CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) Version 04

CONTENTS

SECTION A. General description of the proposed A/R CDM project activity:

A.1. Title of the proposed A/R CDM project activity:

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AES Tietê Afforestation/Reforestation Project in the State of São Paulo, Brazil
Version 03
Date: 19/10/2009

A.2. Description of the proposed A/R CDM project activity:

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The project activity plans to reforest up to 13,939 hectares of riparian areas currently occupied by unmanaged grassland along the banks of ten hydropower reservoirs in the State of São Paulo with native forest species. AES Tietê holds a 30-year concession to develop the hydrological potential of these ten hydropower plants to generate electricity. From 2001-2007, AES Tietê has reforested 1,568 hectares.

The objectives of the project activity are to:

- Restore the structure, function, and ecosystem services of riparian forests located along the borders of ten hydropower reservoirs;
- Enhance the biodiversity of degraded riparian areas, and contribute to the creation of ecological connectivity along the rivers;
- Increase carbon sequestration in riparian forests;
- Improve water recharge in the reservoirs and control soil and water erosion;
- Contribute to stop and reverse land degradation processes in the State of São Paulo, with special focus on riparian ecosystems; and,
- Provide employment and recreational opportunities for local residents in the vicinity of the reservoirs.

The project proponent, AES Tietê S.A., is a large Brazilian electrical energy generator that owns and operates 10 (ten) hydropower plants, with an installed capacity of 2,651 (two thousand, six hundred fifty-one) MW within the State of São Paulo, Brazil. These ten hydropower plants correspond to around 20% of energy generated within the State of São Paulo, and to 2% of national generation. The hydropower plants are located in the central, northwest and northeast regions of the State of São Paulo. Five of these power plants – UHE[1] Barra Bonita, UHE Bariri, UHE Ibitinga, UHE Promissão, and UHE Nova Avanhandava – are located in the Tietê river basin. The UHE Água Vermelha, with 1.396 MW of installed capacity, is the largest hydropower plant, accounting for 50% of base load energy demand for AES Tietê. It is located in the Grande river basin, between the states of São Paulo and Minas Gerais. The other three hydropower plants are located in the Pardo river basin (UHE Euclides da Cunha and UHE Limoeiro), and Mogi-Guaçu river basin (PCH[2] Mogi-Guaçu).

[1] UHE stands for "Usina Hidroelétrica" or hydropower plant.

[2] PCH stands for "Pequena Central Hidrelétrica" or small hydroelectric plant

The riparian areas eligible for reforestation activities based on definitions provided in paragraph 1 of the Annex to Decision 16/CMP.1 ("Land use, land-use change and forestry"), as requested by Decision 5/CMP.1 ("Modalities and procedures for A/R project activities under the Clean Development Mechanism in the first commitment period of the Kyoto Protocol"), and AR-AM0010 are included in Table 1. Exclusions are due to illegal occupations, rocky soils, water bodies, and existing forest fragments.

Table 1: Areas Eligible for Reforestation Activities

Reservoirs	Project Boundary (ha)	Exclusions (ha)	Area Eligible for CDM (ha)
UHE Ibitinga	1.191	402	790
UHE Promissão	3.672	1.182	2.490
UHE Bariri	824	272	552
UHE Barra Bonita	2.141	596	1.545
UHE N. Avanhandava	4.711	512	4.199
UHE Mogi Guaçu	171	80	91
UHE Caconde	123	18	105
UHE Euclides Cunha	14	6	8
UHE Limoeiro	18	10	8
UHE Água Vermelha	5.510	1.359	4.151
Total	18.376	4.438	13.939

Source: Geoconsult Ltda.

The ten reservoirs for which this project is proposed were built more than 25 years ago by the state-owned São Paulo Energy Company, CESP[3]. AES Tietê acquired the rights to develop the hydrological potential of these plants and generate electricity, according to the conditions set forth by the privatization bid document Nº SF/002/99 organized by the State Government of São Paulo in September 1999[4]. The contract between the Brazilian Electricity Regulatory Agency (ANEEL) and AES entered into force in December 1999 and details the company's responsibilities during the 30-year concession period[5]. The contract includes the transfer of the hydropower plants, as well as associated facilities (the reservoirs, riparian areas and dams), from the CESP to the project proponent for a duration of 30 years, and further renewable for an equal period.

Prior to the construction of the hydropower plants and incorporation of the reservoirs, most of the areas within the project boundaries were covered with grass species. These species prohibit woody species from taking root, and, for more than 30 years, the riparian areas have not naturally regenerated. Tropical forest fragments with disturbance histories in southeastern Brazil have a lower potential for regeneration from available seed banks and/or additional natural processes (for an example, see Martins and Engel, 2008).

During the reservoir construction period, the original riparian areas were flooded and remained under the control of the government of the State of Sao Paulo. In 1985, the Brazilian federal government legally

[3] CESP, São Paulo Energy Company

[4] Edital Nº SF/002/99 – Alienação de Ações do Capital Social da Companhia de Geração de Energia Elétrica Tietê, Setembro, 1999

[5] Contrato de Concessão No 92 / 99 – ANEEL – Tietê de uso de bem público para geração de energia elétrica, que celebram a união e a Companhia de Geração de Energia Elétrica Tietê, Processo No 48500.004002/99-77.

designated grassland areas around the reservoirs as "Areas of Permanent Preservation" (APPs or *Área de Preservação Permanente*) to allow for natural regeneration of the riparian forest.

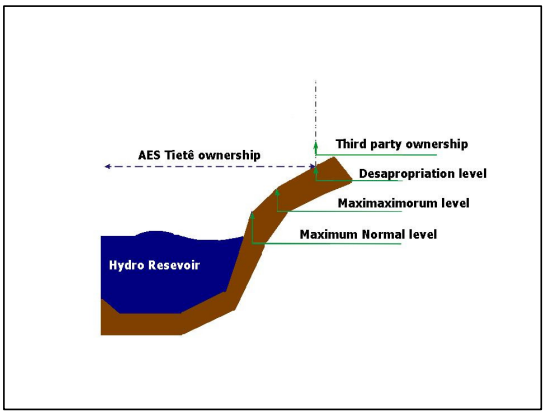

Figure 1 Schematic diagram

At that time, all the areas around the reservoirs controlled by AES Tietê S.A. were included within the APP designation because the area covered by the APP is greater than the area controlled by AES Tietê S.A. The legal foundation for APPs is in the National Forest Code, Law Number 4.771/1965 (Código Florestal Lei 4.771/1965). The areas situated around man-made reservoirs were included in the APP category by Resolution 4/1985 and Resolution 302/2002, passed by the Brazilian National Environmental Council, CONAMA. The land area protected by this legal designation extends 100 (one hundred) meters from the maximum operational level of the waterline for each individual hydropower plant (Figure 1). The environmental laws and resolutions, designating APPs, do not include the obligation to afforest/reforest the land.

In December 1999, the ownership rights for the riparian concession areas around each hydropower plant were transferred to AES Tietê. AES Tietê does have the responsibility to protect these areas from human intervention and may not engage in suppression of the vegetation or create an impediment to natural regeneration. Therefore, these riparian areas are unmanaged and not subject to anthropogenic pressure. The Tietê and Grande river watersheds were historically the gateway for agricultural activities within São Paulo and were subject to constant anthropogenic pressure. From the early 1900´s to around 1930, farmers deforested much of the region to plant coffee. In 1929, the commodities market collapsed, and large-scale cattle ranching were introduced in the region. This activity prevailed from the 1960's to the 1980's, when the hydropower plants and reservoirs were built. Today, almost 40 (forty) percent of the land use around the reservoirs covers cattle ranching, and 60 (sixty) percent covers agribusiness, with sugarcane forming a major crop. Agribusiness activities also include grain, cotton, and orange production. The only areas that reflect tree vegetation cover correspond to the reforested areas.

From 2001 to 2007, AES Tietê reforested around 1,568 hectares of non-contiguous lands along the reservoirs. AES Tietê initiated these activities in 2001 to protect and reforest riparian areas bordering its reservoirs by testing and observing the results of different afforestation/reforestation practices. Those tests were conducted by (1) planting native species in protected areas, which had not demonstrated

spontaneous natural regeneration; and (2) including between 80 and 126 native species for completing reforestation of the areas. The results of those tests demonstrated that these protected areas will only regenerate natural forest cover through human reforestation activities, and will not naturally regenerate.

The A/R CDM project activity will contribute for regional and global sustainable development. There are multiple environmental benefits and values associated with the restoration of protected areas. Riparian buffers can reduce soil erosion effects and keep sediment and pollutants away from water bodies since they function as filters to delay, absorb, or purify contaminated runoff before it enters surface waters. Riparian areas provide other benefits including decreasing soil erosion; storing and recycling of organic matter and nutrients; providing habitat and nursery functions for fish and wildlife; removal of nutrients such as nitrogen, phosphorous and sediment from surface and subsurface flow and providing aesthetic quality, scientific and educational opportunities. Many plant and animal species encountered within the project stratum is dependant on the riparian system for at least a portion of their lifecycle.

Ecosystem and human services provided by riparian areas include both those with use values as well as others with non-use values. The benefits with use value arise from in-stream uses (such as fishing); withdrawal for drinking and irrigation; flood mitigation; enhanced aesthetics; consumptive activities such as hunting; and non-consumptive activities such as bird watching. Riparian systems also provide non-use values such as future benefits (bequest value) and intrinsic values such as the knowing that a healthy ecosystem exists.

In addition to the environmental benefits, particularly for the climate through the removal of atmospheric carbon, the CDM A/R project activity deters the conversion of riparian lands for urban settlements or other types of construction. This is notable, given the example of the Billings Reservoir in the Greater São Paulo region, which is not owned or operated by AES Tietê. From 1989-1999 the Billings Reservoir lost over 6.6% of its vegetative cover[6].

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Indicate if the Party involved wishes to be considered as a project participant (Yes/No)
Brazil (host)	AES Tietê S.A. (Private)	No
Canada	International Bank for Reconstruction and Development as a trustee for the BioCarbon Fund	Yes
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-AR-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		
Note: When the CDM-AR-PDD is prepared to support a proposed new baseline and monitoring methodology (form CDM-AR-NM), at least the host Party(ies) and any known project participant (e.g. those proposing a new methodology) shall be identified.		

[6] ISA (2000).

A.4. Description of location and boundaries of the A/R CDM project activity:

A.4.1. Location of the proposed A/R CDM project activity:

A.4.1.1. Host Party(ies):

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Brazil ratified the Kyoto Protocol on August 23, 2002

A.4.1.2. Region/State/Province etc.:

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Southeastern Region of Brazil, States of São Paulo and Minas Gerais, as can be seen in the **Figure 2** below.

A.4.1.3. City/Town/Community etc:

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As indicated in the Table 1 the reforested areas that comprise the project activity are located along the borders of the reservoirs located at the municipalities listed by Table 2. The location for each hydropower plant headquarters, by municipality, is indicated in Table 2 in a bold and underlined text (e.g. **Ibitinga**).

Figure 2 Map of AES Tietê hydroelectric plant locations

The table below lists the municipalities in which the hydropower plants (i.e. reservoirs) are located.

Table 2: Project Location

Reservoirs	Municipalities
UHE Ibitinga	• Arealva, Bariri, Boracéia, **Ibitinga**, Itaju, Iacanga and Pederneiras (State of São Paulo).
UHE Promissão	• Sabino, Uru, Reginópolis, Guaiçara, Cafelândia, Lins, Iacanga, Ibitinga, Pirajuí, Pongaí, **Promissão**, José Bonifácio, Borborema, Adolfo, Sales, Ubarana, Urupês, Novo Horizonte, Mendonça, Nova Aliança, Potirendaba and Irapuã (State of São Paulo).
UHE Bariri	• Bariri, Barra Bonita, **Boracéia**, Igaraçu do Tietê, Itapuí, Jaú, Macatuba and Pederneiras (State of São Paulo).
UHE Barra Bonita	• Anhembi, **Barra Bonita**, Botucatu, Conchas, Dois Córregos, Igaraçu do Tietê, Laranjal Paulista, Mineiros do Tietê, Piracicaba, Santa Maria da Serra, São Manuel and São Pedro (State of São Paulo).
UHE Nova Avanhandava	• Birigui, Brejo Alegre, **Buritama**, Lourdes, Santo Antonio do Aracanguá, Turiúba, Zacarias. (State of São Paulo).
PCH Mogi Guaçu	• Aguaí, Araras, Conchal, Espirito Santo do Pinhal, Estiva Gerbi, Itapira, Leme, **Mogi-Guaçu**, Moji Mirim, Pirassununga. (State of São Paulo).
UHE Caconde	• **Caconde**, Divinolândia Tapiratiba, São José do Rio Pardo, (State of São Paulo) • Botelhos, Cabo Verde, Muzambinho, Poços de Caldas, (State of Minas Gerais).
UHE Euclides da Cunha	• Caconde, Casa Branca, Divinolândia, Itobi, Mococa, **São José do Rio Pardo**, São Sebastião da Grama, Tambaú, Tapiratiba, (State of São Paulo).
UHE Limoeiro	• Casa Branca, **Mococa**, São José do Rio Pardo, Tambaú, Tapiratiba (State of São Paulo). • Arceburgo, Cássia dos Coqueiros, Guaranésia, Monte Santo, (State of Minas Gerais).
UHE Água Vermelha	• Cardoso, Icem, Indiaporã, Macedônia, Mira Estrela, Orindiúva, Paulo de Faria, Pedranópolis, Pontes Gestal, **Ouroeste** and Riolândia (State of São Paulo) • Campina Verde, Fronteira, Frutal, Itapagipe, Iturama and São Francisco de Sales (State of Minas Gerais).

A.4.2 Detailed geographic delineation of the project boundary, including information allowing the unique identification(s) of the proposed A/R CDM project activity:

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The location of each hydropower reservoir and its geographical coordinates is listed below:

UHE Água Vermelha: is situated on the Grande River, north of the State of São Paulo and south of the State of Minas Gerais, between 19°37' and 20°30' south latitudes and 49°05' and 50°30' west longitudes.

UHE Bariri: is situated on the middle course of the Tietê River, in the center of the State of São Paulo, between 22º28'48" and 22º09'00" south latitudes and 48º45'36" and 48º38'24" west longitudes.

UHE Barra Bonita: is situated on the middle course of the Tietê River, in the center of the State of São Paulo, between 22º52'12" and 22º30'00" south latitudes and 48º31'48" and 47º57'36" west longitudes.

UHE Ibitinga: is situated on the middle course of the Tietê River in the center of the State of São Paulo, between 21º 45' and 22º 00' south latitudes and 48º 50' and 49º 00' west longitudes.

UHE Promissão: is situated on the middle course of the Tietê River in the center west region of the State of São Paulo, between 21º18'00" and 21º45'36" south latitudes and 48º59'24" and 49º46'48" west longitudes.

UHE Nova Avanhandava: is situated on the middle course of the Tiete River in the center west region of the State of São Paulo, between 21°06`00`` south latitudes and 50°12`00`` west longitudes.

PCH Mogi Guaçu: is situated on course of Mogi-Guaçu River, in Mogi-Guaçu municipality of the State of São Paulo, between 22°23`00`` south latitudes and 46°54`00`` west longitudes.

UHE Caconde: is situated on course of Pardo River, in Caconde municipality of the State of São Paulo, between 21°34`00``south latitudes and 46°37`00``west longitudes.

UHE Euclides da Cunha: is situated on course of Pardo River, in São José do Rio Pardo municipality of the State of São Paulo, between 21°36`00``south latitudes and 46°56`56`` west longitudes.

UHE Limoeiro: is situated on course of Pardo River, in Mococa municipality of the State of São Paulo, between 21°37`00`` south latitudes and 47°00`00`` west longitudes.

Quickbird satellite imagery was applied to interpret two specific boundary points: the normal and maximum operational level of waterline for each individual hydropower plant reservoir. Both quotas are considered the project boundary for this project activity. Thus, the area between the two quotas (i.e. the expropriation area) is the one eligible for reforestation activities. The assumption that on average, the maximum operational level of the waterline is located 2 (two) meters in height from the normal operational level, was applied to determine the project boundary. The correct water level for each reservoir was obtained according to the date the Quickbird images were acquired.

For the identification of non-CDM baseline annual proportional forestry rate, a 'region' was determined based on the multiplication of the total project boundary by a factor of 20[7]. Figure 3 illustrates how the project boundary and region was determined for UHE Bariri.

[7] AR-AM0010 determines that the non-CDM proportional forestry rate shall be based on lands in the region. A region shall be considered to be that centred on the project area, and within a radius sufficient to include an area of the non-CDM baseline forestry stratum equal to at least 20 times the proposed project area.

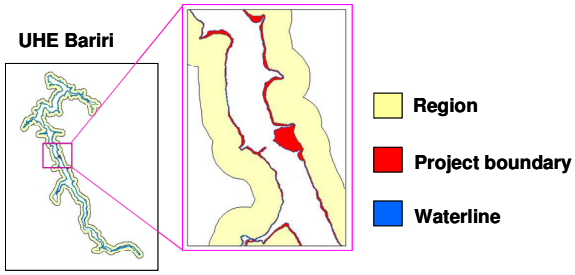

Figure 3 Schematic determination of project boundary

The areas within the project boundary (and region) were screened for vegetative cover according to Quickbird imagery. The satellite images were interpreted for areas that have been reforested by AES Tietê between 2001-2007, as well as, human occupation and water bodies. This analysis resulted in the final eligible area for the project activity as included in Table 1. Natural and seasonal fluctuations in the waterline due to increase/decrease of rainfall events does not affect the project boundary. This is because the lower end of the project boundary is determined by the maximum normal level of the hydroelectric plant.

A.5. Technical description of the A/R CDM project activity:

A.5.1. Description of the present environmental conditions of the area planned for the proposed A/R CDM project activity, including a concise description of climate, hydrology, soils, ecosystems (including land use):

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Climate

The State of São Paulo includes distinct climatic zones, but is mainly classified as being tropical humid, with higher rainfall in the summer (October-March) and dryness in the winter (April-September)[8]. Mean average temperature of the warmest month is above 22°C, whilst in mountainous areas mean temperature are greater than 10°C for at least four months per year. Average annual rainfall for the State is estimated as 1,377 mm (10,839 m^3/s) according to the State Plan for Hydrological Resources Plan (PERH) 2004-2007[9]. For the total amount of rainfall 71% is lost by evapotranspiration, with a remaining water balance of 397 mm (3,120 m^3/s) for human use and consumption. The availability of water resources increases to 9,800 m^3/s when taking into account water production from neighboring hydrological systems.

Ecosystems

[8] Source: Biblioteca Virtual do Estado de São Paulo (2007). Available at: http://www.bibliotecavirtual.sp.gov.br/docs/spgeo_geografia.pdf

[9] The PERH 2004-2007 is available at: http://www.daee.sp.gov.br.

The project activity is located the Atlantic Rainforest biome, originally occupied by a semideciduous seasonal tropical forest[10]. Land areas within the rural areas of the State of São Paulo have been subject to intensive disturbance from agricultural activities and cattle ranching. The remaining forest fragments do not guarantee the conservation of the original ecosystem given that disturbance alters microclimate, the dynamics of nutrients, forest structure, and species composition (Rankin-Merona and Ackerly, 1987; Tabarelli *et al.* 2005). Since legislation was passed to protect the lands within the project boundary, human disturbance was halted and as a consequence grassland species have taken over. The areas within the project boundary comprise mainly aggressive grassland species composed of the species *Panicum maximum* ("capim-colonião") and *Brachiaria decumbens* ("braquiária"). There are minor land areas with the species *Pennisetum purpureum* ("capim-elefante") and *P. americanum* ("milheto") for foraging mainly during the winter period.

Hydrology

The Tietê, Grande and Pardo river basins have suffered significant anthropogenic pressure causing significant variations in discharge behavior. Within the State of São Paulo, water availability suffers an annual fluctuation between the wet (October-April) and dry seasons (May-September). The State Plan for Hydrological Resources (PERH) 2004-2007[11] includes a State-wide water balance assessment quantifying the long-term mean annual discharge on the amount of 3,120 m^3s^{-1}, 29% of total annual precipitation. Groundwater resources within the State of São Paulo have low salinity (less than 250 mg/l), and mainly composed of bicarbonates. In general, water resource quality is declining due to urban and industrial sprawl (PERH 2004-2007).

The Tietê —São Paulo state's largest river— runs 1,100 Km from its eastern source in the São Paulo Metropolitan Region to the western border of the state where it joins the Paraná river, which then runs southward, toward the Rio de la Plata estuary between Argentina and Uruguay. This river has had a tremendous influence on São Paulo City land pattern occupation and today's industrial development set up within Metropolitan Area. Because it is located at the source of these gateways, the São Paulo Metropolitan Area has to import more than 50% of the water from other basins. The Tietê river basin comprehends a total area of 72,391 km^2 and is sub-divided into three main physical units: upper, medium, and lower. Historical flow data for the upper/medium basin (1965-1996), where the hydroelectric plants are located, reveals a mean annual discharge on the amount of 87.6 m^3s^{-1} (Mortatti *et al.* 2004).

The Grande river basin comprises 12 sub-basins. UHE Água Vermelha is located at sub-basin Turvo/Grande with total area of 15,975 km^2 (MRS, 2008). The sub-basin Turvo/Grande is characterized as having a mean annual discharge on the amount of 121 m^3s^{-1} (PERH 2004-2007). Mean annual precipitation is estimated to be over 1,340 mm, and drainage area is around 10,000 km^2.

The Pardo river basin comprises 22 sub-basins within the north/northeast portion of the State of São Paulo with a total area of 8,991.02 km^2 (IPT, 2003). Mean annual long-term discharge for the total basin

[10] In some areas Atlantic Rainforest vegetative species are mixed with Cerrado (savannah-type) species.

[11] The PERH 2004-2007 is available at: http://www.daee.sp.gov.br.

is estimated as 138.8 m^3s^{-1}. The Pardo River Basin Plan[12] quantifies a water availability index on the order of 43.24 m^3s^{-1}. More than 80% of water demand within the basin is for industrial applications.

Soils

In the region comprised by the project activity, soil is basically composed by basaltic rock types, resulted from lava flows occurred during Mesozoic period, concerned to Serra Geral Formation. It results in this well-drained, deep yellow-reddish soil, known as "terra roxa", famous as a producer of coffee, beans, corn (maize), rice, cotton and potatoes. Arenite and slate cliffs are found near the region of Bauru, providing also well-drained soil conditions for reforestation activities. The soils along the Tietê River Basin present good porosity, internal drainage, and friability[13].

