrity, acceptable level of threat, and an adequate level of conservation management status. In each subwatershed we will establish a baseline and monitor progress for each one of the indicators that follows.

Biodiversity Status

TNC will use the landscapes condition as a surrogate for biodiversity. Indicators such as landscape connectivity and fragmented size will be monitored. With the project implementation it is expected that the landscape connectivity will increase and also the size of the forest remnants.

Landscape analysis will be carried out using modern GIS techniques for the required scale. The areas under restoration and its surrounding remnants will, additionally, have a bird assessment as an indicator of the reestablishment of the ecological functions. This work will constitute the baseline for biodiversity status against which we will compare future assessments of the health and viability of the local forests. This information will also help inform the development of our measures of success.

⁶ Excepted in the Guianas and Suriname where TNC doesn't work

Monitoring conservation status consists not only of analyzing the landscape condition, but also in assessing threats that might put our conservation targets at risk in the future, as well as the management practices being employed on the land.

Threats Assessment

In order to ensure the long-term conservation of the sub-watersheds, we must reduce and mitigate threats to the region. TNC and our partners will work with the project stakeholders to compile information and will run the GIS threats modeling tool to predict the future level of threat to the region, based on the scope and severity of the main threats. These results will inform the development of strategies to abate the most serious threats and will provide baseline information to measure effective conservation.

Management Status

Working together with the local government, TNC will evaluate the management status of the areas in private lands and any public conservation areas (IUCN I-IV) according to its level of governance, management plan development and implementation, and resources availability. This will include specific assessments of the project areas under contract.

Once all of this information is compiled and organized for the given scale, TNC will run spatial analyses to assess the conservation status of the landscape. This process will be repeated periodically to measure progress toward our goals for this project. TNC is already doing it for larger scales.

Offsite impacts

Offsite biodiversity will only benefit from the areas restored through this CPA.

D.3. Notes on the impact on Water & Soils
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The improved water quality resulting from the restoration of the riparian forest under this PoA is expected to favor the populations of fish that thrive in the natural conditions of the river habitat.

The effect of the CPA on the soils will be to improve soil stabilization with the development of native forest cover, increase root net (i.e., enlarging the minerals fixation in the sediment matrix) and promote the deposition of organic matter (e.g., litter) in the soil, enlarging the net primary production in the soil cycle and its fertility.

E. COMMUNITY IMPACTS OF THE PROGRAM ACTIVITY

E.1. Indicate if the community impact analysis has been undertaken at the PoA level

Socioeconomic analysis of the broader Cantareira region is described at the PoA level. Information specifically regarding Piracaia is presented below.

According to IBGE data, Piracaia has a population of 22,325. This is an increase of 18.6% from the 1991 population. Average per capita income was R\$294.90 per month in 2000 (Atlas of Human Development of Brazil, 2003). The Average Human Development Index (HDI-A) was 0.792 in 2000 (average of: 0.722 for Income HDI, 0.801 for Longevity HDI, and 0.854 for Education HDI). This HDI ranks 741 when compared to all 5,507 Brazilian municipalities (Atlas of Human Development of Brazil, 2003).

E.2. Analysis of community impacts

The project employs two people to manage an approximate surface of 300 hectares. The restoration activities are being executed since February 2008 and are planned to finish on June 2013, by a local cooperative composed of 21 field workers who live in the local community. In terms of the ratio of employees per hectare of managed area, this represents approximately one employee per 14 hectares, and favorably compares with the employment generated under the predominant land use of cattle ranching.

The jobs provided by the project directly contribute to increasing economic benefits among marginalized segments of Piracaia's rural population. All cooperative workers are paid a wage considerably superior to the national minimum wage, which is currently set at R\$2.56/hour (or US\$1.40).

By restoring local ecosystems and creating mixed plantation systems with several vital habitat functions, the restoration cooperative hopes that this project will generate valuable benefits for surrounding local communities including the creation of new non timber product sources for local livelihoods.