A.5.2. Description of the presence, if any, of rare or endangered species and their habitats:

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The riparian areas surrounding the reservoirs comprise of aggressive grass species. The environmental restoration will contribute to the creation of biodiversity corridors, which will enhance the habitat for fauna and flora. For threatened animal species in the State of São Paulo, the most updated information is included as a list at the State's Environment Secretary website: http://www.ambiente.sp.gov.br/fauna.php. The list was made public in October 2008, and identifies 436 species and subspecies of vertebrates (17% of the known taxonomy) mainly located within the Atlantic Rainforest biome. A summary of the findings is made available at various public electronic sites including: http://tvecologica.wordpress.com/2008/10/08/estado-de-sao-paulo-divulga-sua-lista-de-fauna-ameacada-faca-o-download-aqui/. For threatened plant species, the most updated information is a national list made available by the Ministry of Environment in 2008. Specifically for the State of São Paulo, the State's Environment Secretary released a list in 2004 included in Resolution SMA 48/2004. No rare or endangered species listed and their habitats are expected to be present at the riparian areas surrounding the reservoirs.

A.5.3. Species and varieties selected for the proposed A/R CDM project activity:

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This project activity will utilize a mix of 80 (eighty) to 126 (one hundred twenty-six) native tree and shrub species. The complete list of species is included in Annex 8. These are selected based on their natural occurrence within the reforested areas, as well as, their ability to provide for a long term sustainable riparian forest habitat. It includes pioneer (i.e. fast-growing) species such as *Patagonula americana* ("guaiuvira") and *Lafoensia pacari* ("dedaleiro"), as well as secondary species such as *Talisia esculenta* ("pitomba") and *Hymeneaea courbaril* ("jatobá"). The Resolução SMA 47/2003 of the State of São Paulo encourages reforestation activities within protected areas with high biodiversity levels. The selection of species is guided by Resolução SMA 8/2007 which establishes minimum standards for environmental restoration activities within the State of São Paulo. The following list of species was selected to be planted in large quantities[14]: *Anadenanthera columbrina* ("angico-branco"), *Anadenanthera macrocarpa* ("angico-vermelho"), *Guazuma ulmifolia* ("mutambo"), Croton floribundus

[12] Available at: http://www.sigrh.sp.gov.br/cgi-bin/sigrh_home_colegiado.exe?TEMA=RELATORIO&COLEGIADO=CRH/CBH-PARDO&lwgactw=751085.

[13] O Agronômico, Campinas 52(1) 2000.

[14] This is due to natural occurrence, seedlings availability, carbon removal potential, and biodiversity.

("capixingui"), *Vitex montevidensis* ("tarumã"), *Cordia trichotoma* ("louro-pardo"), *Ficus guaranitica* ("figueira"), *Peltophorun dubium* ("canfístula"), *Balfourodendron riedelianum* ("pau-marfim"), *Cariniana estrellensis* ("jequitibá-branco"), and *Cedrela fissilis* ("cedro-rosa").

A.5.4. Technology to be employed by the proposed A/R CDM project activity:

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Forest planting and management techniques will be designed taking into account the local knowledge of the species and research and development experience of AES Tietê professionals and partners in the region since the 1980s.

The technology implemented in the project in different project activities such as seedling development, site preparation, planting, and plantation management are based on the research and development activities initiated by AES Tiete's project team and partners during 2001 to 2007. The technologies implemented in project activities are summarized below.

Seedlings development

The collection and treatment of seeds is done from forest fragments within the Atlantic Rainforest biome. Fruits from a variety of species are selected and screened for seed collection. The seeds are treated to break dormancy, as for example, the process of scarification of the *Guapuruvu* (*Schizolobium parahyba*) seeds, involves soaking in water for one or two days. Seeds are then planted in small tubes holding 53 cm^3 of substrate involving soil, humus, carbonized rice straw and chemical fertilizer. Small tube supports germination and seedling growth and can hold up to 192 units. The trays are placed in suspended beds with 50 fifty percent shade cover and automated irrigation within in the nursery, which ensures control of growth conditions. In some cases, when the seedlings require better care, the seeds are planted in the germination nursery before transplanting into tubes.

AES currently operates a nursery at UHE Promissão with a capacity to produce 1,000,000 seedlings per year. This production capacity will be used for this project activity. If necessary, the seedlings will also be purchased from evaluated nurseries in the region.

Site preparation

In areas planted from 2001-2007, a less intrusive method of mechanized clearing and soil preparation was used to minimize physical, biological or chemical degradation. To minimize the disturbance of vegetation and soils during site preparation, restoration activities limited the area affected (preparing only the sites where seedlings were planted and using small holes 30-40 cm in diameter), retained as much of the existing vegetation, and positioned holes along the contour lines to reduce soil loss. Fertilizers were applied directly to the small planting holes rather than being spread across the plantation. Pesticide use was minimized by biological control measures.

It is expected that future reforestation activities will closely follow these techniques in order to avoid soil disturbance or soil erosion, which could reduce the soil organic carbon pool over the project lifetime. Approximately 10 (ten) days after the land is cleared, workers, accompanied by a qualified technician will treat the soil with granulated bait or pulverized liquid insecticide to control ants. The insecticide is applied throughout the proposed planting area, as well as a minimum of 100 meters from the fences. For effective weed control, gliphosate is applied using mechanized pulverization tractors.

Planting

For planting activity, 0.04 x 0.04 x 0.04 meter pits are prepared. Each pit is spaced 3.0 x 2.0 meters apart. The seedlings inside the tubes are placed in boxes or buckets and transported to the planting area. Species are identified as fast and slow growing. These groups have complementary demands, regarding the need for light. Fast growing species create a seedbed that restarts the regeneration process. They also provide shade during the initial growth phases of the slow-growing species, facilitating harmonic development of both types. The two groups were planted simultaneously and irrigated. A mix of 80 fast- and -slow-growing species are planted during the 4 (four) months between November and February to take advantage of the rainy season. A second round of planting in the same area takes place 90 (ninety) days following the first planting. In this operation, the entire planted area is surveyed to identify dead or failed seedlings and replanting undertaken. Each pit is covered with dried grass to maintain soil moisture.

The reforestation model applied from 2001-2007, using native species, was induced secondary succession. Knowledge of succession processes and of the ecological features of tree species present in each succession stage indicated the best species that could be employed for successful long-term regeneration of riparian forests.

For the new plantation areas, some modification to this original reforestation model is expected. Firstly, pits will be spaced less than 3.0x2.0 meters apart in order to maximize forest growth potential. Long-term studies conducted by ESALQ/USP demonstrate the potential to decrease pit distance without an increase of competition by different tree species. Although a mix of slow and fast-growing species will be used, control over the number of individuals per species will be improved, as will, the number of species for each land parcel. An estimated 2,000 (two thousand) seedlings will be needed per hectare of reforested area. The seedlings will be classified according to their fast, medium, and slow growth rates and selected in the proportion of 30%, 50%, and 20% respectively.

Plantation management

Plantation management practices for the new areas will be modified slightly from those implemented between 2001-2007. During the first eight months following planting, the area is treated with insecticide and herbicide every two months in the same manner as it was treated prior to planting. Vines and other tropical plants that strangle the seedlings are manually cut and grassy areas are cut using mechanized equipment. Over the first three years of planting, project areas will be managed with the objective of achieving maximum survival and establishment. Following this period, plantation protection and monitoring measures would be continued during the project lifetime.

Fencing

Fencing activities will take place at selected areas with higher risk of human disturbances such as cattle grazing. Only renewable wood from Eucalyptus tree species will be used as fencing material. Wooden poles with diameter between 6-11 cm and a total height of 1.20 m are placed 6 m apart according to specifications provided by AES Tietê technical team.

A.5.5. Transfer of technology/know-how,if applicable:

>>

For this project activity, technology/know-how will be transferred to Brazil by means of scientific literature and techniques related to the environmental recovery of degraded forestry habitat, by the University of São Paulo Agriculture and Agronomics Research Center (ESALQ/USP). Applied research undertaken by the University's Department of Forestry Sciences takes into account international studies conducted within the field of restoration ecology, forestry, and carbon modeling. This theoretical and practical background will be applied to the project activity.

A.5.6. Proposed measures to be implemented to minimize potential leakage:

>>
Under the applicability conditions for AR-AM0010 (version 04) methodology, there are no potential leakage emissions attributable to the proposed A/R project activity.

A.6. Description of legal title to the land, current land tenure and rights to tCERs / lCERs issued for the proposed A/R CDM project activity:

>>
All the riparian areas within the boundaries of the proposed project activity (i.e. the expropriation area) are owned by AES Tietê, according to Concession Contract Number 92/99 – ANEEL, (Contrato de Concessão de Geração Nº 92/99 – ANEEL, Processo Nº 48500.004002/99-77), signed on December 20, 1999. The project entity, AES Tietê S.A. will have ownership to all temporary certified emission reductions (tCERs) to be achieved from the project activity.

A.7. Assessment of the eligibility of the land:

>>
AR-AM0010 version 04 uses the latest version of the mandatory tool: "Procedures to define the eligibility of lands for afforestation and reforestation project activities" approved by the CDM Executive Board (EB35) to demonstrate land eligibility within the project boundary. The tool specifies that project participants shall demonstrate that the land at the moment the project starts does not contain forest and that the activity is a reforestation or afforestation project activity. Project participants may choose to apply aerial photographs or satellite imagery complemented by ground reference data, or ground based surveys.

An assessment of the eligibility of land for reforestation activities was conducted based on satellite imagery with a scale of 1:50,000 and based on definitions as requested by Decision 5/CMP.1 ("Modalities and procedures for A/R project activities under the Clean Development Mechanism in the first commitment period of the Kyoto Protocol")[15].

To evaluate current land use, images from Quickbird and CBERS (China-Brazil Earth Resources Satellite) were used for the period 2006-2007. These images were compared against 1989-1990 TM/Landsat satellite images[16]. The satellite images were superimposed over Digital Terrain Models (DTMs) extracted from the cartographic maps of 1:50.000 scale. According to Brazilian statistical research agency (IBGE), this model presents a three-dimensional view, which enables visualization of relief (drainage, geographical accidents, depressions, etc.).

[15] AESTietê contracted Geoconsult Ltda to develop an eligibility study and the full report will be made available to the DOE for validation.

[16] TM/Landsat has a 30x30m pixel size resulting on a spatial unit of 0.9 ha. CBERS has a 20x20m pixel size resulting on a spatial unit of 0.4 ha, and Quickbird has a 0.6x0.6m pixel size resulting on a spatial unit of $2.16x10^4$.

Figure 4 below presents the eligible areas for reforestation for the SHP Mogi-Guaçu. The land eligibility assessment resulted in a total eligible area of 13,939 hectares.

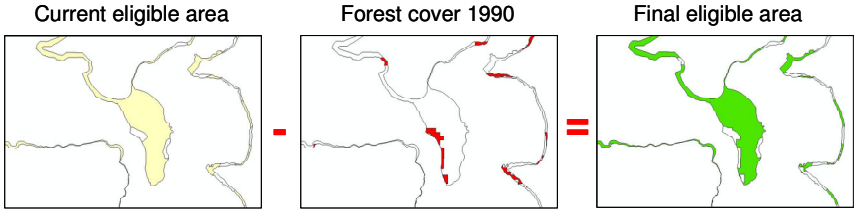

Figure 4 Determining eligible areas for reforestation

A detailed description of the methods used to establish eligibility of land and project boundary, including sample satellite imagery is included in Annex 5. Two reference documents were applied to guide the assessment: "Procedures to Demonstrate the Eligibility of Lands for Afforestation and Reforestation CDM Project Activities[17] and the IPCC's Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003) outlined in Chapter 2 - Basis for Consistent Representation of Land Areas is followed in the land eligibility assessment.

A.8. Approach for addressing non-permanence:

>>
The option of temporary CERs (tCERs) is chosen to address the non-permanence of the forest.

A.9. Estimated amount of net anthropogenic GHG removals by sinks over the chosen crediting period:

>>
The *ex ante* actual net GHG removals by sinks are the sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in GHG emissions—measured in CO_2 equivalents—by sources within the project boundary and attributable to the A/R CDM project activity. Section D of this PDD describes the 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. The *ex ante* estimation of GHG removals by sinks accounts for changes in carbon stock in the living biomass pools according to the standard *carbon gain-loss* method found in IPCC´s Good Practice Guidance for Land use, Land-use Change and Forestry (GPG-LULUCF). Net anthropogenic GHG removals by sinks are discounted to account for the rate of non-CDM forestry in the baseline scenario.

The estimated amount of net anthropogenic GHG removals by sinks is summarized by the table below. In 2009 the company plans to reforest an additional 1,100 hectares. From 2010-2014 the company plans to reforest 2000 hectares/year. The total area planted will sum up to 12,668 hectares, including the 1,568 hectares planted from 2001-2007.

[17] http://cdm.unfccc.int/methodologies/ARmethodologies/Tools/methAR_proc02_v01.pdf

Summary of results obtained in Sections C.7., D.1., and D.2.				
Year	Estimation of baseline net GHG removals by sinks (tonnes of CO_2 e)	Estimation of actual net GHG removals by sinks (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of net anthropogenic GHG removals by sinks (tonnes of CO_2 e)
2001	6	14.260	-	14.254
2002	32	38.544	-	38.512
2003	77	62.071	-	61.994
2004	148	89.954	-	89.805
2005	265	128.434	-	128.170
2006	409	165.398	-	164.989
2007	580	200.784	-	200.205
2008	775	234.906	-	234.131
2009	1.103	297.228	-	296.124
2010	1.692	410.115	-	408.423
2011	2.597	572.332	-	569.735
2012	3.868	781.453	-	777.585
2013	5.558	1.036.344	-	1.030.787
2014	7.709	1.334.878	-	1.327.169
2015	10.030	1.620.891	-	1.610.861
2016	12.517	1.896.488	-	1.883.970
2017	15.156	2.161.204	-	2.146.048
2018	17.940	2.416.085	-	2.398.145
2019	20.845	2.659.604	-	2.638.758
2020	23.875	2.893.894	-	2.870.018
2021	27.022	3.119.336	-	3.092.314
2022	30.273	3.335.816	-	3.305.543
2023	33.621	3.543.639	-	3.510.017
2024	37.055	3.742.839	-	3.705.784
2025	40.579	3.934.840	-	3.894.261
2026	44.186	4.119.757	-	4.075.572
2027	47.855	4.296.583	-	4.248.729
2028	51.590	4.466.513	-	4.414.923
2029	55.399	4.630.909	-	4.575.510
2030	59.257	4.788.332	-	4.729.074
Total (tonnes of CO2 e)	59.257	4.788.332	-	4.729.074

A.10. Public funding of the proposed A/R CDM project activity:

>>
There is no public funding for the project activity.

SECTION B. Duration of the project activity / crediting period

B.1 Starting date of the proposed A/R CDM project activity and of the crediting period:

>>
December 15, 2000

B. 2. Expected operational lifetime of the proposed A/R CDM project activity:

>>
The expected operational lifetime of the project activity is perpetual given that the forest will not be commercially harvested. Moreover, the Brazilian environmental legislation does not allow for management or conversion of Areas of Permanent Preservation, as defined in the National Forest Code, Law Number 4.771/1965, as well as in CONAMA Resolution 4/1985 and Resolution 302/2002. These regulations provide a legal framework for forest maintenance and conservation after the crediting period of the project activity.

B.3 Choice of crediting period:

The project proponent's concession, which includes the areas to be reforested, has a duration of 30 (thirty) years, starting in 1999 and terminating in 2029. The legal foundation of the concession allows AES-Tietê to renew it for an equal period of 30 (thirty) years through a legal decree and approval by the Brazilian Electrical Energy Agency (ANEEL). Given the fact that AES Tietê operates public utilities under the concession, no time lag is expected between the expiration of the current concession and renovation of the second 30-year period. Given these assumptions, AES Tietê considers a fixed period of 30 (thirty) years for the crediting period as the best choice in the given situation.

B.3.1. Length of the renewable crediting period (in years and months), if selected:

>>
NA

B.3.2. Length of the fixed crediting period (in years and months), if selected:

>>
30 years-00 months

SECTION C. Application of an approved baseline and monitoring methodology

C.1. Title and reference of the approved baseline and monitoring methodology applied to the proposed A/R CDM project activity:

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Afforestation and reforestation project activities implemented on unmanaged grassland[18] in reserve/protected areas. AR-AM0010/version 04 (EB 42 on September 26th 2008).

Tool for the demonstration and assessment of additionality for afforestation and reforestation CDM project activities (version 02).

C.2. Assessment of the applicability of the selected approved methodology to the proposed A/R CDM project activity and justification of the choice of the methodology:

>>

The methodology AR-AM0010 is applicable to the following categories of project activities: afforestation and reforestation (A/R) implemented on unmanaged grassland in reserves or protected areas that are not likely to be converted to any other land use except forestry, and which have no potential to revert to forest without direct human intervention. This is consistent with this project activity, given that a previous version of this PDD was used to approve ARNM0034, a precursor to methodology AR-AM0010.

The baseline scenario for this project activity is the continuation of current land use as unmanaged grassland, including allowance for implementation of non-CDM forestry on lands with characteristics similar to the project area at a non-CDM baseline forestry rate that is smaller than the A/R rate of CDM project activity.

The project activity complies with the following applicability conditions:

- No direct human-induced activities leading to loss of carbon stocks (such as harvesting, selective logging, fuel gathering) are expected to occur on lands within the project boundary.
- No direct economic activity (such as agriculture, grazing) is expected to occur within the project boundary.
- Project boundary consists of unmanaged grassland, which is designated as a reserve/protected area; is not likely to be converted to any other land use except forestry; and which has no potential to revert to forest without direct human intervention (through planting, seeding, or promotion of natural seed sources).
- The A/R project activity will not be implemented in severely degraded land.
- The lands converted to unmanaged grassland have not been continuously managed (predominantly by annual crops) for more than 20 years (long-term cultivated).
- Carbon stocks in the dead organic matter pools (litter and dead wood) are expected to be smaller in the absence of the proposed A/R CDM project activity, relative to the project scenario.
- The project activity does not lead to a shift of pre-project activities outside the project boundary, i.e., the land under the proposed A/R CDM project activity can continue to provide at least the same amount of goods and services as in the absence of the project activity.

[18] In this methodology, grassland is defined following the IPCC Good Practice Guidance for Land use, Land-use change and Forestry (IPCC, 2003). Unmanaged grassland, here, refers to grassland that is not under any direct human-induced activity or process, such as grazing or agricultural and silvi-pastural systems. It includes areas that may have been under other land use(s) and management practices and have been abandoned, now being in a steady-state condition or in the process of natural regeneration that is not expected to exceed the forest definition thresholds chosen by the host country. Although unmanaged, cattle from neighbouring areas may stray into the grassland area, if not fenced (unintended grazing). This is not considered, however, to be a direct human-induced activity carried out within the project boundary area.

- If the non-CDM A/R baseline rate is different from zero, the only approach to address non-permanence is tCER.
- Flood irrigation, and drainage of saturated soils, is not permitted, so non-CO2 greenhouse gas emissions from these activities can therefore be neglected.

C.3. Assessment of the selected carbon pools and emission sources of the approved methodology to the proposed CDM project activity:

>>

The selected carbon pools and emission sources of the approved methodology AR-AM0010 to the project activity are described by the tables below.

Table 3: Selected Carbon Pools

Carbon pools	Selected (Yes or No)	Justification / Explanation of choice
Above-ground biomass	Yes	Major carbon pool subject to the project activity
Below-ground biomass	Yes	Major carbon pool subject to the project activity
Dead wood	No	Conservative approach under applicability condition
Litter	No	Conservative approach under applicability condition
Soil organic carbon	No	Conservative approach under applicability condition

Table 4: Emissions Sources Included In or Excluded from the Project Boundary

Sources	Gas	Included/ excluded	Justification /Explanation of choice
Removal of grassland vegetation during site preparation for A/R	CO_2	Included	Main gas for this source
	CH_4	Excluded	Not applicable
	N_2O	Excluded	Not applicable
Biomass burning (use of slash-and-burn practices during site preparation, or from wildfire)	CO_2	Included	Important gas of this source
	CH_4	Included	Non-CO_2 gas emitted from biomass burning
	N_2O	Excluded	Potential emissions are negligibly small

C.4. Description of strata identified using the *ex ante* stratification:

>>

AR-AM0010 determines that if the project activity is not homogeneous, simple stratification should be carried out to improve the accuracy and precision of *ex ante* estimates of baseline and project removals by sinks. The methodology requires a specific baseline stratification approach to deal with the possibility that lands within the project boundary may regenerate from the existing woody species, that however has no potential to reach forest proportions without direct human intervention. As well, the baseline stratification approach must also provide spatial delineation of the non-CDM baseline forestry stratum used to determine the non-CDM baseline proportional forestry rate, $PFR_{non\text{-}CDM}$.

Stratification for *ex ante* estimation of existing biomass and baseline removals by sinks was conducted following the step-wise (2.1.1-2.1.5) approach included in section II.2.1. Stratification of the project area may be achieved by using a hierarchical scheme depicted by Table 1 of methodology AR-AM0010.

The first step (2.1.1) is to stratify the project area into an initial set of five strata on the basis of current vegetation cover:

- Herbaceous vegetation only;
- Herbaceous vegetation and shrubs only;
- Herbaceous vegetation and trees only;
- Shrubs and trees only; and,
- Herbaceous vegetation, shrubs and trees.

Project proponents considered the "herbaceous vegetation only" category as a unique stratum. The other four strata were excluded as options under the assumption that similar protected areas within the project area are composed of herbaceous vegetation for current and climax stages. In the case satellite imagery depicted shrubs and/or trees, these areas were excluded from the baseline stratification process. Therefore steps 2-4 (2.1.2-2.1.4) are not applicable given that there is no woody species in the baseline stratum.

The fifth step includes stratification by variables likely to result in important variations in biomass. If the project area spans a sufficiently large or inhomogeneous area, variations in climate, soils or other factors controlling growth conditions may be important enough to warrant further subdivision of strata formed in steps 2.1.1 to 2.1.4. Such re-stratification may be useful if variation in factors controlling growth give rise to mean differences in biomass between areas within the project boundary of more than about 30%, in cases where baseline biomass and/or removals will be determined by measurement. However, the methodology determines that if estimates of biomass and removals by sinks are to be developed using as defaults existing data from IPCC or other peer-reviewed literature, this restratification step will only be appropriate if the default data available appear as an explicit function the variables used for re-stratification which is not the case. This is not the case for this project activity. Therefore, stratification in this step (2.1.5) was not performed.

The final baseline stratification map considers only one stratum for the project area. Although the methodology considers the inclusion of areas with tree grassland or shrub vegetation in the project boundary, the project proponents decided not to consider these areas for reforestation activities. This assumption is for the sake of simplicity as much as conservativeness. Stratification to identify areas with risk of increased soil erosion by water and/or wind within the project boundary by implementation of the A/R project activity is not considered. The project activity will actually improve soil conditions minimizing erosion.

Stratification for estimation of the non-CDM proportional forestry rate shall comprise lands in the region that have a similar climate, physical characteristics, and land-use history to those in the proposed project area; and that also have been subject to similar financial, legal, and regulatory/policy constraints/conditions/incentives. For AR-AM0010, a "region" shall be considered that area centred on the project area, and within a radius sufficient to include an area of the non-CDM baseline forestry stratum equal to at least 20 times the proposed project area.

Stratification to define the non-CDM baseline forestry stratum was executed as described below. The procedure included in AR-AM0010 requires use of time sequential land cover/use maps of adequate spatial/thematic resolution, or remote sensing imagery (or aerial photography) of adequate spatial/spectral resolution—or some combination of these. The steps included the:

(i) Identification of those lands in the region that are reserves or protected areas, and are similar to the project area in terms of: climate and physical characteristics (soils and topography, primarily); land use history; and financial, legal, and regulatory/policy constraints/conditions/incentives. All reserves or protected areas were included even if the land cover was different from the project area, provided all other conditions are similar;

(ii) Confirmation that none of the planted forest was created in direct response to national and/or sectoral policies, or regulations, that have been implemented since 11 November 2001. Thus, no exclusions of planted forest identified by step (i) were required based on this criterion;

(iii) Exclusion of all areas planted forest for which transparent and credible evidence could be provided to prove that the planted forest was created as a CDM project from the area identified by step (i);

(iv) Definition of the non-CDM baseline forestry stratum for the area remaining after application of steps (i)–(iii);

(v) Recognition that there was no increase in forest area within the non-CDM baseline forestry stratum between the historical and current dates; and,

(vi) Identification of forest in the non-CDM baseline forestry stratum previously planted by the project proponents.

This step-wise approach resulted in an average annual non-CDM proportional forestry rate, $PFR_{non\text{-}CDM}$, on the order of 0.04% as explained in section C.7.

C.5. Identification of the baseline scenario:

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C.5.1. Description of the application of the procedure to identify the most plausible baseline scenario (separately for each stratum defined in C.4.):

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The methodology details the procedure for selection of the most plausible baseline scenario according to a 6-step approach. As explained in the section C.4 only one stratum is considered within the project boundary. A summary of conclusions for each step is detailed below.

- Step 1: The credible alternative land uses for this project activity include:

  - Continuation of the current land use as unmanaged grassland (i.e. a zero reforestation rate);
  - Establishment of forest on unmanaged grassland at a mean annual non-CDM proportional forestry rate; and,
  - Proposed project activity undertaken as a non-CDM project.

From the above alternatives, continuation of the current land use as unmanaged grassland (i.e. a zero reforestation rate) during the crediting period was selected as the most plausible baseline scenario as AES Tietê is expected to maintain the land use around its reservoirs in its existing state. Additional plausible scenarios included the establishment of forest on unmanaged grassland at a mean annual non-

CDM proportional forestry rate (not applicable as explained in step 4); and the proposed project activity undertaken as a non-CDM project (not applicable as explained in Section C.6).

- Step 2: Field data and information from current and historic satellite imagery for more than 10 years prior to the project indicates that natural regeneration is not expected to occur due to lack of an on-site and external seed pools/sources and stress factors (e.g. neighbouring agricultural activities) that may result in natural regeneration within the project boundary;
- Step 3: This step is not necessary given the results obtained from Step 2;
- Step 4: As per the scenarios identified in Step 1, the most plausible scenario is that the most likely land use at the time the project starts—in the absence of the A/R CDM project activity—is unmanaged grassland. The mean annual non-CDM baseline forestry rate (in ha. ha^{-1} yr^{-1}) was assessed based on data obtained from the Environment Secretary of the State of Sao Paulo and the Forestry Institute[19], for similar protected areas within the State of São Paulo. The official information supports a zero reforestation rate as the most plausible baseline scenario[20].
- Step 5: there is no national and/or sectoral land-use policies or regulations that support A/R activities;
- Step 6: this methodology is applicable as the analysis confirms that baseline approach 22(c)—"Changes in carbon stocks in the pools within the project boundary from the most likely land use at the time the project starts"—is the most plausible baseline scenario.

C.5.2. Description of the identified baseline scenario (separately for each stratum defined in Section C.4.):

>>

As described in Section C.4 only one stratum for the project boundary was considered. The identified baseline scenario for this stratum is the continuation of the current land use as unmanaged grassland.

C.6. Assessment and demonstration of additionality:

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The methodology addresses the issue of additionality in two steps, with the second step included to account for the fact that there is a possibility of A/R in the baseline scenario. For step 1, the methodology uses the latest version of the "Tool for the demonstration and assessment of additionality for afforestation and reforestation CDM project activities" (version 02), approved by the CDM Executive Board (EB 35), to demonstrate additionality through investment, barrier and common practice analyses, as applicable. The Tool is applicable given that:

- Forestation of the land within the proposed project boundary performed with or without being registered as the A/R CDM project activity does not lead to violation of any applicable law;
- The baseline methodology AR-AM0010 provides for a stepwise approach justifying the determination of the most plausible scenario; and,
- The project is not a small-scale A/R project activity.

The Tool specifies that an afforestation or reforestation project activity under the CDM is additional if the actual net greenhouse gas removals by sinks are increased above the sum of the changes in carbon

[19] Inventario Florestal do Estado de São Paulo, Instituto Florestal, Secretaria do Meio Ambiente do Estado de São Paulo, 2005.

[20] The technical document from the São Paulo State Environment Secretary – Landscape Restoration Office, forwarded to the project participants in October 2006, clearly states that in the region where the project activity takes place, the overall result that emerges from the analysis of satellite images, is that the protected areas are still losing their forest coverage (see Annex 9).

stocks in the carbon pools within the project boundary that would have occurred in the absence of the registered CDM A/R project activity. This is in accordance with paragraphs 18–22 of modalities and procedures for afforestation and reforestation project activities under the Clean Development Mechanism in the first commitment period of the Kyoto Protocol (contained in the annex to Decision 19/CP.9). The followed step-wise approach contained in the Tool is described below.

Step 0. Preliminary screening based on the starting date of the AR project activity

Given that this reforestation CDM project activity has a starting date after 31 December 1999 but before the date of its registration, the project participants shall:

- Provide evidence that the starting date of the A/R CDM project activity was after 31 December 1999; and,
- Provide evidence that the incentive from the planned sale of CERs was seriously considered in the decision to proceed with the project activity.

The main evidence provided to the validation team for the starting date of the A/R CDM project activity after 31 December 1999 includes the Concession Contract Number 92/99 established between AES Tietê and ANEEL signed on 20 December 1999. Prior to this date AES Tietê had no ownership rights to the water reservoirs, and thus, did not execute any type of activity in the region. The first reforestation activity took place in 2001, when AES Tietê already had the concession to operate the hydroelectric plants.

Regarding the serious consideration of potential CERs in the decision to proceed with the project activity, the timeline below lists a series of actions pursued by AES Tietê, in order to account for reforestation credits and help to mitigate global warming. In the 1990s AES developed a pioneering strategy to pursue forestry activities in developing countries (especially Latin America) as a means to offset GHG emissions from electricity generation. This strategy was put forward in a highly uncertain and risky environment, given that it preceded the Kyoto Protocol or any type of voluntary market standard. This strategy allowed the company to account for carbon offset values, even with inexistent formal markets. Two important examples include: the Sustainable Development Program Mbaracayú Forest Nature Reserve in Paraguay, and the Bananal Island Carbon Sequestration Project (BICSP) in Brazil. The Paraguayan project began with a large investment from AES Barbers Point in Hawaii (USA) in 1992 with a focus on biomass conservation; the design and implementation of reserve management plans; and, community outreach for surrounding communities for sustainable development and conservation education. It includes 64,000 hectares of protected area, providing environmental services to surrounding communities and indigenous groups.

Prior to AES Tietê concession period, AES in Brazil invested on the Bananal Island Carbon Sequestration Project (BICSP). BICSP included the environmental restoration of degraded areas for carbon removal, biodiversity enhancement, and scientific learning. It also included a strong social component related to the environmental education, tourism, and agroforestry initiatives. When the concession was granted to AES Tietê to operate the hydro reservoirs at the end of 1999, the company began to direct funds to its own environmental restoration project along the borders of the hydro reservoirs. Planting activities along the borders of AES Tietê hydroelectric reservoirs began in January 2001, with a focus on restoring forest habitats and carbon removal. This was before Brazil's decision to ratify the Kyoto Protocol. In 2003 the Department of Environmental Management was established

according to clear guidelines to consider global environmental priorities in its decision-making process, not only local/regional environmental effects. Carbon specialists were then hired to pursue the design of an A/R methodology taking into account the particular characteristics of the project activity. In 2005 World Bank Biocarbonfund professionals got involved in designing methodology ARNM0034, and a letter of intent was signed between both parties. Decision 16/CMP.1 "Land use, land use change and forestry" provided the necessary basis to apply Kyoto's conceptual framework for reforestation project activities to protected areas. Methodology ARNM0034 (precursor of AR-AM0010) was approved by the CDM Executive Board in October 2007. In 2008, the current version of the CDM A/R PDD was prepared for validation according to the modalities and procedures adopted by the Kyoto Protocol for A/R project activities.

The table below indicates real actions taken by AES Tietê to include reforestation project activities in its operating profile, and therefore, to consider carbon revenues as a means to sustain additional investments.

Table 5: Consideration of carbon revenues for the project activity

Action	Date	Evidence
Bananal Island Carbon Sequestration Project (BICSP)	2000	Implementation Agreement AES-Ecológica
Start of meetings with Brazilian DNA (Interministerial Commission on Climate Change)	2000	Letter by the Brazilian DNA
BICSP Phase II	2001	First-year activities report
Start of environmental restoration activities within AES Tietê concession areas	2001	Environmental restoration contract
Hiring of consultants to draft ARNM0034 and CDM-AR-PDD	2003-2004	Consulting contracts
Application to the World Bank's BiocarbonFund	2005	Letter of Intent between AES Tietê and BiocarbonFund
CDM-AR-PDD version 01 to CDM EB	2007	CDM-AR-PDD version 01 available at UNFCCC website
New baseline and monitoring methodology - ARNM0034 approval by CDM EB	2007	Approval decision available at UNFCCC website
Preparation of CDM-AR-PDD according to AR-AM0010	2008	CDM-AR-PDD available at AES Tietê website
Project validation	2008	Validation contract

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

Sub-step 1a. Identify credible alternative land use scenarios to the proposed CDM project activity

According to guidance from sub-step 1a) realistic and credible land-use alternatives available to AES Tietê included:

- Continuation of the current land use as unmanaged grassland (i.e. a zero reforestation rate);
- Establishment of forest on unmanaged grassland at a mean annual non-CDM proportional forestry rate; and,
- The proposed project activity not undertaken as a A/R CDM project activity;

Continuation of the current situation is identified as the baseline scenario.

Sub-step 1b. Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

The land use scenarios identified in Sub-step 1a) are in compliance with all mandatory applicable legal and regulatory requirements. Alternative land use scenarios for the project boundary, such as agricultural cropping, are not in compliance with applicable mandatory laws and regulations. Company monitoring and enforcement mechanisms guarantee systematic enforcement of Brazilian Forestry Code (Law

4771/65 art.2) and Brazilian Environmental Crimes Law (Law 9605/97 art. 38 and 39) within the project boundary

Step 2. Investment analysis

The investment analysis was not conducted.

Step 3. Barrier analysis

Barrier analysis, in this case, is performed as a stand-alone additionality analysis. The main barrier categories are listed below.

- Barrier due to prevailing practice
  - The project activity is the "first of its kind" given that no project activity of this type and scale is currently operational in the host country. Minutes of a meeting conducted by ABRAGE[21] in March 26, 2009 confirms this statement. There are initiatives that aim to recover the original forest vegetation within the State of São Paulo by various techniques, including direct planting, but these are happening outside of the areas controlled by the hydroelectric companies.

- Institutional barrier:
  - Lack of enforcement of forest or land-use related legislation given that management of neighboring protected areas limit possibilities for seed germination and/or growth of seedlings of young trees within the project boundary. Cattle grazing, for example, occur in neighboring APPs degenerating potential seed sources (Tabarelli *et al* 2005; Galindo-Leal and Câmara, 2005);

- Technological barrier:
  - A major factor that impacts the viability of large scale restoration efforts within the State of São Paulo is the availability of high quality seedlings, with the necessary species diversity. Natural occurring seed banks within the State are being depleted due to anthropogenic pressure, and thus, seedlings for many naturally occurring species are hard to find[22];

- Barriers due to ecological conditions:
  - Exotic grass species such as the African *Brachiaria decumbens* ("braquiária") have significantly impacted the ability of natural regeneration of forest areas within the State of São Paulo. These species also impact agricultural operations such as sugar cane harvesting (Pivello, 2008).

The identified barriers are potential grounds for demonstration of additionality given that the project proponents would not propose to implement a large scale reforestation activity without the possibility of

[21] ABRAGE is the Brazilian Association of Electric Energy Generators. It is constituted by the main hydroelectric operators in Brazil including AES Tietê, Endesa, CEMIG, CESP, COPEL, Duke Energy, Eletronorte, EMAE, Furnas, Light, and Tractebel Energia.

[22] Barbosa (2006).

obtaining carbon revenues to: (i) cover part of the costs related to care and maintenance of newly established forest fragments; (ii) create market conditions for an increase in seedlings availability; (iii) convince neighboring APP owners the importance of correct management of these areas due to the large-scale restoration activity; and, (iv) overcome the common practice of only protecting existing eligible areas. The identified barriers are not preventing the continuation of the current land use as unmanaged grassland. In fact, these barriers work for the maintenance of the *status quo*.

Step 4: Common practice analysis

Similar restoration activities, defined as that which are of similar scale, take place in a comparable environment (e.g. with respect to the regulatory framework and/or geographical area), to the project activity have not been implemented. The innovative character of the project activity is exemplified by the need to propose a new methodology to the CDM EB, whose first version was submitted in September 2004[23]. CESP had previously engaged in forestation activities within the State of São Paulo, but not with the scale and organizational characteristics of this project activity. Melo *et al* (2001) describes that the main motivation for previous restoration activities within the State of São Paulo has been related to a regulatory obligation. In 2006, the State Secretary of the Environment announced a GEF-funded project entitled "Projeto de Recuperação de Matas Ciliares" with an objective to increase the existing land area with natural vegetation from the actual 13.9% to 20% within the State of São Paulo territory[24]. The State Secretary estimates a total of 1.7 million hectares of protected areas suitable for restoration activities. In September 2008, only a fraction of this amount (14%) was officially registered within the program, and limited restoration activities have actually taken place. The targeted audience is mainly sugar and alcohol producers within the State of São Paulo.

C.7. Estimation of the *ex ante* baseline net GHG removals by sinks:

>>

The *ex ante* baseline net GHG removals by sinks is the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of an A/R CDM project activity. In estimating baseline net GHG removals by sinks, a conservative approach should be taken when choosing key parameters and making critical assumptions. For any year t, total baseline net GHG removals by sinks are given by:

$$\Delta C_{BSL,t} = \Delta C_{BSL\text{-}project,t} + \Delta C_{BSL\text{-}A/R,t} \quad (1)$$

Where:

- $\Delta C_{BSL,t}$ Total annual baseline net GHG removals by sinks, for year *t*; t CO2-e yr-1
- $\Delta C_{BSL\,project,\,t}$ Annual baseline net GHG removals by sinks within the project boundary, for year *t*; t CO2-e yr-1
- $\Delta C_{BSL\text{-}A/R,\,t}$ Equivalent annual baseline net GHG removals by sinks due to A/R in the baseline scenario, for year *t*; t CO2-e yr-1

[23] Currently, AES Tietê is disseminating information regarding AR-AM0010 in public forums and events in order to multiply its application throughout the host country. The company has recently made available the translated version of the methodology to Portuguese language at their website: http://www.aestiete.com.br.

[24] Fore more information consult: http://www.ambiente.sp.gov.br/mataciliar/index.htm.

- *t* Time elapsed since the start of the project; *0* … *n*, yrs

AR-AM0010 methodology details that baseline removals by sinks within the project boundary are calculated for woody species only (i.e. shrubs and trees), as the biomass of herbaceous species is considered to be at steady-state under an applicability condition of the methodology. Thus, the annual baseline net GHG removals by sinks is equal to zero, given that the final baseline stratification map resulted in one stratum of herbaceous vegetation only (i.e. current and climax vegetation is herbaceous). The default value of 1 was applied for $R_{G,tree}$ given that a high degree of similarity is expected between the tree species used for non-CDM forest in the baseline scenario and tree species used for A/R in the project[25]. This is because the São Paulo State Environment Secretary (SMA/SP) has published specific resolutions with technical guidance related to the environmental restoration of areas. All reforestation project proponents (within the CDM or not) have to respect such guidance.

The methodology accounts also accounts for A/R in the baseline scenario as those lands that would have been in the project area becoming gradually afforested or reforested, at a rate equal to the non-CDM baseline proportional forestry rate or the $PFR_{non\text{-}CDM}$ (ha $ha^{-1}yr^{-1}$). By definition, forestry in the baseline scenario is occurring on similar lands (i.e. protected areas) to those within the project boundary. AR-AM0010 subsection 2.2 (section II. Baseline methodology description) determines that to ensure a conservative approach, $PFR_{non\text{-}CDM}$ is estimated based on the non-CDM baseline forestry stratum analysis as the greater of:

i) The average annual average area of forest planting in the non-CDM baseline forestry stratum, divided by the stratum area or;
ii) The average annual rate of forest planting by project proponents in the non-CDM baseline forestry stratum, divided by the proposed project area.

The average annual average area of forest planting in the non-CDM baseline forestry stratum is equal to 115 ha/yr due to the operation license issued for UHE Água Vermelha. The stratum area is equal to 20x13,939 ha=278,780 ha. The result for alternative i) is 0.04%. For option ii) the average annual rate of forest planting by project proponents in the non-CDM baseline forestry stratum is equal to 115 ha/5,510 ha (total area for UHE Agua Vermelha reservoir) or 0.02. This result divided by the proposed project area of 13.393 hectares is equal to 1.49×10^{-6}. Thus option i) was selected and the value of 0.04% adopted.

[25] $R_{G,tree}$ is defined as the ratio of mean annual increment of above-ground biomass of tree species used for non-CDM forest in the baseline scenario, to the mean annual increment of above-ground biomass of the tree species used for A/R in the project.

Year	Annual estimation of baseline net anthropogenic GHG removals by sinks in tonnes of CO_2 e
2001	6
2002	32
2003	77
2004	148
2005	265
2006	409
2007	580
2008	775
2009	1.103
2010	1.692
2011	2.597
2012	3.868
2013	5.558
2014	7.709
2015	10.030
2016	12.517
2017	15.156
2018	17.940
2019	20.845
2020	23.875
2021	27.022
2022	30.273
2023	33.621
2024	37.055
2025	40.579
2026	44.186
2027	47.855
2028	51.590
2029	55.399
2030	59.257
Total estimated baseline net GHG removals by sinks (tonnes of CO_2 e)	59.257
Total number of crediting years	30
Annual average over the crediting period of estimated baseline net GHG removals by sinks (tonnes of CO2 e)	1.975

C.8. Date of completion of the baseline study and the name of person(s)/entity(ies) determining the baseline:

>>
September 01, 2008
Mr. Demostenes Barbosa da Silva / AES Tietê S.A.

SECTION D. 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

D.1. Estimate of the *ex ante* actual net GHG removals by sinks:

>>
The *ex ante* actual net GHG removals by sinks are the sum of the verifiable changes in carbon stocks in the carbon pools within the project boundary, minus the increase in GHG emissions —measured in CO_2 equivalents— by sources within the project boundary and attributable to the A/R CDM project activity.

$$\Delta C_{ACTUAL,\,t} = \sum_{i=1}^{n_{st}} \sum_{j=1}^{n_{sp}} \Delta C_{i,j,t} - PE_t \qquad (2)$$

Where:

$\Delta C_{ACTUAL\,t}$, Annual actual net GHG removals by sinks, for year *t*; t CO2-e yr^{-1}

$\Delta C_{i\,j\,t}$, Annual carbon stock change in biomass of tree species *j* in stratum *i*, for year *t*; t CO2 yr^{-1}

PEt Total annual GHG emissions by sources within the project boundary from implementation of the A/R project activity, for year *t*; t CO2-e yr^{-1}

i Number of strata; *1 …. nst*
j Number of tree species; *1 …. nsp*
t Time elapsed since the start of the project; 0 … n, yrs

The annual carbon stock change in the living biomass of trees established by the project—for stratum *i*, species *j*, for year *t*; $\Delta C_{ij,\,t}$ —is estimated using the carbon gain-loss method described in Section II.5.1 (Estimation of net GHG removals by sinks within the project boundary) using equations (B3) to (B6). Section II.5.1.3 provides guidance on selection of parameters and data for *ex ante* estimation of the carbon stock change in the living biomass of trees established by the project. The methodology determines that information can be obtained by a combination of destructive harvest of vegetation in sample plots or of individual trees or shrubs, and making use of available studies according to a priority from local to global species-specific data. Project proponents decided to apply IPCC 2006 default values for parameters where local data is not available. For woody density estimates and aboveground biomass (AGB) for woody vegetation, data measurements from ESALQ/USP were applied. These are based on growth models derived from long-term experimental studies performed within the identified stratum of the project activity[26]. Wood density estimates, for example, are based on Paula and Alves (1997), Mainieri and Chimelo (1989) and others[27]. AGB for woody species is obtained by applying methods

[26] Revisão Curva AES (ESALQ/USP, 2008).

[27] The project considers low, medium, and high density species for restoration activities.

described by Brown (1997) and Campos *et al* (2001). AR-AM0010 determines that in choosing key parameters and making critical assumptions when estimating GHG removals by sinks, project participants should retain a conservative approach: that is, if different values for a parameter are plausible, a value that does not lead to an over-estimation of actual net GHG removals by sinks should be applied.

Estimation of *ex ante* actual net GHG removal by sinks was performed by the application of TARAM (Tool for Aforestation and Reforestation Approved Methodologies) made available by the World Bank BioCarbon Fund, by applying the stock-change method. The complete TARAM excel file will be made available to the DOE during validation. The parameters considered for the *ex ante* actual net GHG removals by sinks is provided by the table below.