The complexity of the restoration system and management operations requires that all cooperative workers receive intensive training, which is provided through partnering with non-profit organizations and other cooperatives. The restoration cooperative has collaborated extensively to train its workers, which is important in enabling the cooperative to execute other native tree plantation projects and consequently to expand its area of operation.

Offsite impacts

This CPA alone does not constitute a large enough area to directly impact jobs in Piracaia. The PoA partners do not expect any negative social impacts on the communities outside of the CPA.

F. STAKEHOLDER COMMENTS

F.1. Indicate if the stakeholder comments have been invited at the PoA level

Stakeholder analysis is described at the CPA level.

F.2. Stakeholder consultation & participation

First meeting with community surrounding the restoration areas – Piracaia, São Paulo

Date: 08 June 2008

Present: Residents from around the Cachoeira Reservoir in Piracaia, SP, Piracaia Municipal Department of the Environment, and TNC

Publicizing of the meeting:

Residents from surrounding areas were invited by the Municipality of Piracaia

The meeting was carried out in the Church of the Barbas District after Sunday mass so that all those interested could participate.

Main points raised during the meeting:

The main objective of the first meeting with the residents of areas surrounding the restoration areas was to recognize the local reality, introduce the main concepts of the project and raise possible forms of integration/ participation/ engagement.

In the initial presentation, the organizers proposed that each person briefly describe their history with regard to the reservoir and surrounding areas. All the narratives related the history of the occupation of the area by Sabesp. Many people and/or family members sharing their stories were people who had their areas repossessed for the construction of the reservoir or who worked on the construction of the reservoirs and canals of the Cantareira System.

After this discussion, TNC introduced the main actions of the Cachoeira project, which aims to restore forest to an area of 185.56 ha surrounding the Cachoeira Reservoir, one of four major reservoirs in a water in the Cantareira System supplying the city of São Paulo, Brazil, and its metropolitan area. The reforestation areas are located in the municipality of Piracaia, in the state of São Paulo.

In the discussions that followed, the recurring themes were in relation to the institutions involved (TNC, Sabesp, São Paulo Secretariat for the Environment, Municipality of Piracaia), the planned activities and the source of resources for their execution.

After the initial clarifications, TNC asked those present of their interest in integrating/ participating in the project. They showed interest in working on the project and participating in the restoration

activities. They also expressed interest in making the meals to serve to workers and visitors who would be coming to the area.

Many doubts arose regarding the form of community participation on the project. As much time had already elapsed by this time, the organizers decided to set up a second meeting to delve into this topic.

Second meeting with community surrounding the restoration areas – Piracaia, São Paulo

Date: 13 July 2008

Present: Residents from around the Cachoeira Reservoir in Piracaia, SP, Piracaia Municipal Department of the Environment, and TNC

Publicizing of the meeting:

Meeting date and time were set up at the end of the first community meeting. The meeting was again carried out in the Church of the Barbas District after Sunday mass.

Main points raised during the meeting:

Many who were present in the second meeting had not participated in the first one. Thus, the first activity was again to describe the project objectives and activities as well as the institutions involved in the project concept and execution.

After initial clarification, the organizers showed a map of the area to be restored to help position the area in relation to the districts of Barbas and Carás (the two closest districts to the restoration area) as well as other points of reference that will be eventually surveyed.

One man from the community said that he raises cattle in the Sabesp area, exactly in the area indicated, and asked if he would have to remove his cattle. Before TNC or the Municipality of Piracaia could respond, many residents replied that yes, even if there were no tree planting, he should remove his cattle from the area because the company (Sabesp) did not give permission to anyone to carry out any kind of economic activities in the area. They also said that the area has not returned to a forested state because the cattle ranchers who use the land for pasture set fires each year.

TNC informed meeting participants that all people possessing cattle in the restoration area will be informed of the project and will be requested to remove their cattle at the start of the project restoration activities.