Table 6: Parameters for Estimation of the *ex ante* Actual Net GHG Removals by Sinks

ID number [28]	Data variable	Data unit	Value applied	Source
D1.1	Aboveground biomass (AGB)	t.d.m[29]*ha^{-1}	-	ESALQ USP 2006
D1.2	Carbon fraction	tC(td.m)$^{-1}$	47%	IPCC 2006
D1.3	Root to shoot ratio	dimensionless	0.24	IPCC 2006
D1.4	Wood density - low - medium - high	td.m(m^3)$^{-1}$	 0.6 0.8 1.0	ESALQ USP 2006
D1.5	Biomass expansion factor - low density - medium density - high density	dimensionless	 2.0 1.5 1.2	IPCC 2006
D1.6	Planting density	trees/ha	2000	

Total annual GHG emissions by sources within the project boundary from implementation of the A/R project activity may occur due to: (i) decrease in carbon stocks in living biomass of vegetation that existed at the time the project commenced, caused either by site preparation or competition from planted trees; and, (ii) emissions of non-CO_2 GHG from biomass burning during slash-and-burn site preparation.

$$PE_t = E_{biomassloss} + E_{Non\text{-}CO2,\ BiomassBurn,\ t} \quad (3)$$

Where:

PE_t Total annual GHG emissions by sources within the project boundary from implementation of the A/R project activity, for year *t*; tCO2-e yr− 1

$E_{biomassloss,\ t}$ Annual CO2 emissions from a decrease in carbon stock in vegetation biomass for year *t*; tCO2 yr− 1

$E_{Non\text{-}CO2,\ BiomassBurn,\ t}$ Annual emissions from biomass burning, if this is used, for year *t*; tCO2-e yr− 1

t Time elapsed since the start of the project; *0* … *n*, yrs

[28] ID number for cross-referencing in the PDD.

[29] t.d.m = tonne dry matter

The CDM Executive Board provided further guidance on accounting GHG emissions in A/R CDM project activities during EB42 (24-26 September 2008) and EB44 (26-28 November 2008). As per the decision of EB 42 paragraph 35, the Board agreed that GHG emissions in A/R CDM project activities from the following sources: (i) fertilizer application, (ii) removal of herbaceous vegetation, and (iii) transportation may be considered as insignificant and hence can be neglected in A/R baseline and monitoring methodologies. EB44 complemented this decision by considering the following additional GHG emission sources as insignificant: (iv) fossil fuel combustion in A/R CDM project activities, (v) collection of wood from non-renewable sources to be used for fencing of the project area; and, (vi) nitrous oxide (N_2O) emissions from decomposition of litter and fine roots from N-fixing trees. Since there hasn't been, and there will be no slash-and-burn site preparation, project emissions are not being considered by this project activity as per methodology AR-AM0010 version 04.

D.2. Estimate of the *ex ante* leakage:

>>

Under the applicability conditions for the methodology, there are no potential leakage emissions attributable to the A/R project activity. Thus:

$$LE_t = 0 \quad (5)$$

Where:

LE_t Total annual GHG emissions due to leakage activities for year t; t CO_2-e yr^{-1}

SECTION E. Monitoring plan

E.1. Monitoring of the project implementation:

>>

AR-AM0010 (version 04) monitoring methodology is based on standard forest inventory practice, and comprises the following major elements:

- Assessment of project implementation to establish that: geographic position of the project boundary is recorded for all parcels; applicability conditions are met; commonly accepted principles of forest inventory are implemented; and, implementation of forest planting and management activities are in accordance with the project plan used as a basis for making *ex ante* estimates of net GHG removals by sinks;

- Stratification and sampling. *Ex post* stratification for project removals by sinks will consider strata of 3-year planted cohorts for this project activity as explained by subsection E.2. Stratification will be reviewed once sampled biomass data become available, and adjusted to account for differences between planned and actual forest establishment and management. The methodology uses permanent sample plots to monitor carbon stock changes in living biomass pools, with the number of plots required in each stratum based on achieving a targeted precision level in estimated biomass of +/- 10% of the mean at a 95% confidence level;

- The methodology does not require that baseline net GHG removals by sinks be determined *ex post*. Given that project participants selected a fixed crediting period, assumptions and applicability conditions relating to the baseline state will not be reassessed; and,

- The *ex post* estimation of GHG removals by sinks uses permanent plot-based inventory methodology to quantify changes in carbon stocks in above-ground biomass for each stratum.

E.1.1. Monitoring of forest establishment and management:

>>

ID number [30]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d) [31]	Recording frequency	Number of data points / Other measure of number of collected data	Comment
E11.1	*Stratum ID*	*Alphanumeric code*	-	*1-3 months after planting*	*All sample plots*	-
E11.2	*Sample plot ID*	*Alphanumeric code*	-	*1-3 months after*	*All sample plots*	-

[30] Please provide ID number for cross-referencing in the PDD.

[31] Please provide full reference to data source.

				planting		
E11.3	*Sample plot location*	*Alphanumeric code*	*M*	*1-3 months after planting*	*All sample plots*	*-*
E11.4	*Tree species name*	*Alphanumeric code*	*-*	*1-3 months after planting*	*All sample plots*	*-*
E11.5	*Initial survival rate for species s*	*Dimensionless*	*M*	*1-3 months after planting*	*All sample plots*	*-*
E11.6	*Final survival rate for species s*	*Dimensionless*	*M*	*First three years after planting*	*All sample plots*	*-*
E11.7	*s – species of trees; 1…n_{sp}*	*Dimensionless*	*-*	*-*	*-*	*-*
E11.8	*Reforested area*	*ha*	*M*	*First seven years*	*Project area*	*-*

E.1.2. If required by the selected approved methodology, describe or provide reference to, SOPs and quality control/quality assurance (QA/QC) procedures applied.

>>

ID number [32]	**Data variable**	**Data unit**	**Measured (m), calculated (c) estimated (e) or default (d)** [33]	**Recording frequency**	**Number of data points / Other measure of number of collected data.**	**Comment**
E12.1	*% of randomly selected plots re-measured at year, y*	*Dimensionless*	*M*	*5 years*	*All sample plots*	*-*
E12.2	*Location of randomly selected plots re-measured at year, y*	*Dimensionless*	*-*	*5 years*	*All sample plots*	*-*
E12.3	*Diameter at 30 cm of species i, for tree j, at year y*	*meters*	*M*	*5 years*	*All sample plots*	*-*
E12.4	*Tree height (H)*	*meters*	*M*	*5 years*	*All sample plots*	*-*

[32] Please provide ID number for cross-referencing in the PDD.

[33] Please provide full reference to data source.

	of species i, for tree j, at year y					
E12.5	*Difference between re-measurement and original measurement*	*percentage*	*M*	*5 years*	*All sample plots*	-

E.2. Sampling design and stratification

>>

For sampling design, the latest version of the tool for the 'Calculation of the number of sample plots for measurements within A/R CDM project activities (version 01, approved by EB31)', approved by the CDM Executive Board[34] will be applied.

a) Project stratification

The stratification of the project considers strata of 3-year planted cohorts such as:

2001 to 2003;
2004 to 2006;
2007 to 2009; and,
2010 to 2012.

Having cohorts of equal intervals to cover the project area increases the number of strata and allows grouping of planted areas with same age cohorts or classes. The *ex ante* mean carbon stock (in tC/ha) for sample plots is 150. The value is obtained from similar native forest plantations within the State of São Paulo (including AES Tietê areas). The standard deviation value considered is 40% resulting in 126 sample plots. The same standard deviation is assumed for all strata for *ex ante* purposes.

Ex post stratification will be reviewed once sampled biomass data become available, and adjusted if necessary to account for differences between planned and actual forest establishment and management, or unexpected disturbances, or merging of strata where changes in biomass stocks are similar. AR-AM0010 methodology uses permanent sample plots to monitor carbon stock changes in living biomass pools, with the number of plots needed in each stratum based on achieving a targeted precision level in estimated biomass of ± 10% of the mean at a 90% confidence level. The monitoring plan considers the archive of the geographic coordinates of the project boundary, and strata boundaries—including any re-stratification *ex post* in response to post-inventory analysis of biomass spatial distribution, disturbance, or change in the non-CDM baseline forestry stratum.

b) Sampling

Permanent sampling plots will be applied for monitoring changes in carbon stocks of above and below-ground biomass. Permanent plots are generally more statistically efficient than temporary sampling plots in estimating changes in carbon stocks over time, because there is typically a high covariance between

[34] CDM Executive Board Meeting Report EB31, Annex 15: Calculation of the number of sample plots for measurements within A/R CDM project activities.

observations at successive sampling dates. However, it will be ensured that the plots are treated in the same way as other lands within the project boundary—e.g., during site preparation, weeding, fertilization, irrigation, etc—and should not be destroyed over the monitoring interval. If there is any modification of the stratification during the project to improve homogeneity within each stratum, the existing permanent sample plots in the affected strata shall be retained, and new plots added as necessary.

A stratified sampling design is used to estimate the verifiable changes in carbon stocks in the carbon pools of the project and the corresponding sampling error. The monitoring data are based on the record of field measurements at each monitoring interval as per the monitoring frequency adopted for the pool. The nested plot approach is proposed for the measurement of the carbon pools since it permits efficient measurement of tree growth through time (e.g. a representative number of both small and large trees are measured on the same plots. The plot markers of permanent plots for post-2007 forest parcels will not be prominently displayed to ensure that the sample plots do not receive differential treatment. The GPS coordinates would also be used to identify the plots.

- *Above-ground tree vegetation*: Permanent sample plots are used to estimate the changes in the biomass pool. Permanent sample plots facilitate the development of plot and management histories as the tree vegetation grows.
- *Non-tree vegetation*: Considering the short duration of non-tree pools, temporary plots within the nested plots will be used and destructive sampling is used to estimate the pool. The number of plots used for measuring the non-tree vegetation will be based on the relative significance of herb and shrub layers and as per the steps and procedures outlined in the approved methodology AR-AM 0010.

Guidelines and procedures for the establishment of permanent sample plots for this project activity were designed by ESALQ/USP in the document provided to the validation team entitled *Manual de Procedimentos para o Monitoramento das Parcelas Permanentes (January, 2009).*

c) Plot location

To avoid subjective choice of plot locations (location of plot centers, plot reference points, or movement of plot centers to more 'convenient' positions), permanent sample plots will be located randomly, which is considered good practice[35]. The geographical position (preferably, GPS coordinates), administrative location, and stratum series number of each plot will be recorded and archived. Sample plots must be distributed across the entire project area. For example, if one stratum is spread across multiple parcels, then the number of sample plots estimated to be required to meet the designed sampling precision should be spread among the parcels according to the percentage area that each parcel contributes to the stratum.

d) Plot size

The size of sample plots depends on the density of trees—in general between 100 m^2 for dense stands and 1000 m^2 for open stands, and sufficiently large to include at least 10 trees. Sample plots may be circular, square, or rectangular in shape—although circular plots are recommended because they are usually the simplest to implement and they also reduce the chance of bias in selection of corner positions

[35] GPG-LULUCF (IPCC 2003).

in systematically planted plantations. However, if square or rectangular plots are used, the sides of each plot shall be placed parallel to the rows of planted trees, and each corner of the plot shall be set at a point which is at a distance as near as possible equal from surrounding trees. This may mean that the plots are of slightly varying sizes, and in which case plot dimensions must be carefully noted and checked. The number of plots will be on the range of 1:50 ha to 1:20 ha, and size of plots on the order of 400 m^2 (40m x 10m).

E.3. Monitoring of the baseline net GHG removals by sinks, if required by the selected approved methodology:

>>

The monitoring of the baseline net GHG removals by sinks is not required by monitoring methodology AR-AM0010.

E.4. Monitoring of the actual net GHG removals by sinks:

>>

E.4.1. Data to be collected in order to monitor the verifiable changes in carbon stock in the carbon pools within the project boundary resulting from the proposed A/R CDM project activity:

>>

ID number [36]	Data variable	Data unit	Measured (m), calculated (c) estimated (e) or default (d) [37]	Recording frequency	Number of data points / Other measure of number of collected data	Comment
E41.1	*Statum ID*	*Alphanumeric code*	*-*	*Before the start of the project*	*Entire project area*	*-*
E41.2	*Sample plot ID*	*Alphanumeric code*	*-*	*Before the start of the project*	*Entire project area*	*Assigned to each permanent or temporary sample plot.*
E41.3	*Sample plot location*	*Alphanumeric code*	*M*	*5 years*	*Entire project area*	*Preferably, locations will not be marked visibly in the field.*
E41.4	*Sample plot size*	*m^2 or ha*	*M*	*5 years*	*Entire*	*-*

[36] Please provide ID number for cross-referencing in the PDD.

[37] Please provide full reference to data source.

					project area	
E41.5	*Sub-plot size*	*m^2*	*M*	*5 years*	*Entire project area*	-
E41.6	*Frame size*	*m^2*	*M*	*5 years*	*Entire project area*	-
E41.7	*Tree species name*	*Alphanumeric code*	-	*5 years*	*All sample plots*	-
E41.8	*Shrub species name*	*Alphanumeric code*	-	*5 years*	*All sample plots*	-
E41.9	*Herbaceous species name*	*Alphanumeric code*	-	*5 years*	*All sample plots*	-
E41.10	*Number of trees of the same species in a sample plot*	*Number*	*M*	*5 years*	*All sample plots*	-
E41.11	*Number of shrubs of the same species in a sample plot*	*Number*	*M*	*5 years*	*All sample plots*	-
E41.12	*Number of herbaceous species of the same type in a sample plot*	*Number*	*M*	*5 years*	*All sample plots*	-
E41.13	*Age of plantation*	*Years*	*M*	*5 years*	*All sample plots*	*Time zero is the time of planting*
E41.14	*A_i – Area of stratum i*	*ha*	*M*	*5 years*	*All strata*	-
E41.15	*$B_{AB,j,t}$ – above-ground biomass for stock of tree species j, for year t*	*$td.m.ha^{-1}.yr^{-1}$*	*M*	*5 years*	*All sample plots*	-
E41.16	*$B_{AB,i,j,\ herb,t}$ – above-ground biomass stock of herbaceous species j, in stratum i, for year t*	*$td.m.ha^{-1}.yr^{-1}$*	*M*	*5 years*	*All sample plots*	-
E41.17	*$B_{AB,i,j,\ shrub,t}$ – above-ground biomass stock of shrub species j, in stratum i, for year t*	*$td.m.ha^{-1}.yr^{-1}$*	*M*	*5 years*	*All sample plots*	-
E41.18	*$B_{AB,i,j,\ tree,t}$ – above-ground biomass stock for tree species j, in*	*$td.m.ha^{-1}.yr^{-1}$*	*M*	*5 years*	*All sample plots*	-

	stratum i, for year t					
E41.19	*BEF_2 – biomass expansion factor for conversion of merchantable biomass to above-ground biomass*	*$td.m(td.m^{-1})$*	*E*	*Start of project*	*-*	*Destructive harvest if species-specific data from local/regional inventory preferred*
E41.20	*$BEF_{2,j}$ – biomass expansion factor for conversion of merchantable volume to above-ground biomass for tree species j*	*$td.m.m^{-3}$*	*E*	*Start of project*	*-*	*Species-specific data from local/regional inventory preferred if well-sampled data exist, otherwise use IPCC data*
E41.21	*CF – average carbon fraction of above-ground biomass*	*$tC.(td.m)^{-1}$*	*D*	*Start of project*	*-*	*IPCC default value = 0.47*
E41.22	*CF_{herb} – average carbon fraction for biomass of herbaceous species*	*$tC.(td.m)^{-1}$*	*D*	*Start of project*	*-*	*IPCC default value*
E41.23	*CF_{shrub} – average carbon fraction for biomass of shrubs*	*$tC.(td.m)^{-1}$*	*D*	*Start of project*	*-*	*IPCC default value*
E41.24	*CF_{tree} – average carbon fraction for biomass of trees*	*$tC.(td.m)^{-1}$*	*D*	*Start of project*	*-*	*IPCC default value*
E41.25	*D_v – merchantable volume – weighted average wood density*	*$td.m.m^{-3}$*	*D*	*Start of project*	*-*	*ESALQ/USP*
E41.26	*f(DBH,H) – an allometric equation linking above-ground biomass ($d.m.tree^{-1}$) to tree diameter at breast height (DBH), and possibly also to tree height (H)*	*-*	*C*	*Start of project*	*-*	*ESALQ/USP*
E41.27	*$f_{SP,i,t}$ – fraction of stratum i cleared during site*	*Dimensionless*	*M*	*At time of site preparation*	*All strata*	*-*

	preparation for year t, or planted at any time as part of project activities, whichever is greater			*or wildfire*		
E41.28	*i – number of strata; 1…n_{st}*	*Dimensionless*	*M*	*As required*	*Project area*	*-*
E41.29	*j – number of tree, shrub, or herbaceous species, as appropriate; 1…n_{sp}*	*Dimensionless*	*M*	*5 years*	*All sample plots*	*-*
E41.30	*K – time span between two verifications*	*Years*	*-*	*5 years*	*-*	*-*
E41.31	*$R_{1,jshrub}$ – root-shoot ratio appropriate for above-ground biomass increment for shrub species j*	*td.m.(td.m.)$^{-1}$*	*E*	*Start of project*	*-*	*IPCC default value*
E41.32	*$R_{1,jherb}$ – root-shoot ratio appropriate for above-ground biomass increment for herb species j*	*td.m.(td.m.)$^{-1}$*	*E*	*Start of project*	*-*	*-*
E41.33	*$R_{1,jtree}$ – root-shoot ratio appropriate for above-ground biomass increment for tree species j*	*td.m.(td.m.)$^{-1}$*	*E*	*Start of project*	*-*	*-*
E41.34	*R_2 – root-shoot ratio appropriate for above-ground biomass stock*	*td.m.(td.m.)$^{-1}$*	*E*	*Start of project*	*-*	*-*
E41.35	*$R_{2,jherb}$ – root-shoot ratio appropriate for above-ground biomass stock of herbaceous species j*	*td.m.(td.m.)$^{-1}$*	*E*	*Start of project*	*-*	*-*
E41.36	*$R_{2,jshrub}$ – root-shoot ratio appropriate for above-ground biomass stock of shrub species j*	*td.m.(td.m.)$^{-1}$*	*E*	*Start of project*	*-*	*-*
E41.37	*$R_{2,jtree}$ – root-shoot ratio appropriate for above-ground biomass stock of tree species j*	*td.m.(td.m.)$^{-1}$*	*E*	*Start of project*	*-*	*-*
E41.38	*$R_{G,jtree}$ – ratio of mean annual increment of*	*td.m.ha^{-1}yr^{-1}.(td.m.ha^{-1}yr^{-}*	*E*	*Start of project*	*-*	*Default =1*

	above-ground biomass of tree species used for non-CDM forest in the baseline scenario, to the mean annual increment of above-ground biomass of the tree species used for A/R in the project	*$^{1})^{-1}$*				
E41.39	*T – time elapsed since the start of the project; 0…n*	*Years*	*-*	*As required*		*-*
E41.40	*T – Number of years between monitoring times m2 and m1*	*Years*	*-*	*5 years*	*-*	*-*
E41.41	*t_v – Year of verification*	*Year*	*-*	*As required*	*-*	*-*
E41.42	*V – merchantable volume*	*m^3ha^{-1}*	*C*	*5 years*	*All sample plots*	*-*
E41.43	*$V_{j,t}$ – merchantable volume for tree species j for year t*	*m^3ha^{-1}*	*C*	*5 years*	*All sample plots*	*-*

E.4.2. Data to be collected in order to monitor the GHG emissions by the sources, measured in units of CO_2 equivalent, that are increased as a result of the implementation of the proposed A/R CDM project activity within the project boundary:

>>

GHG emissions by the sources are not going to be considered. Thus no monitoring is required.

E.5. Leakage:

>>

According to AR-AM0010 methodology (version 04), there are no potential leakage emissions attributable to the proposed A/R project activity. Thus, no monitoring is required.

E.5.1. If applicable, please describe the data and information that will be collected in order to monitor leakage of the proposed A/R CDM project activity:

>>

Not applicable.

E.5.2. Specify the procedures for the periodic review of implementation of activities and measures to minimize leakage, if required by the selected approved methodology:

>>
Not applicable.

E.6. Provide any additional quality control (QC) and quality assurance (QA) procedures undertaken for data monitored not included in section E.1.3:

>>

Data *(Indicate ID number)*	**Uncertainty level of data (High/Medium/Low)**	**Explain QA/QC procedures planned for these data, or why such procedures are not necessary.**
E.6.1 – Plot location	*Low*	*Random plot verification using GPS to ensure the consistent measuring and monitoring of the carbon stock change over time.*
E.6.2 – Tree species	*Low*	*Random verification over the project area to ensure the area of each tree species is correctly measured.*
E.6.3 – Age of plantation	*Low*	*Random verification over the project area to ensure the area in terms of plantation age is correctly measured.*
E.6.4 – Diameter at 0.30 m	*Low*	*Random plot verification.*
E.6.5 – Tree height (H)	*Low*	*Random plot verification.*
E.6.6 – Aboveground biomass (AGB)	*Low*	*All equations to calculate this data shall be verified.*
E.6.7 – Wood density	*Low*	*All equations to calculate this data shall be verified.*

E.7. Please describe the operational and management structure(s) that the project operator will implement in order to monitor actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity:

>>
The proposed A/R CDM project activity will be implemented under the following operational and management structure:

- AES Tietê (Dept. of Environment) with headquarters in São Paulo, Brazil will be responsible for general management of the project activity. Monitoring data for actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity will be reviewed by the team in São Paulo;

- UHE Promissão (Dept. of Environment) with headquarters in Promissão, Brazil will be responsible for coordinating field activities and seedlings supply; and,

- The Universidade de São Paulo, Escola Superior de Agricultura Luiz de Queiroz, (Dept. of Forestry Sciences) located in Piracicaba, Brazil will be responsible for applying the monitoring plan in partnership with AES Tietê. Monitoring data for actual GHG removals by sinks and any leakage generated by the proposed A/R CDM project activity will be compiled by the team in Piracicaba.

E.8. Name of person(s)/entity(ies) applying the monitoring plan:

>>

Paulo Yoshio Kageyama
Universidade de São Paulo, Escola Superior de Agricultura Luiz de Queiroz, Departamento de Ciências Florestais. Av. Pádua Dias, 11. Agronomia. 13418-900 - Piracicaba, SP - Brasil - Caixa-Postal: 9
Phone: (19) 21058642 Fax: (19) 21058601

SECTION F. Environmental impacts of the proposed A/R CDM project activity:

F.1. Documentation on the analysis of the environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary of the proposed A/R CDM project activity:

>>

According to the Brazilian environmental legislation, reforestation activities of riparian areas at the borders of reservoirs do not require environmental assessments to be completed. It is expected that the project activity will generate positive impacts on natural ecosystems and increase biodiversity within the State of São Paulo. It will contribute to a wider strategy promoted by the State Secretary of the Environment to restore more than one million hectares of riparian areas within the State of São Paulo described by Resende (2006).

Environmental restoration activities within the State of São Paulo are relatively recent (Barbosa 2006). It was motivated by the creation of the National Environment Council (CONAMA) in the beginning of the 1980s. Barbosa (2006) provides a summary of potential environmental benefits from the restoration of riparian areas such as: protection of water and soil resources, supply of food and shelter for animal species, and the functioning as natural barriers for the propagation of agricultural diseases and plagues.

AES Tietê develops a series of Environmental Programs designed to improve the environmental quality of water resources used for hydroelectric generation and other community activities. Restoration of protected areas is one of many actions conducted by the company as part of its Environmental Management System (EMS). The system is based on ISO 14001:2004 guidelines, and focuses on the prevention of environmental impacts and ongoing monitoring of operating activities. The goal is to ensure the correct use of natural resources, for example, by reducing water and power consumption in company facilities. Additional (and complementary) actions undertaken by the company includes:

- Biodiversity (use and occupation of reservoir banks): inspection and management of more than 4,800 km in length regarding illegal occupations for leisure, social and economic activities, as well as, for public use. Increased human interference impacts natural restoration processes and thus, the company's ability to protect biodiversity within its border areas;

- Fishery management (ichthyofauna): management and monitoring of fish populations of water reservoirs. The company maintains two fish hatchery units with an annual production capacity of

more than 2.5 million young fish of various species such as: *Prochilodus lineatus* ("curimbatá"), *Leporinus elongates* ("piapara"), *Piaractus mesopotamicus* ("pacu-guaçu"), *Salminus maxillosus* ("dourado"), *S. hilarii* ("tabarana"), and *Astyanax sp.* ("lambari"). The monitoring of fish populations includes frequent collection of ecological parameters such as number and diversity of species, mortality, growth, and breeding success;

- Macrophytes: management and monitoring of rooted vascular aquatic plants and algae populations of the water reservoirs. The company monitors and controls the proliferation of aquatic plant populations with field work for data collection and implementation of control procedures; and,

- Water quality: analysis of physical, chemical and biological parameters for water quality of water reservoirs.

The project activity is an integral part of the Environmental and Conservation Plans for the Use of the Reservoir Banks prepared by AES Tietê for Água Vermelha, Caconde, Limoeiro, and Euclides da Cunha facilties[38]. These Plans contains proposals for the delimitation of environmental preservation areas and criteria on the use of the reservoir banks. The main objective is to guarantee the sustainability of a sovereign asset represented by the hydroelectric potential, the object of the concession. It also focuses on the preservation of water resources, the landscape, geological stability, the soil and the biodiversity of the region, as well as ensuring the well-being of the communities.

F.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken an environmental impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to support documentation:

>>
The project activity will not have negative impacts related to water quality and/or run-off along the borders of the water reservoirs. It is expected that restoration efforts will further protect water resources and allow for the sustainability of hydroelectric operations.

F.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section F.2. above:

>>
Significant negative environmental impacts are not expected. AES Tietê will continue to undertake environmental actions included in its EMS to monitor and manage environmental aspects associated with its operations and actions performed, including the project activity.

SECTION G. Socio-economic impacts of the proposed A/R CDM project activity:

G.1. Documentation on the analysis of the major socio-economic impacts, including impacts outside the project boundary of the proposed A/R CDM project activity:

>>

[38] Additional plans are under execution.

Since 2001, AES Tietê has conducted environmental restoration activities as part of its environmental management system. Although no formal socio-economic assessment related to this specific activity has been undertaken, a number of informal consultations with stakeholders located around the hydroelectric plants confirm their commitment and positive attitudes for project implementation. The Environmental and Conservation Plans mentioned in section F.1 does include a socioeconomic assessment of land and water use programs suggested by the company. These Plans are considered as instruments of social engagement for the management of these areas[39]. Each Plan included public consultation meetings with stakeholders impacted by the initiatives proposed by AES Tietê as the ecological restoration of protected areas as a means to enhance community well-being and regional development. For each Plan, an analysis of socioeconomic impacts by proposed management activities is analyzed and discussed with stakeholders. Informal and public consultations confirm that no major negative socio-economic impact is expected from the project activity.

Annex III to Resolution Nº 01 issued by the Brazilian Interministerial Commission on Global Climate Change the Brazilian DNA, includes a description of the major positive socio-economic impacts of the project activity. These are due to job creation ranging from seed growing, plantation activities and maintenance. In the long term, improvement of the water quality and of the landscape in the borders of the reservoirs may result in a higher recreational value for the region, as well as potential economic activities such as leisure and tourism.

The table below relates each socio-economic impact with relevant documentary evidence available to the DOE.

Table 7: Expected positive socioeconomic impacts

Socio-economic impact	Summary	Documentary evidence
Local environmental sustainability	Increase of local biodiversity, environmental connectivity, and water resources conservation.	Scientific evidence provided by ESALQ/USP for previous restoration activities, and the restoration manual produced by GEF-funded project FAPESP nº 03/06423-9.
Labor conditions and employment	Improvement of labor conditions and employment opportunities.	Contractual agreements and terms of reference between AES Tietê and 3rd parties for restoration activities.
Income distribution	Mainly related to the purchase of seedlings from 3rd parties.	Purchase contracts for materials/services related to the project activity.
Capacity building and Technological development	Partnership with ESALQ/USP to conduct scientific and practical activities.	Contract between ESALQ/USP for scientific and practical activities related to the project activity.
Regional integration	Project activity relates to land use plans required for each hydroelectric plant comprising more than an individual municipality.	Land-use plans completed by AES Tietê.

[39] Resolução CONAMA Nº 302/02.

G.2. If any negative impact is considered significant by the project participants or the host Party, a statement that project participants have undertaken a socio-economic impact assessment, in accordance with the procedures required by the host Party, including conclusions and all references to supporting documentation:

>>
No significant negative socioeconomic impact has been identified.

G.3. Description of planned monitoring and remedial measures to address significant impacts referred to in section G.2 above:

>>
Significant negative socioeconomic impacts are not expected. AES Tietê will continue to inspect and manage the use and occupation of its border areas according to its Biodiversity program described in section F.1. The Environmental and Conservation Plans includes important social activities to be executed by the company around the hydroelectric plants, such as: participation in public forums and events; generation of detailed information about land and water use; evaluation of social demands; and, formulation of land and water use management proposals.

SECTION H. Stakeholders' comments:

H.1. Brief description of how comments by local stakeholders have been invited and compiled:

>>
Brazilian DNA Resolution N^{o} 07 establishes that the project proponent must invite comments from local stakeholders considering at least the following entities:

- Municipality and Alderman Chamber
- State and Municipal Environmental Agencies
- Brazilian Forum of NGOs
- Community Associations
- Public Ministry

A description of the project activity was sent by mail on August-September 2008 to more than 500 different entities within the State of São Paulo. The complete list of entities is presented in Annex 10. This initiative will be followed by a Social Communication Plan with local specificities developed by AES Tietê Communications Department. It is important to mention that the company undertakes a comprehensive social management program with a diversity of stakeholders. The program includes a variety of cultural and educational projects in the communities located adjacent to the hydroelectric plants. Many of these have a strong environmental education component related to the project activity. As an example, the "Planet Echoes" sustainability fair, held in São Paulo (October 2007) recreated 400 m^2 of Atlantic rainforest and addressed issues related to global warming, biodiversity, and environmental preservation[40]. The company is also an active participant within the various Hydrobasin committees (*Comitê de Bacias Hidrográficas*) organized within the State of São Paulo. Basin-level institutional arrangements have the potential to decentralize decision-making, and improve stakeholder participation in the process of managing water resources.

[40] For more information please consult AES Tietê Sustainability Report available at http://www.aestiete.com.br.

In order to provide incentives for stakeholder engagement relative to the project activity, AES Tietê has published both the PDD and the AR-AM0010 methodology at their website in Portuguese for public consultation. Moreover, the project activity was presented in a number of carbon and development related events during 2008. One of the last events co-organized by AES Tietê and the São Paulo Forum for Climate Change in September 2008 discussed alternatives to the temporary nature of credits for A/R project activities[41].

H.2. Summary of the comments received:

>>

AES Tietê received comments related to the project activity in written letters, e-mail, and phone calls. None of the comments questioned the suitability of the initiative for local sustainable development. A list of comments received is provided by the table below.

Table 8: List of comments received

Entity	MoC*	Date	Summary of Comments
Prefeitura Municipal de Mira Estrela (Mira Estrela/SP)	E-mail	09/09/08	Indicated that is having trouble in downloading project documentation from AES Tietê website.
Prefeitura Municipal de Boracéia (Boracéia/SP)	E-mail	10/09/08	Would like to develop partnerships related to the project activity.
Prefeitura Municipal de Divinolandia (Divinolandia/SP)	E-mail	16/09/08	Would like to publish material about the project and contribute for its development.
Casa da Agricultura de Sales (Sales/SP)	Letter	16/09/08	Would like to receive a more detailed description of the project activity.
Câmara Municipal de Pirassununga (Pirassununga/SP)	Letter	16/09/08	Was thankful to receive information about the project activity.
Prefeitura da Estãncia Turística de Igaraçu do Tietê (Igaraçu do Tietê/SP)	Letter	16/09/08	Communicated positive interest for the project activity.
Sindicato Rural de Ibitinga (Ibitinga/SP)	E-mail	25/09/08	Would like develop partnerships for the project activity.
Associação dos Engenheiros e Arquitetos de Mococa	Letter	29/10/08	Would like to receive a copy of the project.
Câmara Municipal de Novo Horizonte	Letter	03/12/08	Would like to receive a copy of the project.
Casa Civil do Governo de São Paulo	Letter	10/06/09	Communicated positive interest for the project activity.
Fundação Estadual do Meio Ambiente (FEAM/MG)	Letter	25/06/09	Communicated positive remarks of the project.

* Modality of communicaton

H.3. Report on how due account was taken of any comments received:

>>

The comments received by local stakeholders were positive, and included the will to establish partnerships for project development. Necessary answers were formulated by letter or e-mail as demonstrated to the DOE during validation.

[41] Please view a summary for the event at: http://www.ambiente.sp.gov.br/verNoticia.php?id=189

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROPOSED A/R CDM PROJECT ACTIVITY

Organization:	AES Tietê
Street/P.O.Box:	Rua Lourenço Marques 158 – 2 andar
Building:	Edificio Brasiliana
City:	Sao Paulo
State/Region:	Sao Paulo
Postfix/ZIP:	04547-100
Country:	Brasil
Telephone:	55 11 2195 2303
FAX:	55 11 2195 2300
E-Mail:	demostenes.silva@aes.com
URL:	www.aestiete.com.br
Represented by:	Demostenes Barbosa da Silva
Title:	Director
Salutation:	Mr.
Last Name:	Da Silva
Middle Name:	Barbosa
First Name:	Demostenes
Department:	Environmental Management and Carbon Market
Mobile:	55 11 9635 8236
Direct FAX:	55 11 2195 2300
Direct tel:	55 11 2195 2305
Personal E-Mail:	demostenes.silva@aes.com

Organization:	International Bank for Reconstruction and Development as a trustee for the BioCarbon Fund
Street/P.O.Box:	1818H St
Building:	
City:	Washington, DC
State/Region:	District of Columbia
Postfix/ZIP:	20433
Country:	USA
Telephone:	202-458-1873
FAX:	202-522-7432
E-Mail:	jchassard@worldbank.org
URL:	www.carbonfinance.org
Represented by:	Ms. Joelle Chassard
Title:	
Salutation:	Ms.
Last Name:	Joelle
Middle Name:	

First Name:	Chassard
Department:	Environment Department
Mobile:	
Direct FAX:	202-522-7432
Direct tel:	202-458-1873
Personal E-Mail:	jchassard@worldbank.org

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for this project activity.

Annex 3

BASELINE INFORMATION

The state of São Paulo has an area of approximately 248,800 km² (95.700 mi²), and a population of about 40 million (21.5% of the population of Brazil), which makes it the most populous country subdivision in the Western Hemisphere. The climate of São Paulo is tropical to subtropical, altitude being the largest contributor to what variation there is. The capital, São Paulo City, is located barely outside the tropics in the south of the State and about 800 meters above sea level. The service sector is the largest component of GDP at 47.2%, followed by the industrial sector at 46.3%. Agriculture represents 6.5% of GDP (2004). São Paulo (state) exports: vehicles 17.2%, airplanes and helicopters 11.6%, food industry 10%, sugar and alcohol fuel 7.8%, orange juice 5.2%, telecommunications 4.1% (2002).

The State of São Paulo is basically comprised of the Atlantic rainforest and *Cerrado* biomes. The importance of these ecosystems was recently recognized with the inclusion of both in the list of hot spots (i.e. biologically rich and endangered regions on the planet) organized by Conservation International (CI). According to the Forest Inventory of the State of São Paulo for 1993, the State has about 33,307,744 ha of 'natural forest', or 13.4% of its territory. Of these, approximately 85% is classified as 'forest' and 'secondary forest'; 9% as different *Cerrado* physiognomies and 4% between 'flooded', 'sandy soil', 'mangrove' and 'unclassified vegetation'. About 60% of the remaining 'natural forest' area is located along the coastal region. The State's Forest Inventory also reveals that from 1962 to 1971-73 there was a 39.45% decrease in natural vegetal coverage in the state and from 1971-73 to 1990-92, this decrease totaled 29.20%. Altogether, there was a 57.13% loss of vegetation from 1962 to 1990-92.

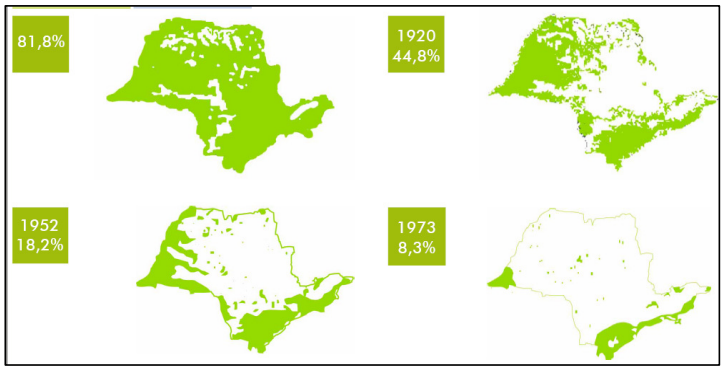

Figure 5: Vegetative cover estimates for the State of São Paulo (1500-1973). Source (Vitor, 1975)

The Atlantic Rain Forest is comprised of 3 main vegetation types, of unique, though similar, characteristics: *floresta ombrófila densa* (known as Atlantic Rain Forest), *floresta estacional semidecidual* (Inland forest) and *floresta ombrófila mista* (araucária pine forest). These vegetation types shelter a significant part of the rich endemic biodiversity of Brazil. In the State of São Paulo, the Atlantic Rain Forest is mainly concentrated on the slopes of Serra do Mar (Coastal Escarpment). It is very difficult to be accessed, due to the dense vegetation - grown in shallow and acid, low-nutrient soil. This ecosystem is the one that still has the largest continuous remains preserved. The Inland Forest was originally located in the State's western reaches. Its vegetation is about 30 meters high and 50% of its tree species loose their leaves during winter. It is associated to the local climate, with well-defined rainy

and dry periods. Today it is limited to some small remains in the State and is the most affected considering fauna and flora survival. The *Cerrado* biome covers only 1% of the total area of São Paulo; conservation units protect only 18% of these remains. Very rich in terms of species and landscapes, it may be found in a variety of forms (*cerradão, cerrado* and *campo cerrado*), defined by soil type. Their biodiversity value is estimated to be about 166,000 species, 6,000 of them being seed producers. It is known for its ability to regenerate after forest fires (53% of the ecosystem's organic matter is found in the roots, about 1-meter deep). It is the natural habitat of a rich fauna in terms of species. Its characteristic animal is the mammal "Guará", (*Chrysocium brachyrus*), a kind of wolf, that is considered endangered. It also shelters many bird species, but the endemic ones only comprise 10% of the total. The remaining *Cerrado* area in the State of São Paulo is spread in fragments. 70% of them are not larger than 20 ha.

Remaining natural vegetation is located mainly within the slopes of *Serra do Mar* or the State's coastal zone (Figure 7 – green color). Deforestation rates were decreased by the enactment of the Forestry code and establishment of conservation units at the end of the 1970s. Reforestation with Pinus and Eucalyptus species mainly for pulp and paper production is illustrated in red in Figure 7.

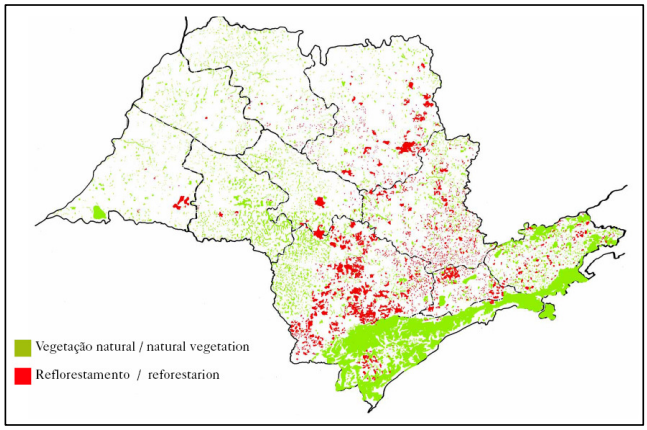

Figure 6: Remaining forest cover (Source: Kronka, 1993)

Most of the State of São Paulo is located in the Paraná River Watershed with a tropical climate and varied rains, dry winter and hot summer. The average temperature is between 16 and 18 degrees and average annual rainfall is between 1000 and 1400 mm (INPE, 2000). The relief in the State of São Paulo is subdivided into the following geomorphological units:

- *Coastal Province*: includes the coastal lowlands, coastal mountain ranges (Serra do Mar, Paranapiacaba and Itatins) and the coastal hills and Vale do Ribeira;
- *Atlantic Plateau:* encompasses the stretch of crystalline rocks that go from the state's southern region (Guapiara) to the northeast, at the border with the state of Minas Gerais (Campos do Jordão);
- *Peripheral Depression:* encompasses the region that stretches from the Atlantic Plateau to the west of the state, through the Middle Tietê, Paranapanema and Mogi-Guaçu valleys;

- *Basaltic Cuestas:* formed by the remaining erosion areas of basaltic volcanic rock from the Paraná Basin, stretching from Ituverava and Franca to Botucatú and Avaré and southwest;
- *Western Plateau:* includes the plateaus of the Marília, Catanduva and Monte Alto regions.

The project activity is located within three main river basins in the State of São Paulo: Tietê, Grande, and Pardo. The Tietê river —São Paulo state's largest river— runs 1,100 km from its eastern source in the São Paulo Metropolitan Region to the western border of the state where it joins the Paraná river, which then runs southward, toward the Rio de la Plata estuary between Argentina and Uruguay. The climate in the basin is typical of tropical high plain savannas, with a temperate summer. Precipitation varies little throughout the basin, averaging 1,400 mm per year. The Grande River rises in the Mantiqueira Mountains almost in sight of Rio de Janeiro city and descends inland, west-north-westward, in many falls and rapids. Its lower course marks a portion of the Minas Gerais–São Paulo border. At the Mato Grosso do Sul State border, after a course of 845 miles (1,360 km), it joins the Paranaíba River to form the Alto (Upper) Paraná River. The Márimbondo Waterfalls, 35 miles (56 km) north of São José do Rio Prêto, have hydroelectric potential. The Grande is navigable for about 130 miles (210 km) above the falls. The Pardo River begins in the municipality of Ipuiúna, south-central region of the State of Minas Gerais. The river enters São Paulo at the Caconde municipality, cuts through the São José do Rio Pardo municipality, and then flows northeastern, passing through a coffee producing area known as 'California Paulista'. The Pardo River is a tributary of the Grande River. Its total length is 573 km. The Pardo River watershed is a major source of drinking water supply for the region, and water for domestic and industrial use within Botucatu and surrounding areas.

Annex 4

MONITORING PLAN

The Monitoring Plan (MP) for the A/R CDM project activity will measure objectives set forth by the forest planting and management actions included in this project design document. Minimum requirements for a MP are detailed in section H (Monitoring) of the "Modalities and procedures for afforestation and reforestation project activities under the clean development mechanism in the first commitment period of the Kyoto Protocol (5/CMP.1)[42]". Considering decision 5/CMP.1 and the specific characteristics of monitoring methodology AR-AM0010, the project's MP will:

- Detail the collection and archiving of all relevant data necessary for estimating or measuring the *ex post* actual net GHG removals by sinks during the crediting period;
- Specify techniques and methods for sampling and measuring individual carbon pools and GHG emissions by sources included in the *ex post* actual net greenhouse gas removals by sinks that reflect commonly accepted principles and criteria concerning forest inventory;
- Identify all potential sources of, and the collection and archiving of data on, leakage during the crediting period;
- Describe changes in circumstances within the project boundary that affect legal title to the land or rights of access to the carbon pools;
- Include quality assurance and control procedures for the monitoring process; and,
- Procedures for the periodic calculation of the *ex post* actual net greenhouse gas removals by sinks due to the reforestation project activity and documentation of all steps involved in those calculations.

It is not expected that the project will result in significant negative socio-economic and environmental impacts, including impacts on biodiversity and natural ecosystems, and impacts outside the project boundary. Thus, the MP does not include the collection and archiving of information related to the planned monitoring and remedial measures for this subject matter.

The MP will be complemented by standard operating procedures (SOPs) under development by the project proponents. These will include procedures for project implementation and monitoring (i.e. training, emergency preparedness, equipment used in inventory and calibration, etc.). The SOPs will be classified and archived within the project database.
The following items are considered in the MP:

1. Monitoring of the baseline net GHG removals

The carbon stock changes in the baseline scenario do not need to be monitored.

[42] FCCC/KP/CMP/2005/8/Add.1.

2. Monitoring the overall performance of the proposed A/R CDM project activity

a) Monitoring actual project boundary;

The project boundary is defined as two specific boundary points for each hydropower plant reservoir. It is delineated to cover all land parcels of the project and the boundaries of the parcels are demarcated using global positioning system (GPS). Project boundary will be periodically verified and any change (e.g. due to soil erosion, etc.) is measured and recorded in the project database for submission to the DOE at the time of next verification.

- Field surveys will be conducted at periodic intervals to verify that the permanent markers used to delineate the project boundary can be located on the ground;

- The project boundary is delineated using the GPS by measuring and recording the latitude and the longitude of polygons that represent the geographical positions. Furthermore, field surveys are used to verify that the actual project boundary is consistent with the GPS coordinates and boundaries of respective sites;

- Monitoring measures to assess the risk of fire and other natural events that occur within and outside the project boundary;

- Personnel involved in the monitoring will be trained to identify the changes in the boundary and to record those changes in the project database for reporting at the project verification.

b) Monitoring the areas and quality of forest establishment to ensure the technical design described in section A is well-implemented. The following activities will be conducted in the first three years after planting:

- Confirm that site and soil preparation are implemented based on practice documented in section A, no slash and burn and overall tillage will be used in the site and soil preparation;

- Confirm that site preparation is carried out in such a way as to avoid levels of soil disturbance or soil erosion sufficient to significantly[43]

- Survival checking
    - The initial survival rate of planted trees will be checked within one to three months after the planting, and re-planting will be conducted if the survival rate is lower than 90%;
    - Final survival checking will be carried out three years after the planting;
    - Survival checking will be conducted for all sample plots.

- Weeding checking: to check and confirm that the weeding practice is well-implemented.