TNC and the Municipality of Piracaia then asked if identifying the cattle owners would be a difficult task and to their surprise, the response was that Sabesp already knows all of them. This remains to be confirmed with Sabesp representatives.

Continuing with the meeting agenda, the organizers asked meeting participants if they had given any thought to or discussed the possible forms of community participation in the project. The following activities were brought up: participation in the planting; participation in building the fence; apiculture (beekeeping) activities in the area through the municipal association of beekeepers; cultivation of commercial annual species between the rows of the restoration planting; and collection of seeds and production of seedlings to meet the demands of the project. After all these possibilities were raised, the organizers explained that each of these activities would require a negotiation with the property owner to obtain a license to put them into practice. Everyone agreed immediately and they requested another meeting with a Sabesp representative.

Because of the history of the area, they emphasized the importance of having a local fire-fighting unit and signs in the area with 24-hour emergency telephone numbers to contact and dispatch this unit. They also described a nearby community, Atibainha, where many people are unemployed and work temporarily in eucalyptus plantations in the region and who could be involved in this project.

Agenda for the third meeting with community surrounding the restoration areas – Piracaia, São Paulo

Plan:

- Take a camera to take photos of the participants.
- Collect signatures for the previous meetings.
- Describe how the meetings were publicized and how participants were invited.
- Record all comments.

Date: 07 October 2008

Place: Church of the Barbas District

Time: 18:00

Invitees: Municipality of Piracaia, TNC, Barbas Community, Carás Community, Atibainha Community, Municipal Association of Beekeepers, Sabesp, Cattle-owners

Agenda:

Visual presentation of the project using data show

- Main problems of the district (future workshop)
- Goals for the district (future workshop)
- Forms of community involvement
- Venn Diagram (identify clearly for the participants which institutions are involved, the importance of these institutions for the community, how these institutions relate to the community/ to the project/ to each other - time permitting)
- Move toward a plan of action (time permitting).
- Describe the strategy in development by TNC, Sabesp, and Piracaia to mitigate the risks of fire (preventing arson and accidental fires from campers and fishermen, appeasing cattle-owners, incorporating best practices)
- Schedule a formal meeting with the city council about one month before the verification process.
- Distribute summaries of this Project Design Document (PDD) in Portuguese

Publicizing the community event:

In addition to the postings pictured below, flyers were also handed out to local residents.

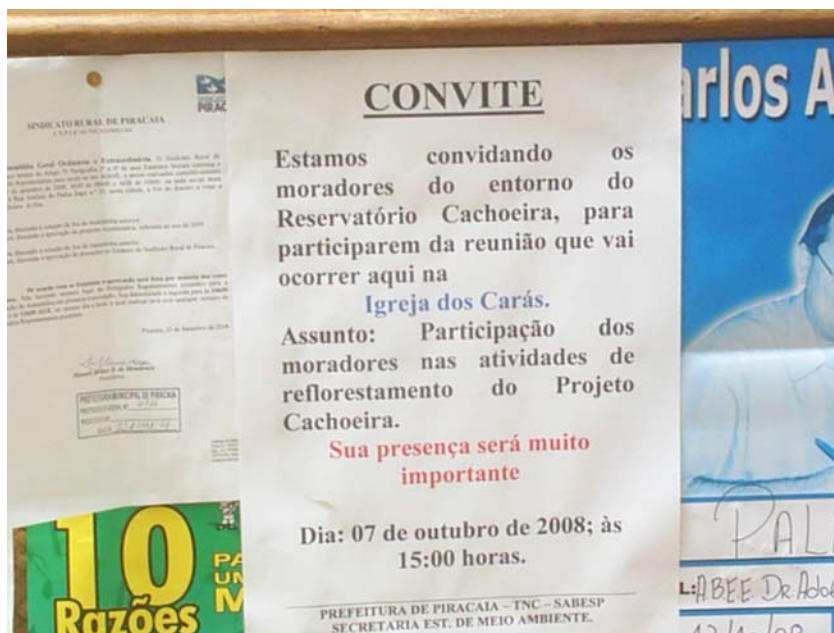


Figure 16: Flyer publicizing the event, posted at various locations as shown in the following photographs.



Figure 17: Flyers posted at various locations, left to right: Piracaia City Hall and Dept of Public Works, Environment and Finance.



Figure 18: Flyer posted at various locations, left to right: Supermarket and Bus Station.



Figure 19: Flyer posted at local supermarket.

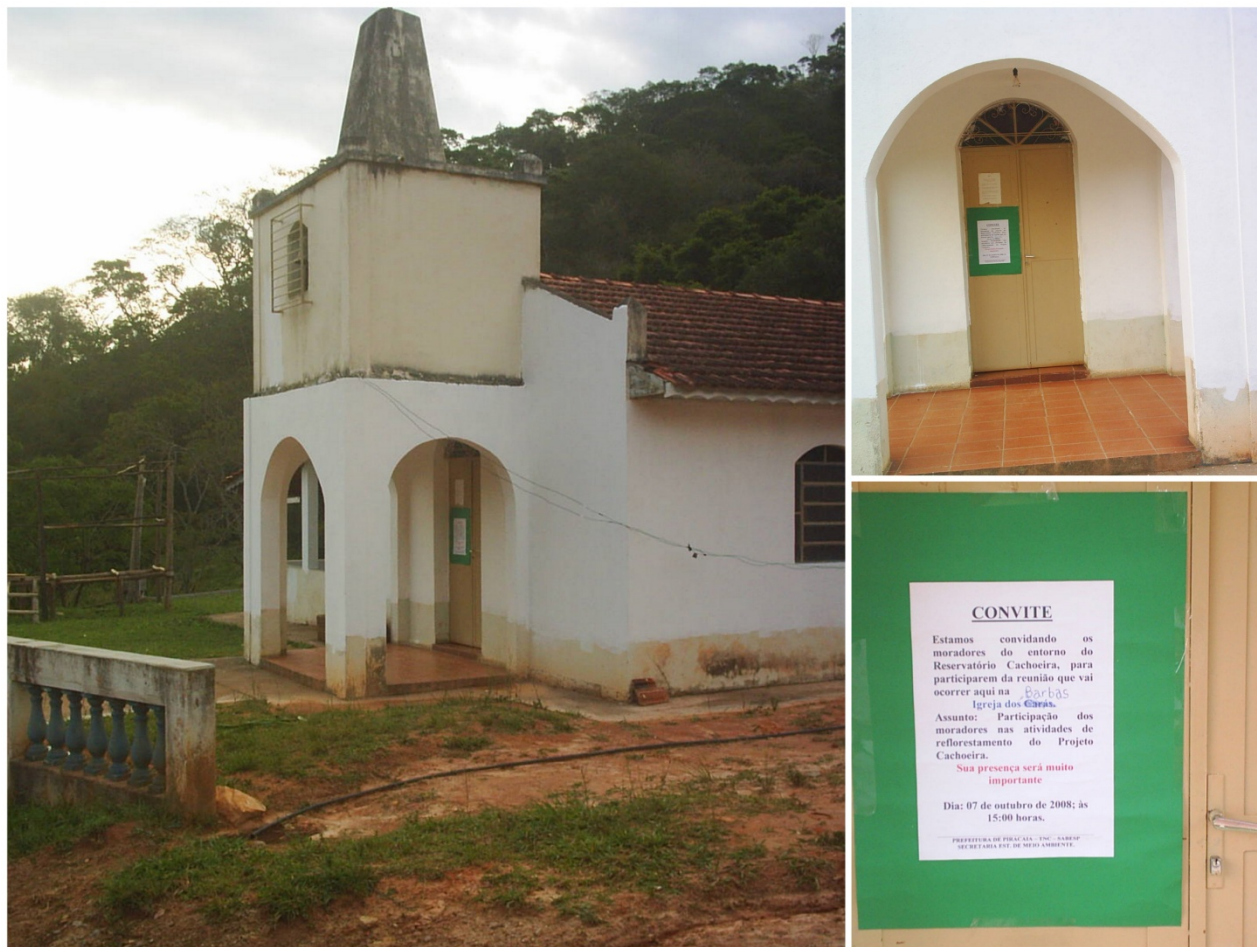


Figure 20: Flyer posted at local church, Igreja dos Barbas.

Third meeting with community surrounding the restoration areas – Piracaia, São Paulo

Date: 07 October 2008

Location: Church of the Barbas District

Time: 3pm

Invitees: Piracaia Prefeitura, TNC, Barbas Community, Carás Community, Atibainha Community, Municipal Association of Beekeepers, Sabesp, Cattle-owners

Agenda: Visual presentation of the project (with projector)

- Main problems in the district (future workshop)
- Goals for the district (future workshop)
- Forms of development for the community

Present: Residents from the Barbas and Carás Districts, Municipal Association of Beekeepers of Piracaia and Region, Piracaia Prefeitura, and TNC

Summary: The meeting was widely publicized in the municipality. Fliers were posted at various places throughout the city, such as the City Hall (Prefeitura), Secretary of Public Works, supermarket, Barbas District Church and the local bus station. In addition, personal invitations were distributed to residents of areas surrounding the restoration areas. All project partners, including Sabesp, were informed of the meeting by email and telephone.

Main points raised during the meeting:

Initially, the representative from TNC approached the broader question of the project, carbon. He presented the causes and data of the increasing concentration of greenhouse gases in the atmosphere and its relationship to global warming. He also presented the general results of international agreements on climate change and how these agreements are reflected in the Cachoeira restoration project. He presented the methods of carbon fixation of the Cachoeira restoration project and the standards that it must follow to be certified (Climate, Community, and Biodiversity Standard and Voluntary Carbon Standard).

A summary of the project was distributed to each person present at the meeting. Also, extra copies were left with the were given to the Barbas district community leader for him to distribute to the residents of the areas surrounding the restoration project.