[43] Whether the risk of increased soil erosion is significant can be determined using the criteria provided in EB Meeting Report 33, Annex 15: *Procedure to determine when accounting of the soil organic carbon pool may be conservatively neglected in CDM A/R project activities*.

- Surveying and checking the area of planted species and planting year for each stratum.

c) Monitoring of forest management.

- The number and periodicity of weeding and the frequency of herbicide use and fertilizer application will be monitored and recorded.

- If plantings on certain lands within the project boundary fail after 3rd year, the information will be documented and excluded from the project ex post carbon calculations.

- Information on the occurrence of natural and human disturbance
  - Droughts and floods and other natural emergencies will be monitored and recorded;
  - In case of fire, the causes, area affected, season, and duration of fire occurrence shall be recorded in the database;
  - Significant human disturbance (e.g. cattle grazing, etc.) that influence GHG removals by sinks will be monitored, reported, and recorded in the project database;

- Deviations in forest management activities implemented in the field and the ones outlined in the project design document will be monitored, and reasons for deviations will be recorded.

3. Sources of variability and stratification for aboveground biomass pools

The main procedures of *ex post* stratification of the project are outlined in the PDD. Sources of variability within project lands are managed by stratification, whereby the project is divided into a reasonable number of relatively homogeneous units in order to reduce the number of plots needed for monitoring. The following procedures will be implemented.

a) Stratification

Review of the final stratification map once sampled biomass data become available, and adjusted if necessary to account for differences between planned and actual forest establishment and management, or unexpected disturbances, or merging of strata where changes in biomass stocks are similar.

b) Sampling frame

Permanent sampling plots are used for sampling over time to measure and monitor changes in carbon stocks of the relevant carbon pools. The plots will be located with GPS and are invisible so as to be treated in the same way as other lands within the project boundary, e.g., during site and soil preparation, weeding, fertilization, etc., and will be prevented from being deforested over the crediting period. If there is any modification of the stratification during the project to improve homogeneity within each stratum, the existing permanent sample plots in the affected strata shall be retained, and new plots added as necessary.

- Determining sample size

To determine the sample size, this methodology uses the latest version of the tool for the "Calculation of

the number of sample plots for measurements within A/R CDM project activities", approved by the CDM Executive Board[44]. The targeted precision level for biomass estimation within each stratum is ±10% of the mean at a 95% confidence level.

The plot area AP has major influence on the sampling intensity and time and resources spent in the 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)[45], the relationship between coefficient of variation and plot area can be denoted as follows:

$$CV_2^2 = CV_1^2 \cdot \sqrt{\frac{\bar{AP_1}}{AP_2}} \qquad (6)$$

Where AP_1 and AP_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 m^2 for dense stands and 1000 m^2 for open stands.

- Locating sampling plots

The permanent sample plots shall be located systematically with a random start, which is considered good practice in GPG-LULUCF. This will be accomplished with the help of a GPS in the field. The geographical position (GPS coordinate); administrative location, stratum and stand, series number of each plots will be recorded and archived. The number of plots will be on the range of 1:50 ha to 1:20 ha, and size of plots on the order of 400 m2 (40m X 10m). It is important to ensure that the sampling plots are evenly distributed in the stratum. Sample plots will be rectangular in shape, and the sides of each plot will be place in parallel to the rows of planted trees. Each corner of the plot will be set at a point which is at a distance as near as possible equal from surrounding trees. This may mean that the plots are of slightly varying sizes, and in which case plot dimensions will be carefully noted and checked. To avoid bias in the location of plots, their location will be marked on a map prior to establishment. This will be done using a simple grid based on the number of plots required. In most cases plots will be located away from the edge of the plantation to avoid the edge effect.

c) Monitoring interval

The monitoring interval depends on the rate and variability of carbon accumulation; that is, on the magnitude and variation of growth rates within the project boundary. Although verification and certification will be carried out every five years after the first verification until the end of the crediting period[46], the monitoring interval may be less than five years. However, to reduce the monitoring cost, the monitoring intervals will coincide with verification times as far as possible; that is, a monitoring interval

[44] CDM Executive Board Meeting Report EB31, Annex 15: Calculation of the number of sample plots for measurements within A/R CDM project activities.

[45] Freese, F. 1962. Elementary Forest Sampling. USDA Handbook 232. GPO Washington, DC. 91 pp.

[46] Paragraph 32 of Decision 19/CP.9.

of five years. Logically, one monitoring and verification event will take place close to the end of the first commitment period (e.g., in the second half of 2012). Project participants will determine the first monitoring time taking into account the growth rate of trees and financial resources of the project activity.

d) Measuring and estimating carbon stock changes over time

The estimation of actual net GHG removals by sinks will be estimated according to the specific steps, parameters and formula in section D.1.

e) Monitoring GHG emissions by sources as the results of the A/R CDM project activity

The monitoring of GHG emissions by sources as the result of the A/R CDM project activity will not be part of the monitoring plan.

4. Monitoring the actual net GHG removals by sinks data

The monitoring plan implements the steps, equations and procedures outlined in the approved methodology AR-AM0010 to calculate the carbon stock changes of the project. It includes monitoring procedures for the carbon pools above-ground and below-ground biomass. It does not include the following carbon pools: dead wood, litter, and soil organic carbon.

a) Above-ground biomass

Above-ground biomass will be monitored over time by measuring the growth of individual trees in permanent sample plots at fixed intervals, keeping track of growth, in-growth, and mortality and associated changes in carbon stock of trees. All living trees are measured in a clockwise manner. The measurement of diameter at 30 cm is recorded. The diameter position should take into account the tree form and topography. The number and location of tree and its diameter measurement should be recorded. The ESALQ manual guidance shall be followed in the diameter measurements of trees on different topographic setting and with different irregularities. Above-ground biomass from natural regeneration processes are also to be accounted for by the project activity.

Procedures for measurement of tree biomass

- *Tree diameter*

The diameter of a tree measured at 30 cm. The measurement is rounded down to full centimeters. The minimum diameter to be measured is 5 cm.

- *Tree height*

For each site, the yield class will be determined by measuring tree heights. If the heights of several trees are the same, one measurement can be used for several trees.

Carbon stock changes over time will be estimated using data for biomass growth. The biomass growth will be calculated as a function of volume growth. The biomass estimation consists of the following steps:

1) Determination of the location of sample plots.
2) Separately for each species present in the sample plot, measurement of diameter at 30 cm of all trees with diameter greater than 5 cm will be conducted.
3) Calculation of mean diameter per species present at the site is used to assess the volume.
4) For each species, the heights of trees are measured and average height is calculated.
5) For each species, height class is assessed (according to species, mean diameter and average height).
6) The volume per tree of the aboveground biomass corresponding to average diameter is assessed from the allometric equation/yield table.
7) For each species, the volume is multiplied by number of trees on the sample plot to obtain volume per sample plot.
8) Volume per plot is a product of volume per hectare and area of the plot.

Equipment used in inventories and calibration procedures for measurement accuracy

The equipment to be used in fieldwork should withstand the rigors of field use under adverse conditions. To avoid errors in the measurement of carbon stock, the following equipment used in monitoring and inventory activities would be calibrated using standard forest management and inventory operating procedures.

- *Equipment for use in inventory*

– Maps of the project area, stratum and planting site with GPS coordinates
– Compass for measuring bearings
– Fibreglass or metal tapes (100m and 30m) for measuring distances
– Global Positioning System (GPS) for locating plots
– Plot centre marker (rebar/PVC tubing) for marking plots
– Metal detector for locating belowground plot markers
– Aluminium nail and number tags for marking trees
– Tree diameter at 30 cm tape for measuring trees
– Hyspometer
– Diameter tape
– Pocket calculator
– Clinometers (percent scale) for measuring tree height and slope
– Coloured rope and pegs or a digital for marking plot boundaries measuring device (DME)
– 100m line or two 50m lines for measuring dead wood
– Calipers for measurement of dead wood
– Hand saw for collecting dead wood samples and cutting destructive samples
– Spring scales (1kg and 300g) for weighing destructive samples
– Large plastic sheets for mixing forest floor/under storey sample
– Soil sampling probes for sampling soil
– Rubber mallet for inserting soil probes
– Cloth (for example, Tyrek) or paper bags for collecting soil and under storey samples
- Tree caliper, graduated in centimeter graduated in diameter classes of 5 cm

- Wood plank and accessories (cord, grip, rubber band, etc),
- Plastic file folder to put essential inventory documents, tables of correction for slope, etc,
- Pencil of average hardness (HB), a gum, and a penknife

Procedures for the maintenance of equipment used in vegetation measurement

The common procedures to be followed in the maintenance of equipment used in vegetation measurement are outlined below.

- When compass is used in the field, it is calibrated to compensate for the local difference between magnetic and true north (magnetic declination) and adjustment is completed in order to facilitate the recording of accurate bearing.

- It is recommended to use tapes made of steel or aluminum, and cloth tapes should be avoided considering their propensity for wear and tear that could result in measurement inaccuracies.

- Pacing can be useful to establish the relationship between map and photo information with the measurements on the ground. One step represents half of a pace and two steps equal one pace. Therefore, crew should be trained in pacing on flat ground.

b) Below-ground biomass

Below-ground biomass will be estimated by root-shoot ratios from authoritative published literature such as the Good Practice Guidance on Land Use, Land Use Change and Forestry (IPCC 2004). Destructive harvesting at permanent project plots will be conducted in order to confirm international and/or regional root-shoot ratios applied by the project activity.

c) Project emissions

The monitoring of project emissions is not required.

5. Monitoring the leakage

The monitoring of leakage is not required.

6. Monitoring the social economy of stakeholders

No significant negative social-economic impacts have been identified in section G, and therefore, no monitoring actions have been planned for this theme.

7. Monitoring environmental impacts

No significant negative environmental impacts have been identified as described in section F, and therefore, no monitoring actions have been planned for this theme.

8. Scheduling of monitoring, measurement and verification

The frequency of monitoring and measurement activities are outlined by tables E.1.1, E.1.2, E.4.1, E.4.2, and E.6.1 outlined in section E of this project design document.

The project will be verified at the end of each measurement period, which is every 5 years after the first verification from the start of the project. Verification at the beginning of the project will establish its initial conditions. Subsequent periodic verifications will serve to ensure that the project has accrued the carbon credits.

9. Quality Assurance and Quality Control (QA/QC)

To ensure the net anthropogenic GHG removals by sinks to be measured and monitored precisely, credibly, verifiably and transparently, a quality assurance and quality control (QA/QC) procedure will be implemented.

a) Reliable field measurements

To ensure the reliable field measurements, Standard Operating Procedures (SOPs) for each step of the field measurements, including all detail phases of the field measurements and provisions for documentation for verification purposes, will be developed and adhered to over time.

Training courses on the field data collection and data analyses will be held by ESALQ/USP for students involved in field measurement work. The training courses will ensure that each field team member is fully aware of all procedures and the importance of collecting data as accurately as possible. Any new staff will be adequately trained.

b) Verification of field data collection

To verify that the plots have been installed and the measurements taken correctly, the following actions will be undertaken:

- 20% of randomly selected plots will be re-measured by another team;
- Key re-measurement elements include the location of plots, diameter at 30 cm and tree height of all trees present; and,
- The re-measurement data will be compared with the original measurement data. Any errors found will be corrected and recorded. Any errors discovered will be expressed as a percentage of all plots that have been rechecked to provide an estimate of the measurement error. If the difference between the re-measurement and original measurement is higher than 5%, the sample plot will be eliminated.

c) Verification of data entry and analysis

To minimize the possible errors in the process of data entry, the entry of both field data and laboratory data will be reviewed by an independent expert team and compared with independent data to ensure that the data are realistic. Communication between all personnel involved in measuring and analyzing data will be used to resolve any apparent anomalies before the final analysis of the monitoring data is completed. If there are any problems with the monitoring plot data that cannot be resolved, the plot should not be used in the analysis.

d) Data maintenance and archiving

Data archiving will take both electronic and paper forms, and copies of all data will be provided to each project participant. All electronic data and reports will also be copied on durable media such as CDs and copies of the CDs are stored in multiple locations. The archives include:

- Copies of all original field measurement data, laboratory data, data analysis spreadsheet;
- Estimates of the carbon stock changes in all pools and non-CO_2 GHG and corresponding calculation spreadsheets;
- GIS products; and,
- Copies of the measuring and monitoring reports.

10. Uncertainty assessment

The uncertainty for each species in each stratum can be estimated from re-measurement of randomly selected plots and/or from the measurement of replicate plots. Uncertainties will be estimated and expressed as half the 95% confidence interval width divided by the estimated value, i.e.[47]

$$U_s(\%) = \frac{\frac{1}{2}(95\%ConfidenceIntervalWith)}{\mu} \cdot 100 \quad (7)$$

$$= \frac{\frac{1}{2}(4\sigma)}{\mu} \cdot 100 \quad (8)$$

Where:

U_s = percentage uncertainty of each species within sub-stratum, %
μ = mean value
σ = standard deviation

The uncertainty of each sub-stratum is then combined using the following error propagation equations[48]:

$$U_c = \frac{\sqrt{(U_{s1} \cdot C_{s1})^2 + (U_{s2} \cdot C_{s2})^2 + \cdots + (U_{sn} \cdot C_{sn})^2}}{|C_{s1} + C_{s2} + \cdots + C_{sn}|} \quad (9)$$

Where

U_c = combined percentage uncertainty of sub-stratum, %
U_{si} = percentage uncertainty of species i in the sub-stratum, %
C_{si} = mean carbon stock of species i in the sub-stratum

[47] Box 5.2.1 in GPG LULUCF

[48] Refers to equation 5.2.2 in GPG LULUCF

The stratum and total percentage uncertainties are further combined in the same way as above.

Annex 5

ASSESSMENT OF LAND ELIGIBILITY AND PROJECT BOUNDARY

The methodological steps applied for assessment of land eligibility and determination of the project boundary is outlined below:

1. Organization and geometric correction of cartographic and remote sensing data
2. Development of a data bank
3. Identification of project boundary
4. Assessment of current and historical land use
5. Consideration of AES reforested areas between 2001-2007
6. Mapping adjustments
7. Determination of land eligibility

Step 1 included a thorough organization of all cartographic and remote sensing data acquired to determine land eligibility and project boundary by various media types. These included: 'scanmaps' of topographic letters supplied by IBGE; field GPS topographic data (in DXF format) supplied by the company Palladini; and, remote sensing data (Quickbird, Landsat/TM, and CBERS images). In step 2, a spatial data bank was developed in GIS ArcGIS™ as per cartographic projection procedures, horizontal datum (i.e. SAD69), proposed scale (i.e. 1:50,000) and layer structures for thematic classification of study areas.

The identification of the project boundary (step 3) consisted identification of lines corresponding to normal and maximum quotas, and beginning of expropriation area (Annex 5.2). The maximum normal and beginning of expropriation lines were traced utilizing a digital model of superficial terrain (an image in shades of grey, which enables visualization of altitudes of superficial terrain). This model represents a group of points with three-dimensional coordinates, which enable visualization in relief (drainage, geographical features, etc .). The points were extracted from pairs of aerial photographs superimposed provided a 60% overlap of the topographic elements that are photographed. The three-dimensional visualization enables precise extraction of altitudes of photographed elements. The determination of waterline level at the time the Quickbird images were acquired facilitated the identification of the project boundary (Annex 5.1).

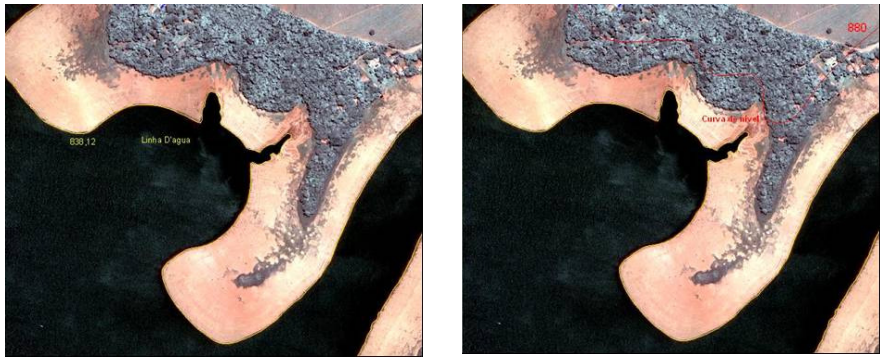

Figure 7: The image on the left represents an example of interpretation of the waterline at UHE Caconde's reservoir according to the image taken by Quickbird for the level of 838.12 m. The same image on the right represents the level curve of 880 m traced for UHE Caconde reservoir and its configuration relative to the Quickbird image.

After the waterline is defined for each hydropower plant, against Quickbird images, hypsometric curves are traced by means of a three dimensional representation of images. The hypsometric curves represent the normal and maximum quotas (2 meters above the normal quota).

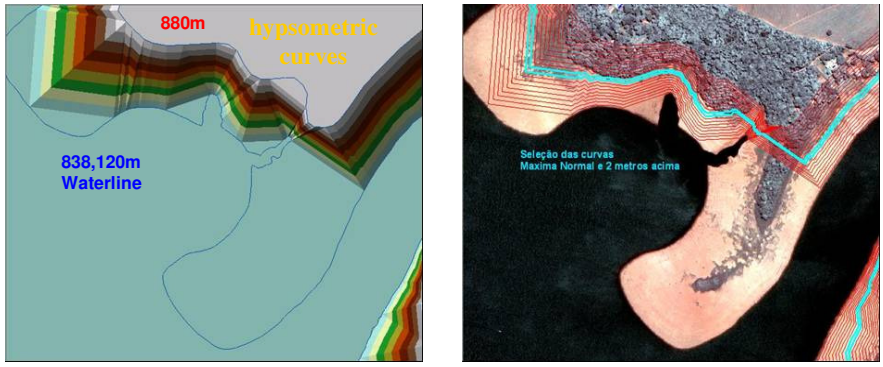

Figure 8: The image on the left is an example of hypsometric curves (every two meters) against the pre-defined waterline and level curve. The image on the right represents the selection for the normal (855 m) and maximum (857 m) quotas against the backdrop of hypsometric curves.

Polygons for the project boundary identified for each reservoir were developed from the corrected normal and maximum quotas using the XtoosPro tool from ArcGIS. The tool allowed for identification of the surface area (i.e. area polygon) between the curves. This area is defined as the project boundary included in a map for each individual reservoir.

Figure 9: The image on the left represents an example of the project boundary, and the image on the right is the generated project boundary map for UHE Caconde.

Satellite imagery (Quickbird and CBERS) was interpreted for an assessment of current and historical land use (step 4) within the project boundary. Potentially eligible areas were classified as forest fragments, water bodies, illegal occupations, and rocky soils. Historical land use was also assessed by interpreting TM/Landsat images. Classification methods were applied based on Nascimento *et al* (1998).

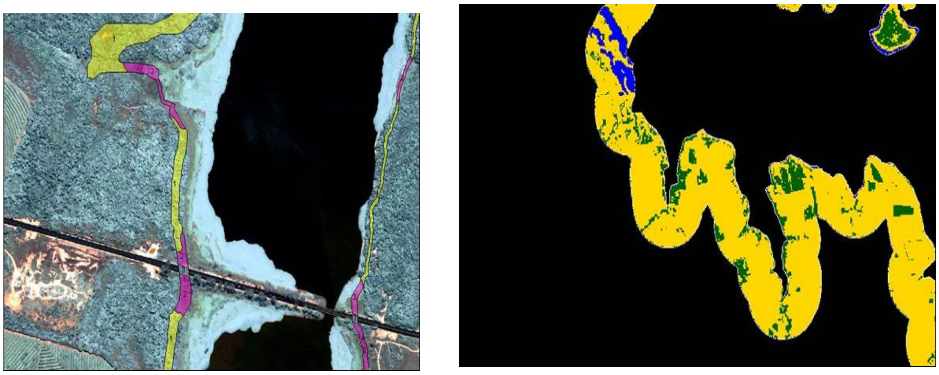

Figure 10: The image on the left represents the assessment of current land use classifying areas according to existing forest fragments along the reservoir (black color) according to a Quickbird image. On the right, a TM/Landsat image is used for the historical assessment of land use within the project boundary (yellow color).

After the interpretation of current and historical land use, The AES reforested areas under the project from 2001 to 2007 are also identified (step 9) to present the information on total eligible area of the project.

Annex 6

ADDITIONAL PROJECT INFORMATION

Annex 6.1

RESERVOIR LEVELS FOR QUICKBIRD SATELLITE IMAGERY

Área	Date	Reservoir level
Água Vermelha	*sábado, 22 de julho de 2006*	*378,11*
Água Vermelha	*sábado, 22 de julho de 2006*	*378,11*
Água Vermelha	*quinta-feira, 27 de julho de 2006*	*377,61*
Água Vermelha	*quinta-feira, 27 de julho de 2006*	*377,60*
Água Vermelha	*sexta-feira, 4 de agosto de 2006*	*377,18*
Água Vermelha	*sexta-feira, 4 de agosto de 2006*	*377,18*
Água Vermelha	*quinta-feira, 14 de setembro de 2006*	*375,57*
Água Vermelha	*quinta-feira, 14 de setembro de 2006*	*375,56*
Água Vermelha	*quarta-feira, 27 de setembro de 2006*	*375,27*
Água Vermelha	*quarta-feira, 27 de setembro de 2006*	*375,27*
Água Vermelha	*segunda-feira, 2 de outubro de 2006*	*375,20*
Água Vermelha	*segunda-feira, 2 de outubro de 2006*	*375,19*
Água Vermelha	*segunda-feira, 26 de março de 2007*	*383,28*
Água Vermelha	*segunda-feira, 26 de março de 2007*	*383,28*
Água Vermelha	*sexta-feira, 13 de abril de 2007*	*382,89*
Água Vermelha	*sexta-feira, 13 de abril de 2007*	*382,89*
Bariri	*quinta-feira, 17 de agosto de 2006*	*427,47*
Bariri	*sábado, 28 de outubro de 2006*	*427,17*
Barra Bonita	*quinta-feira, 17 de agosto de 2006*	*448,76*
Barra Bonita	*quinta-feira, 17 de agosto de 2006*	*448,76*
Barra Bonita	*segunda-feira, 23 de outubro de 2006*	*447,32*
Barra Bonita	*segunda-feira, 23 de outubro de 2006*	*447,32*
Barra Bonita	*segunda-feira, 23 de outubro de 2006*	*447,32*
Barra Bonita	*terça-feira, 7 de agosto de 2007*	*449,99*
Barra Bonita	*terça-feira, 7 de agosto de 2007*	*449,99*
Caconde	*domingo, 5 de novembro de 2006*	*838,12*
Euclides da Cunha	*terça-feira, 25 de julho de 2006*	*664,80*
Ibitinga	*terça-feira, 3 de abril de 2007*	*403,82*
Ibitinga	*sábado, 21 de abril de 2007*	*403,79*
Limoeiro	*terça-feira, 25 de julho de 2006*	*572,78*
Mogi Guaçu	*segunda-feira, 1 de maio de 2006*	*599,31*
Nova Avanhandava	*sábado, 3 de junho de 2006*	*357,95*
Nova Avanhandava	*sexta-feira, 16 de junho de 2006*	*357,88*
Nova Avanhandava	*quinta-feira, 14 de setembro de 2006*	*357,91*
Nova Avanhandava	*quarta-feira, 27 de setembro de 2006*	*357,96*
Promissão	*quarta-feira, 15 de fevereiro de 2006*	*383,03*
Promissão	*sexta-feira, 4 de agosto de 2006*	*382,36*
Promissão	*terça-feira, 22 de agosto de 2006*	*382,05*
Promissão	*quinta-feira, 14 de setembro de 2006*	*381,90*
Promissão	*quinta-feira, 8 de março de 2007*	*383,91*
Promissão	*quinta-feira, 26 de abril de 2007*	*383,88*

Annex 6.2

PARAMETERS APPLIED FOR DETERMINATION OF PROJECT BOUNDARY

Reservoir	QUOTAS					Number of altimetry steps	Perimeter (km)
	MAXIMUM NORMAL	MAX MAXIMORUM		Expropriation			
		Beginning	End	Beginning	End		
UHE EUCLIDES CUNHA	665,000	667,500	667,500	667,500	667,500		16,00
UHE LIMOEIRO	573,000	575,400	575,400	575,400	575,400		21,00
PCH MOGI GUAÇU	598,500	600,500	601,000	601,000	603,200	10	56,00
UHE BARIRI	427,500	428,500	433,250	431,000	432,000	3	203,00
UHE CACONDE	855,000	857,500	857,500	857,000	857,000		269,00
UHE IBITINGA	404,000	405,000	408,500	407,500	407,500		375,00
UHE NOVA AVANHAN-DAVA	358,000	358,500	358,500	358,000	359,000	1	462,00
UHE BARRA BONITA	451,500	453,000	453,000	453,000	453,000		788,00
UHE ÁGUA VERMELHA	383,300	383,300	386,000	384,000	391,000	4	1.190,00
UHE PROMISSÃO	384,000	385,300	385,300	386,000	387,000	1	1.423,00

Annex 7

PHOTOS OF EXISTING REFORESTED PLOTS

The photos below represent examples of reforested plots along riparian areas along the banks of the UHE Ibitinga reservoir. The reforested fragments fall within the project boundary or the area between the normal quota and the beginning of the expropriation line. Areas above the threshold of the project boundary are also defined as protected areas by the Brazilian legislation but no reforestation has taken place. Instead, neighboring properties use these lands for agronomic activities, cattle ranching, or as recreational sites.