The importance of community involvement for the success of the project was highlighted.

The representative from the Piracaia Association of Beekeepers stated that the project would be very good for the region, that it will bring positive impacts to the municipality and can bring income and work opportunity for the residents of surrounding areas. He highlighted that apiculture is an activity that would develop well in the area to be restored, due to the great presence of apiarian forest (typical of the area) and the abundance of water. He made the Association available to local residents to participate in apiculture courses. As he explained, one of the objectives of the association is to have larger number of members and, therefore, the association itself could promote capacity-building courses for the local residents interested in developing beekeeping in the project areas.

One meeting participant brought up the importance of having an environmental education activity to show how to avoid setting fires, directed to campers and fishermen. Signs about the project should be

posted with a telephone number to call in case of emergency. In addition, a local fire brigade should be created in the local community.

Some doubts were raised in relation to the forest restoration work, transport, housing, and gender roles in the work (Will men and women be working together or separated?). Such questions can only be answered when the restoration company is contracted.

At the end of the meeting, everyone present was asked about which project activities might interest them. Project activities were listed as planting of seedlings, apiculture, drivers, and supplying meals to the restoration workers.

Since there was no representative from Sabesp present at the meeting, the TNC representative was obliged to observe the community's demand for apiculture activities in the restoration areas, owned by Sabesp.



Figure 21: Meeting with local residents, 7 October 2008.



Figure 22: Meeting with local residents, 7 October 2008.

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H. ANNEX 1: DETAILED MAP AND COORDINATES OF PROJECT SITES

See attached map and coordinates in pdf format.

I. ANNEX 2: CONTACT INFORMATION FOR PROJECT PARTICIPANTS

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