Annex 8

NATIVE SPECIES UTILIZED IN PROJECT ACTIVITY

Popular Name	Scientific Name	Family	Ecological Classification
Abiu	Pouteria torta (Mart..)Radlk.	Sapotaceae	NP
Açoita cavalo	Luehea divaricata Mart.	Tiliaceae	P
Açoita cavalo grande	Luehea candicans Mart. et Zucc.	Tiliaceae	P
Aldrago	Pterocarpus violaceus Vog.	Fabaceae	P
Alecrim-de-Campinas	Holocalyx balansae MIch.	Caesalpiniaceae	NP
Amburana	Amburana cearensis (Fr.All.)A.C. Smith.	Fabaceae	NP
Amendoim-do-campo	Pterogyne nitens Tul.	Caesalpiniaceae	P
Amescla/Almecega	Protium heptaphyllum (Aubl.) March.	Burseraceae	NP
Anda-assu/Boleira	Joannesia princeps Vell.	Euphorbiaceae	NP
Angico branco	Anadenanthera colubrina (Vell.) Brenan.	Mimosaceae	P
Angico-do-cerrado	Anadenanthera falcata (Benth.) Speg.	Mimosaceae	P
Angico vermelho	Anadenanthera macrocarpa (Benth.) Brenan.	Mimosaceae	P
Anona	Annona sp.	Annonaceae	NP
Araça-da-mata	Myrcia glabra Berg.	Myrtaceae	NP
Araça roxo	Psidium myrtoides O. Berg.	Myrtaceae	NP
Araribá	Centrolobium tomentosum Guill. ex. Benth.	Fabaceae	P
Araticum cagão	Annona cacans Warm.	Annonaceae	P
Aroeira branca	Lithraea molleoides (Vell.) Engl.	Anacardiaceae	P
Aroeira vermelha	Myracrodruon urundeuva Fr. All.	Anacardiaceae	NP
Aroerinha (Ar. Pimenteira)	Schinus terebinthifolius Raddi.	Anacardiaceae	P
Assapuva/Sapuva	Machaerium stipitatum (DC.) Vog.	Fabaceae	NP
Bacuri	Scheelea phalerata (Mart.) Burret.	Palmae	NP
Baru	Dipteryx alata Vog.	Fabaceae	NP
Bico-de-pato	Machaerium aculeatum Raddi.	Fabaceae	P
Bicuiba	Virola sebifera Aubl.	Miristicaceae	NP
Biriba	Rolinia mucosa (Jacquin) Baill.	Annonaceae	NP
Buriti	Mauritia flexuosa L. f.	Palmae	NP
Cabeludinha	Eugenia tomentosa Camb.	Myrtaceae	NP
Cabreuva	Myroxylon peruiferum L. f.	Fabaceae	NP
Café-de-bugre	Cordia ecalyculata Vell.	Boraginaceae	P
Caja mirim	Spondias lutea L.	Anacardiaceae	NP

[C1] Comentário: Please write scientific names in italics.

Canafístula	Peltophorun dubium (Spreng.) Taub.	Caesalpiniaceae	P
Canelinha	Nectandra megapotamica (Spreng.) Mez.	Lauraceae	NP
Canjerana	Cabralea canjerana (Vell.) Mart.	Meliaceae	NP
Canudo-de-pito	Mabea fistulifera Mart.	Euphorbiaceae	P
Capitão-do-campo	Terminalia brasiliensis Camb.	Combretaceae	NP
Capitão-do-cerrado	Terminalia argentea Mart. et. Succ.	Combretaceae	NP
Capixingui	Croton floribundus Spreng.	Euphorbiaceae	P
Casca-d'anta	Rauvolfia sellowii M. Arg.	Apocynaceae	P
Catiguá vermelho	Trichilia hirta L.	Meliaceae	NP
Caxeta amarela	Chrysophyllum gonocarpum (Mart.& Eichl.) Engl.	Sapotaceae	NP
Cedro	Cedrela fissilis Vell.	Meliaceae	P
Coração-de-negro	Poecilanthe parviflora Benth.	Fabaceae	NP
Cordia	Cordia sp.	Boraginaceae	P
Correeiro	Diatenopteryx sorbifolia Radlk.	Sapindaceae	NP
Crindiuva	Trema micrantha (L.) Blum.	Ulmaceae	P
Dedaleiro	Lafoensia pacari St. Hil.	Lythraceae	P
Embauva (fruto branco)	Cecropia pachystachya Trec.	Cecropiaceae	P
Embauva (fruto preto)	Cecropia hololeuca Miq.	Cecropiaceae	P
Embira-de-sapo	Lonchocarpus guilleminianus (Tul.) Malme	Fabaceae	P
Esfregadinha	Eugenia sp	Myrtaceae	NP
Espeteiro	Casearia gossypiosperma Briquet.	Flacourtiaceae	NP
Farinha seca	Albizia hasslerii (Chodat.) Burr.	Mimosaceae	P
Feijão Cru	Lonchocarpus muehlbergianus Hassl.	Fabaceae	P
Goiaba vermelha	Psidium guajava L.	Myrtaceae	P
Guabiroba-de-árvore	Campomanesia xanthocarpa Berg.	Myrtaceae	NP
Guaiuvira	Patagonula americana L.	Boraginaceae	P
Guanandi	Calophyllum brasiliensis Camb.	Guttiferae	NP
Guapuruvú	Schizolobium parahyba (Vell.) Blake	Caesalpiniaceae	P
Guarantã	Esenbeckia leiocarpa Engl.	Rutaceae	NP
Guarita	Astronium graveolens Jacq.	Anacardiaceae	NP
Guarucaia	Paraptadenia rigida (Benth.) Brenan	Mimosaceae	P
Guatambu-de-sapo	Chrysophyllum gonocarpum (Mart. & Eichl.) Engl.	Sapotaceae	NP
Gueirova	Syagrus oleracea (Mart.) Becc.	Palmae	NP
Ingá	Inga uruguensis Hooker at Arnott.	Mimosaceae	P
Ingá	Ingá laurina (Sw.) Willd.	Mimosaceae	NP
Ipê amarelo	Tabebuia chrysotricha (Mart. ex. DC.) Standl.	Bignoniaceae	NP
Ipê amarelo da	Tabebuia vellosoi Tol.	Bignoniaceae	NP

mata			
Ipê amarelo-grande	Tabebuia ochracea (Cham.) Standl.	Bignoniaceae	NP
Ipê branco	Tabebuia roseo-alba (Ridl.) Sand.	Bignoniaceae	NP
Ipê branco do brejo	Tabebuia dura (Bur. & K. Schum.) Spreng.&Standl.	Bignoniaceae	NP
Ipê felpudo	Zeyheria tuberculosa (Vell.) Bur.	Bignoniaceae	P
Ipê rosa	Tabebuia impetiginosa (Mart.) Standl.	Bignoniaceae	NP
Ipê roxo	Tabebuia heptaphylla (Vell.) Tol.	Bignoniaceae	NP
Ipê roxo-comum	Tabebuia avellanedae Lor. ex. Griseb.	Bignoniaceae	NP
Jaboticaba sabara	Myrciaria trunciflora Berg.	Myrtaceae	NP
Jacarandá-da-bahia	Dalbergia nigra (Vell.) Fr. All. Ex. Benth.	Fabaceae	NP
Jacarandá-do-campo	Platypodium elegans Vog.	Fabaceae	P
Jacarandá mimoso	Jacaranda cuspidifolia Mart.	Bignoniaceae	P
Jaracatiá	Jacaratia spinosa (Aubl.) A. DC.	Caricaceae	NP
Jatobá	Hymenaea stilbocarpa Hayne/ H. courbaril L.	Caesalpiniaceae	NP
Jatobá-do-cerrado	Hymenaea stigonocarpa Mart. ex. Hayne	Caesalpiniaceae	NP
Jenipapo	Genipa americana L.	Rubiaceae	NP
Jequitibá branco	Cariniana estrellensis (Raddi.) Kuntze.	Lecythidaceae	NP
Jequitibá vermelho	Cariniana legalis (Mart.) Kuntze.	Lecythidaceae	NP
Jerivá	Syagrus romanzoffiana (Cham.) Glassm.	Palmae	P
Leiteiro	Peschiero fuchsiaefolia Miers.	Apocynaceae	P
Louro pardo	Cordia trichotoma (Vell.) Arrab. ex. Steud.	Boraginaceae	NP
Macaúba	Acrocomia aculeata (Jacq.) Lodd.	Palmae	NP
Mamica-de-porca (f. miúda)	Zanthoxylum rhoifolium Lam.	Rutaceae	P
Mamica-de-porca (f. larga)	Zanthoxylum riedelianum Engl.	Rutaceae	P
Mandioqueiro	Didymopanax morototonii (Aubl.) Dcne et. Planch.	Araliaceae	NP
Manduirana/Fedegoso	Sena macranthera (Collad.) Irwin et Barn	Caesalpiniaceae	P
Maria pobre	Dilodendron bipinnatum Radlk.	Sapindaceae	NP
Marinheiro	Guarea guidonia (L.) Sleumer.	Meliaceae	P
Marmelinho	Diospyros inconstans Jacquin	Ebenaceae	NP
Monjoleiro	Acacia polyphylla DC.	Mimosaceae	P
Mulungu	Erythrina mulungu Mart.	Fabaceae	P
Mulungu do brejo	Erythrina crista-galli L.	Fabaceae	P
Mutambo	Guazuma ulmifolia Lam.	Sterculiaceae	P
Olho-de-cabra	Ormosia arbórea (Vell.) Harms.	Fabaceae	NP

Óleo-de-copaiba	Copaifera langsdorffii Desf.	Caesalpiniaceae	NP
Osso-de-burro	Helietta apiculata Benth.	Rutaceae	P
Paineira	Chorisia speciosa St. Hil.	Bombacaceae	P
Paineira branca	Ceiba pentandra (L.) Gaertn	Bombacaceae	NP
Pau Brasil	Caesalpinia echinata Lam.	Caesalpiniaceae	NP
Pau-cigarra	Senna multijuga (Rich.) Irwin et Barn.	Caesalpiniaceae	P
Pau d'alho	Gallesia integrifolia (Spreng.) Harms.	Phytolaccaceae	P
Pau-de-cardoso	Pouteria ramiflora (Mart.) Radlk.	Sapotaceae	NP
Pau formiga rosa	Triplaris brasiliana C\ham.	Polygonaceae	NP
Pau jacaré	Piptadenia gonoacantha (Mart.) Macbr.	Mimosaceae	P
Pau marfim	Balfourodendron riedelianum (Engl.) Engl.	Rutaceae	NP
Pau rei	Pterigota brasiliensis Fr. All.	Sterculiaceae	NP
Pau viola	Cytharexyllum myrianthum Cham.	Verbenaceae	P
Peito-de-pomba	Tapirira guianensis Aubl.	Anacardiaceae	P
Peroba poca	Aspidosperma cylindrocarpon M. Arg.	Apocynaceae	NP
Peroba rosa	Aspidosperma polyneuron M. Arg.	Apocynaceae	NP
Pindaíba	Duguetia lanceolata St. Hil.	Annonaceae	NP
Piqui	Caryocar brasiliense Camb.	Caryocaraceae	NP
Pitanga	Eugenia uniflora L.	Myrtaceae	NP
Pororoca ou Capororoca	Rapanea guianensis Aubl.	Myrsinaceae	P
Quaresmeira roxa	Tibouchina granulosa Cogn.	Melastomaceae	NP
Saguaragi	Colubrina glandulosa Perk.	Rhamnaceae	NP
Saguaragi	Colubrina elaeocarpus Reiss.	Rhamnaceae	P
Sangra d'água	Croton urucurana Baill.	Euphorbiaceae	P
Simaruba	Simarouba versicolor St. Hil.	Simaroubaceae	NP
Taiuva	Maclura tinctoria (L.) D. Don. ex. Steud.	Moraceae	NP
Tamboril	Enterolobium contortisiliquum (Vell.) Morong.	Mimosaceae	P
Tarumã	Vitex montevidensis Cham.	Verbenaceae	NP
Unha de vaca do campo	Bauhinia longifólia (Bong.) Steud.	Caesalpiniaceae	NP
Uvaia	Eugenia pyriformis Camb.	Myrtaceae	NP
Vinhatico/ Candinha	Plathymenia reticulata Benth.	Mimosaceae	NP

Annex 9

Document from Environment Secretariat of Sao Paulo State Government
Landscape Restoration Office

SECRETARIA DE ESTADO DO MEIO AMBIENTE
DEPARTAMENTO DE PROJETOS DA PAISAGEM

O Inventário Florestal da Vegetação Natural do Estado de São Paulo[1] elaborado a partir de fotointerpretação, mapeamento e quantificação das diferentes fitofisionomias vegetacionais remanescentes baseados na utilização de imagens orbitais recentes dos satélites LANDSAT 5 e 7 (período 2000-2001) e fotografias aéreas coloridas digitais, decorrentes de vôo efetuado em 2000-2001, na escala 1:35.000, da Região da Mata Atlântica Litorânea, indicam a existência de 3.457.301 hectares de remanescentes, abrangendo todas as diferentes fitofisionomias, que correspondem a 13,94% da superfície do Estado de São Paulo. Os mapas produzidos no mencionado levantamento, cuja base digital foi estruturada em ambiente de SIG (Sistema de Informações Geográficas), permitem leituras e quantificações sob diferentes níveis e abrangências: Unidades de Gerenciamento de Recursos Hídricos, Regiões Administrativas e Municípios, o que possibilita análises regionais.

A área total recoberta por remanescentes de vegetação nativa constatada no último inventário é superior àquela detectada no levantamento anterior (período 1990-1992), que foi de 3.330.744 hectares. O acréscimo verificado no período foi de 126.557 hectares ou 3,8% da área recoberta por vegetação. Os dados obtidos demonstram ter havido a estabilização na tendência histórica de desmatamento no Estado. Ocorre, no entanto, que os acréscimos nas áreas vegetadas se deram em regiões que já apresentavam índices mais elevados no levantamento anterior, destacando-se a região do litoral, que apresentou acréscimo de 130.295 hectares. Tal acréscimo pode ser creditado a processos de regeneração natural da vegetação que foram possibilitados pela intensificação da fiscalização e consequente remoção dos fatores de degradação. Por outro lado, em regiões onde os índices de cobertura já eram baixos houve a redução nas áreas de vegetação nativa. Nesta última situação encontram-se as regiões localizadas no centro, norte e oeste do Estado de São Paulo, cortadas pelo Rio Tietê, incluindo as Regiões Administrativas de Araçatuba, São José do Rio Preto e Bauru onde estão situadas áreas abrangidas pelos reservatórios da AES Tietê.

O fato de não ter sido verificado aumento nos índices de cobertura de vegetação nativa nas regiões mais desflorestadas é coerente com as dificuldades esperadas para o desenvolvimento de processos de regeneração natural em áreas historicamente ocupadas por atividades agrícolas e de pecuária. Em ecossistemas severamente degradados tanto a colonização por espécies arbóreas quanto a sucessão secundária são dificultadas ou impedidas devido a limitações do espaço físico e/ou biótico que, segundo ENGEL & PARROTTA[2], incluem um ou mais dos seguintes fatores: *a) ausência ou baixa disponibilidade de propágulos*, pela destruição do banco de sementes e ausência de fontes de propágulos na vizinhança, ausência de dispersores e dificuldade da semente para estabelecer contato com o solo pela alta biomassa de gramíneas; *b) falhas no recrutamento de plântulas e jovens,* pelo aumento de predação de sementes e herbivoria de plântulas em áreas abertas, ausência de ambiente propício ao desenvolvimento de mudas e competição com gramíneas; *c) fatores adicionais de estresse,* como fogo, pastoreio e super exploração de áreas em

[1] Inventário Florestal da Vegetação Natural do Estado de São Paulo Secretaria do Meio Ambiente / Instituto Florestal, São Paulo, 2003.
[2] ENGEL, V. L. & PARROTTA, J. A. Definindo a Restauração Ecológica: Tendências e Perspectivas Mundiais, publicado em Restauração Ecológica de Ecossistemas Naturais, organizado por Paulo Y. Kageyama et al, Botucatu, FEPAF, 2003.

SECRETARIA DE ESTADO DO MEIO AMBIENTE
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regeneração; *d) falhas no estabelecimento de interações essenciais para a manutenção da integridade,* pela ausência de simbiontes, polinizadores e dispersores.

A avaliação geral das áreas ciliares nas regiões que apresentaram decréscimo de vegetação mostra que os mencionados fatores impeditivos da regeneração natural estão presentes. Adicionalmente verifica-se que a matriz regional onde estas zonas ciliares se inserem é constituída por áreas fortemente alteradas ou degradadas, o que agrava este quadro. Assim, verifica-se que as condições são muito desfavoráveis para que a restauração de matas ciliares nestas regiões ocorra devido a processos de regeneração natural.

Diante do exposto, é possível afirmar que não tem havido a recuperação de matas ciliares em níveis expressivos nas regiões do Estado de São Paulo onde foram verificadas reduções nos índices de vegetação nativa.

Em anexo seguem tabelas extraídas do Inventário Florestal da Vegetação Natural do Estado de São Paulo publicado pela Secretaria do Meio Ambiente/Instituto Florestal em 2005.

São Paulo, 31 de outubro de 2006.

Helena Carrascosa von Glehn
Diretora do DPP
Coordenadora do Projeto de Recuperação de Matas Ciliares

PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 04

Annex 10

STAKEHOLDER LIST

Federal/State Entities
Instituto Estadual de Florestas - IEF (MG);Fundação Estadual do Meio Ambiente - FEAM (MG);Companhia de Tecnologia de Saneamento Ambiental - CETESB (SP);Departamento Estadual de Proteção dos Recursos Naturais - DEPRN (SP);Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis - IBAMA;Fórum Brasileiro de ONGs e Movimentos Socias para o Meio Ambiente e Desenvolvimento;Ministério Público do Estado de São Paulo;Ministério Público do Estado de Minas Gerais;Ministério Público Federal;Secretaria do Meio Ambiente do Estado de São Paulo;Secretaria de Estado de Meio Ambiente e Desenvolvimento Sustentável;Ministério do Meio Ambiente;Assembléia Legislativa do Estado de São Paulo;Assembléia Legislativa do Estado de Minas Gerais;Assembléia Legislativa Federal, Governo do Estado de São Paulo, Governo do Estado de Minas Gerais
Municipalities/NGOs
ADOLFO - SP - Prefeitura Municipal de Adolfo; Câmara Municipal de Adolfo; Casa de Agricultura de Adolfo; Associação Comercial e Industrial de Adolfo.
AGUAÍ - SP - Prefeitura Municipal de Aguaí; Câmara Municipal de Aguaí; Secretaria Municipal de Obras de Aguaí; Associação Comercial e Industrial de Aguaí.
ANHEMBI - SP - Prefeitura Municipal de Anhembi; Câmara Municipal de Anhembi; Secretaria Municipal de Meio Ambiente de Anhembi.
ARARAS - SP - Prefeitura Municipal de Araras; Câmara Municipal de Araras; Departamento de Meio Ambiente de Araras; APPA - Associação de proteção e preservação ambiental de Araras.
ARCEBURGO - MG - Prefeitura Municipal de Arceburgo; Câmara Municipal de Arceburgo; Secretaria Municipal de Meio Ambiente de Arceburgo; Associação Comercial e Industrial de Arceburgo.
AREALVA - SP - Prefeitura Municipal de Arealva;Câmara Municipal de Arealva;Secretaria Municipal de Agricultura e Meio Ambiente de Arealva
BARIRI - SP - Prefeitura Municipal de Bariri;Câmara Municipal de Bariri;Departamento Municipal de Meio Ambiente de Bariri;Associação Comercial e Industrial de Bariri
BARRA BONITA - SP - Prefeitura Municipal de Barra Bonita; Câmara Municipal de Barra Bonita; Secretaria Municipal de Meio Ambiente de Barra Bonita; Movimento de Amparo Ecológioco - MAE Natureza.
BIRIGÜI - SP - Prefeitura Municipal de Birigui; Câmara Municipal de Birigui; Secretaria Municipal de Obras de Birigui; Associação do Grupamento Ambientalista de Birigüi.
BORACÉIA - SP - Prefeitura Municipal de Boracéia;Câmara Municipal de Boracéia; Secretaria Municipal de Meio Ambiente de Boracéia
BORBOREMA - SP - Prefeitura Municipal de Borborema; Câmara Municipal de Borborema; Secretaria Municipal de Meio Ambiente de Borborema; Associação Comercial e Industrial de Borborema.
BOTELHOS - MG - Prefeitura Municipal de Botelhos; Câmara Municipal de Botelhos; Secretaria Municipal de Meio Ambiente de Botelhos; Adesbot - Agência de Desenvolvimento Sócio-Econômico de Botelhos.
BOTUCATU - SP - Prefeitura Municipal de Botucatu; Câmara Municipal de Botucatu; Secretaria Municipal de Meio Ambiente de Botucatu; SOS Cuesta de Botucatu - Movimento em Defesa do Meio Ambiente.
BREJO ALEGRE - SP - Prefeitura Municipal de Brejo Alegre; Câmara Municipal de Brejo Alegre; Secretaria Municipal de Obras de Brejo Alegre.
BURITAMA - SP - Prefeitura Municipal de Buritama; Câmara Municipal de Buritama; Secretaria Municipal de Obras de Buritama; Associação Comercial e Industrial de Buritama.
CABO VERDE - MG - Prefeitura Municipal de Cabo Verde; Câmara Municipal de Cabo Verde; Secretaria Municipal de Meio Ambiente de Cabo Verde; Associação Comercial Industrial de Cabo Verde.
CACONDE - SP - Prefeitura Municipal de Caconde; Câmara Municipal de Caconde; Secretaria Municipal de Meio Ambiente de Caconde; Associação Comercial Empresarial de Caconde.
CAFELÂNDIA - SP - Prefeitura Municipal de Cafelândia, Câmara Municipal de Cafelândia, Casa da Agricultura de Cafelândia.
CAMPINA VERDE - MG - Prefeitura Municipal de Campina Verde; Câmara Municipal de Campina Verde; Secretaria Municipal de Meio Ambiente de Campina Verde.

CARDOSO - SP - Prefeitura Municipal de Cardoso; Câmara Municipal de Cardoso; Assessoria da Agricultura e Meio Ambiente de Cardoso; Associação Comercial de Cardoso.
CASA BRANCA - SP - Prefeitura Municipal de Casa Branca; Câmara Municipal de Casa Branca; Departamento Municipal de Agricultura e Meio Ambiente de Casa Branca; Associação Comercial e Industrial de Casa Branca.
CÁSSIA DOS COQUEIROS - SP - Prefeitura Municipal de Cássia dos Coqueiros; Câmara Municipal de Cássia dos Coqueiros; Secretaria Municipal de Meio Ambiente de Cássia dos Coqueiros; Associação Comercial e Industrial de Cássia dos Coqueiros.
CONCHAL - SP - Prefeitura Municipal de Conchal; Câmara Municipal de Conchal; Departamento de Agricultura, Abastecimento e Meio Ambiente.
CONCHAS - SP - Prefeitura Municipal de Conchas; Câmara Municipal de Conchas; Secretaria Municipal de Meio Ambiente de Conchas.
DIVINOLÂNDIA - SP - Prefeitura Municipal de Divinolândia; Câmara Municipal de Divinolândia; Secretaria Municipal de Meio Ambiente de Divinolândia; Associação Comercial e Industrial de Divinolândia.
DOIS CÓRREGOS - SP - Prefeitura Municipal de Dois Córregos; Câmara Municipal de Dois Córregos; Setor de Meio Ambiente de Dois Córregos.
ESPÍRITO SANTO DO PINHAL - SP - Prefeitura Municipal de Espirito Santo do Pinhal; Câmara Municipal de Espirito Santo do Pinhal; Departamento de Agricultura e Meio Ambiente Espirito Santo do Pinhal; Associação Comercial e Industrial de Espírito Santo do Pinhal.
ESTIVA GERBI - SP - Prefeitura Municipal de Estiva Gerbi; Câmara Municipal de Estiva Gerbi; Secretaria Municipal de Meio Ambiente de Estiva Gerbi.
FRONTEIRA - MG - Prefeitura Municipal de Fronteira; Câmara Municipal de Fronteira; Secretaria Municipal de Meio Ambiente de Fronteira.
FRUTAL - MG - Prefeitura Municipal de Frutal; Câmara Municipal de Frutal; Secretaria Municipal de Meio Ambiente de Frutal.
GUAIÇARA - SP - Prefeitura Municipal de Guaiçara, Câmara Municipal de Guaiçara, Secretaria Municipal de Meio Ambiente de Guaiçara.
GUARANÉSIA - MG - Prefeitura Municipal de Guaranésia; Câmara Municipal de Guaranésia; Secretaria Municipal de Meio Ambiente de Guaranésia; Associação Comercial e Industrial de Guaranésia.
IACANGA - SP - Prefeitura Municipal de Iacanga;Câmara Municipal de Iacanga; Diretoria Municipal de Agricultura e Meio Ambiente de Iacanga.
IBITINGA - SP - Prefeitura Municipal de Ibitinga;Câmara Municipal de Ibitinga;Secretaria Municipal de Agricultura e Meio Ambiente de Ibitinga;Sindicato Rural de Ibitinga
ICEM - SP - Prefeitura Municipal de Icem; Câmara Municipal de Icem; Diretora Municipal de Cultura, Eventos, Turismo e Meio Ambiente; Associação Comercial de Icém.
IGARAÇU DO TIETÊ - SP - Prefeitura Municipal de Igaraçu do Tietê; Câmara Municipal de Igaraçu do Tietê; Depto. De Meio Ambiente de Igaraçu do Tietê; Associação Comercial de Barra Bonita e Igaraçu do Tietê.
INDIAPORÃ - SP - Prefeitura Municipal de Indiaporã; Câmara Municipal de Indiaporã; Diretoria Municipal de Agricultura de Indiaporã; Associação Comercial de Indiaporã.
IRAPUÃ - SP - Prefeitura Municipal de Irapuã; Câmara Municipal de Irapuã; Setor de Engenharia da Prefeitura Municipal de Irapuã.
ITAJU - SP - Prefeitura Municipal de Itaju;Câmara Municipal de Itaju;Secretaria Municipal de Meio Ambiente de Itaju
ITAPAGIPE - MG - Prefeitura Municipal de Itapagipe; Câmara Municipal de Itapagipe; Secretaria Municipal de Meio Ambiente de Itapagipe.
ITAPIRA - SP - Prefeitura Municipal de Itapira; Câmara Municipal de Itapira; Secretaria Municipal de Meio Ambiente de Itapira; Itapira Associação Comercial e Industrial.
ITAPUÍ - SP - Prefeitura Municipal de Itapuí; Câmara Municipal de Itapuí; Secretaria Municipal de Meio Ambiente de Itapuí; Câmara Dirigentes Lojistas de Itapuí.
ITOBI - SP - Prefeitura Municipal de Itobi; Câmara Municipal de Itobi; Departamento Municipal de Agricultura e Meio Ambiente de Itobi; Associação Comercial e Industrial de Itobi.
ITURAMA - MG - Prefeitura Municipal de Iturama; Câmara Municipal de Iturama; Secretaria Municipal de Meio Ambiente de Iturama.

JAÚ - SP - Prefeitura Municipal de Jaú; Câmara Municipal de Jaú; Secretaria Municipal de Meio Ambiente de Jaú; Associação Comercial e Industrial de Jaú.
JOSÉ BONIFÁCIO - SP - Prefeitura Municipal de José Bonifácio; Câmara Municipal de José Bonifácio; Secretaria Municipal de Meio Ambiente de José Bonifácio; Biodiversitê - Organização de proteção ao meio ambiente do Baixo Tietê.
LARANJAL PAULISTA - SP - Prefeitura Municipal de Laranjal Paulista; Câmara Municipal de Laranjal Paulista; Secretaria de Agricultura, Abastecimento e Meio Ambiente; Associação Comercial e Industrial de Laranjal Paulista.
LEME - SP - Prefeitura Municipal de Leme; Câmara Municipal de Leme; Secretaria Municipal de Meio Ambiente de Leme.
LINS - SP - Prefeitura Municipal de Lins, Câmara Municipal de Lins, Secretaria Municipal de Desenvolvimento Sustentado, SOS Rio Dourado.
LOURDES - SP - Prefeitura Municipal de Lourdes; Câmara Municipal de Lourdes; Secretaria Municipal de Obras de Lourdes.
MACATUBA - SP - Prefeitura Municipal de Macatuba; Câmara Municipal de Macatuba; Secretaria Municipal de Meio Ambiente de Macatuba; Associação Comercial e Empresarial de Macatuba.
MACEDÔNIA - SP - Prefeitura Municipal de Macedônia; Câmara Municipal de Macedônia; Secretaria Municipal de Obras de Macedônia.
MENDONÇA - SP - Prefeitura Municipal de Mendonça; Câmara Municipal de Mendonça; Secretaria Municipal de Agricultura de Mendonça.
MINEIROS DO TIETÊ - SP - Prefeitura Municipal de Mineiros do Tietê; Câmara Municipal de Mineiros do Tietê; Departamento de Meio Ambiente de Mineiros do Tietê; Associação Comercial e Industrial de Mineiros do Tietê.
MIRA ESTRELA - SP - Prefeitura Municipal de Mira Estrela; Câmara Municipal de Mira Estrela; Secretaria Municipal de Meio Ambiente de Mira Estrela.
MOCOCA - SP - Prefeitura Municipal de Mococa; Câmara Municipal de Mococa; Departamento Municipal de Agricultura e Meio Ambiente de Mococa; Associação Comercial e Industrial de Mococa.
MOGI MIRIM - SP - Prefeitura Municipal de Mogi Mirim; Câmara Municipal de Mogi Mirim; Secretaria Municipal de Meio Ambiente de Mogi Mirim; Associação Comercial e Industrial de Mogi Mirim.
MOGI-GUAÇU - SP - Prefeitura Municipal de Mogi-Guaçu; Câmara Municipal de Mogi-Guaçu; Secretaria Municipal de Meio Ambiente de Mogi-Guaçu; ACIMG - Associação Comercial e Industrial de Mogi-Guaçu.
MONTE SANTO DE MINAS - MG - Prefeitura Municipal de Monte Santo de Minas; Câmara Municipal de Monte Santo de Minas; Secretaria Municipal de Meio Ambiente de Monte Santo de Minas; Associação Comercial e Industrial de Monte Santo de Minas.
MUZAMBINHO - MG - Prefeitura Municipal de Muzambinho; Câmara Municipal de Muzambinho; Secretaria Municipal de Meio Ambiente de Muzambinho; Associação Comercial e Industrial de Muzambinho.
NOVA ALIANÇA - SP - Prefeitura Municipal de Nova Aliança; Câmara Municipal de Nova Aliança; Departamento de Engenharia da Prefeitura de Nova Aliança.
NOVO HORIZONTE - SP - Prefeitura Municipal de Novo Horizonte; Câmara Municipal de Novo Horizonte; Diretoria de Agricultura e Meio Ambiente de Novo Horizonte; Associação Comercial e Industrial de Novo Horizonte.
ORINDIÚVA - SP - Prefeitura Municipal de Orindiúva; Câmara Municipal de Orindiúva; Secretaria Municipal de Obras de Orindiúva; Associação dos Fornecedores de Cana da Região de Orindiuva.
OUROESTE - SP - Prefeitura Municipal de Ouroeste; Câmara Municipal de Ouroeste; Secretaria Municipal de Meio Ambiente de Ouroeste.
PAULO DE FARIA - SP - Prefeitura Municipal de Paulo de Faria; Câmara Municipal de Paulo de Faria; Secretaria Municipal de Meio Ambiente de Paulo de Faria.
PEDERNEIRAS - SP - Prefeitura Municipal de Pederneiras; Câmara Municipal de Pederneiras;Departamento de Desenvolvimento Urbano e Meio Ambiente de Pederneiras;Associação Comercial e Industrial de Pederneiras
PEDRANÓPOLIS - SP - Prefeitura Municipal de Pedranópolis; Câmara Municipal de Pedranópolis; Secretaria Municipal de Meio Ambiente de Pedranópolis.
PIRACICABA - SP - Prefeitura Municipal de Piracicaba; Câmara Municipal de Piracicaba; Secretaria de Defesa do Meio Ambiente de Piracicaba;Associação Comercial e Industrial de Piracicaba.

PIRAJUÍ - SP - Prefeitura Municipal de Pirajuí; Câmara Municipal de Pirajuí; Secretaria Municipal de Agricultura de Pirajuí.
PIRASSUNUNGA - SP - Prefeitura Municipal de Pirassununga; Câmara Municipal de Pirassununga; Secretaria Municipal de Meio Ambiente de Pirassununga; Associação Comercial e Industrial de Pirassununga.
POÇOS DE CALDAS - MG - Prefeitura Municipal de Poços de Caldas; Câmara Municipal de Poços de Caldas; Secretaria Municipal de Planejamento e Coordenação de Poços de Caldas - Departamento de Preservação Ambiental; Associação Comercial e Industrial de Poços de Caldas.
PONGAÍ - SP - Prefeitura Municipal de Pongaí; Câmara Municipal de Pongaí; Casa de Agricultura de Pongaí.
PONTES GESTAL - SP - Prefeitura Municipal de Pontes Gestal; Câmara Municipal de Pontes Gestal; Secretaria Municipal de Meio Ambiente de Pontes Gestal.
POTIRENDABA - SP - Prefeitura Municipal de Potirendaba; Câmara Municipal de Potirendaba; Coordenadoria Municipal de Agricultura de Potirendaba.
PROMISSÃO - SP - Prefeitura Municipal de Promissão; Câmara Municipal de Promissão; Secretaria Municipal do Meio Ambiente de Promissão; ACEP - Associação Comercial e Empresarial de Promissão .
REGINÓPOLIS - SP - Prefeitura Municipal de Reginópolis, Câmara Municipal de Reginópolis, Secretaria Municipal de Meio Ambiente de Reginópolis.
RIOLÂNDIA - SP - Prefeitura Municipal de Riolândia; Câmara Municipal de Riolândia; Secretaria Municipal de Meio Ambiente de Riolândia.
SABINO - SP - Prefeitura Municipal de Sabino, Câmara Municipal de Sabino, Casa da Agricultura de Sabino.
SALES - SP - Prefeitura Municipal de Sales; Câmara Municipal de Sales; Setor de Obras e Agricultura de Sales.
SANTA MARIA DA SERRA - SP - Prefeitura Municipal de Santa Maria da Serra; Câmara Municipal de Santa Maria da Serra; Secretaria Municipal de Meio Ambiente de Santa Maria da Serra.
SANTO ANTÔNIO DO ARACANGÁ - SP - Prefeitura Municipal de Santo Antonio do Aracanguá; Câmara Municipal de Santo Antonio do Aracanguá; Secretaria Municipal de Obras de Santo Antonio do Aracanguá.
SÃO FRANCISCO DE SALES - MG - Prefeitura Municipal de São Francisco de Sales; Câmara Municipal de São Francisco de Sales; Secretaria Municipal de Meio Ambiente de São Francisco de Sales.
SÃO JOSÉ DO RIO PARDO - SP - Prefeitura Municipal de São José do Rio Pardo; Câmara Municipal de São José do Rio Pardo; Secretaria Municipal de Meio Ambiente de São José do Rio Pardo; Associação Comercial Industrial de São José do Rio Pardo.
SÃO MANUEL - SP - Prefeitura Municipal de São Manuel; Câmara Municipal de São Manuel; Diretoria de Agricultura e Meio Ambiente de São Manuel; Associação Comercial e Industrial de São Manuel.
SÃO PEDRO - SP - Prefeitura Municipal de São Pedro; Câmara Municipal de São Pedro; Secretaria Municipal de Meio Ambiente de São Pedro; ACISP - Associação Comercial e Industrial de São Pedro.
SÃO SEBASTIÃO DA GRAMA - SP - Prefeitura Municipal de São Sebastião da Grama; Câmara Municipal de São Sebastião da Grama; Secretaria Municipal de Meio Ambiente de São Sebastião da Grama; Associação Comercial e Industrial de São Sebastião da Gama.
TAMBAÚ - SP - Prefeitura Municipal de Tambaú; Câmara Municipal de Tambaú; Secretaria Municipal de Meio Ambiente de Tambaú; Associação Comercial e Industrial de Tambaú.
TAPIRATIBA - SP - Prefeitura Municipal de Tapiratiba; Câmara Municipal de Tapiratiba; Secretaria Municipal de Meio Ambiente de Tapiratiba; Associação Comercial e Industrial de Tapiratiba.
TURIÚBA - SP - Prefeitura Municipal de Turiúba; Câmara Municipal de Turiúba; Secretaria Municipal de Saúde de Turiúba.
UBARANA - SP - Prefeitura Municipal de Ubarana; Câmara Municipal de Ubarana; Casa de Agricultura de Ubarana; Associação e Centro de Pesquisas Ecológicas de Ubarana.
URU - SP - Prefeitura Municipal de Uru, Câmara Municipal de Uru, Casa da Agricultura de Uru.

URUPÊS - SP - Prefeitura Municipal de Urupês; Câmara Municipal de Urupês; Casa da Lavoura de Urupês; ACIUR - Associação Comercial e Industrial.
ZACARIAS - SP - Prefeitura Municipal de Zacarias; Câmara Municipal de Zacarias; Secretaria Municipal de Meio Ambiente de Zacarias.

Annex 11

GEOGRAPHICAL IDENTIFICATION OF DISCRETE AREAS

An example for the unique geographical identification of discrete areas included in the project activity at one of the reservoirs – Limoeiro – is included below. Data related to the additional discrete areas is available to the validation team.

Code	X	Y	Perimeter	Area	Hectares
lime_01	291905,1266	7607213,401	813,437	2314,629	0,231
lime_02	292048,6415	7607318,487	14,107	9,024	0,001
lime_03	291462,9281	7607331,619	900,980	3803,153	0,380
lime_04	292064,9296	7607409,968	200,476	769,881	0,077
lime_05	292070,1638	7607502,374	11,965	5,612	0,001
lime_06	292089,082	7607550,281	26,659	10,297	0,001
lime_07	292064,5327	7607615,056	6,437	1,514	0,000
lime_08	292105,7777	7607684,038	141,796	64,943	0,006
lime_09	292356,8878	7607827,119	965,431	1515,400	0,152
lime_10	292633,0615	7607910,409	134,115	206,034	0,021
lime_11	292801,5684	7607913,531	699,601	1013,708	0,101
lime_12	291447,5155	7607951,567	2552,488	14322,192	1,432
lime_13	292819,8924	7607998,085	13,306	1,321	0,000
lime_14	293028,1886	7608161,788	817,600	2876,514	0,288
lime_15	293048,9133	7608282,138	5,436	1,187	0,000
lime_16	293023,0464	7608336,863	153,143	452,448	0,045
lime_17	293006,2722	7608343,295	9,389	2,579	0,000
lime_18	293014,2494	7608379,941	11,137	5,058	0,001
lime_19	292039,2139	7608406,554	978,750	4550,699	0,455
lime_20	293023,7922	7608414,961	86,492	115,055	0,012
lime_21	292934,6919	7608418,068	18,056	3,024	0,000
lime_22	294035,9841	7608437,151	1742,862	6456,682	0,646
lime_23	292889,7826	7608455,056	194,582	782,127	0,078
lime_24	292862,694	7608471,491	24,465	6,397	0,001
lime_25	293372,5302	7608517,062	200,730	584,371	0,058
lime_26	292812,0362	7608585,158	23,493	18,189	0,002
lime_27	291859,9492	7608705,313	162,895	608,076	0,061
lime_28	292788,5965	7608722,283	95,500	121,499	0,012
lime_29	291775,5379	7608741,699	223,989	813,585	0,081
lime_30	292815,372	7608784,222	18,209	5,277	0,001
lime_31	293555,0836	7608858,304	716,189	4381,195	0,438
lime_32	292212,9442	7608972,2	145,899	740,939	0,074
lime_33	292866,0482	7609015,13	17,359	5,540	0,001
lime_34	291954,0942	7609047,704	433,721	2076,309	0,208
lime_35	293007,3167	7609056,896	262,502	841,074	0,084
lime_36	292245,125	7609089,95	155,908	558,386	0,056
lime_37	293049,9923	7609117,741	9,751	1,627	0,000
lime_38	293108,0896	7609155,119	195,147	610,100	0,061
lime_39	293171,0424	7609210,229	19,968	14,544	0,001
lime_40	293712,2425	7609229,473	764,997	4207,748	0,421

Code	X	Y	Perimeter	Area	Hectares
lime_41	292316,5931	7609264,953	171,191	609,385	0,061
lime_42	292578,5024	7609290,963	148,169	580,824	0,058
lime_43	293269,2131	7609291,417	19,751	3,459	0,000
lime_44	293769,3618	7609301,85	6,426	1,358	0,000
lime_45	293739,0084	7609306,206	18,096	3,327	0,000
lime_46	293315,3131	7609312,475	137,591	386,712	0,039
lime_47	292886,3188	7609322,336	13,814	2,839	0,000
lime_48	292892,0776	7609337,398	120,362	267,004	0,027
lime_49	293888,5934	7609351,795	274,048	769,310	0,077
lime_50	293690,4045	7609365,294	91,199	180,448	0,018
lime_51	293403,2045	7609394,334	273,130	1410,893	0,141
lime_52	292941,9359	7609409,054	218,174	1407,458	0,141
lime_53	292556,5306	7609420,102	321,651	1613,847	0,161
lime_54	293592,371	7609453,297	34,427	42,270	0,004
lime_55	293035,0037	7609483,52	127,472	637,255	0,064
lime_56	293560,2628	7609483,769	20,952	17,999	0,002
lime_57	292526,1085	7609565,651	172,724	1109,469	0,111
lime_58	293215,4848	7609590,118	106,812	414,092	0,041
lime_59	292450,6478	7609609,058	156,572	578,492	0,058
lime_60	293560,7097	7609658,248	29,270	32,317	0,003
lime_61	292705,0798	7609701,122	8,581	1,063	0,000
lime_62	293576,4455	7609734,951	107,363	619,217	0,062
lime_63	292724,5633	7609749,133	150,262	140,462	0,014
lime_64	292492,6198	7609774,946	492,848	2887,449	0,289
lime_65	292695,2964	7609794,023	7,680	1,183	0,000
lime_66	292733,8466	7609872,254	40,689	10,138	0,001
lime_67	292794,7292	7609893,945	66,358	31,595	0,003
lime_68	292822,3925	7609917,641	17,965	5,605	0,001
lime_69	292577,4733	7609954,105	514,034	4373,906	0,437
lime_70	292878,8286	7610014,996	84,081	165,779	0,017
lime_71	292919,7327	7610057,338	18,575	4,101	0,000
lime_72	292764,7677	7610062,109	402,825	3328,017	0,333
lime_73	292691,6359	7610207,139	148,449	767,386	0,077
TOTAL			**18490,511**	**77282,591**	**7,728**

Annex 12

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PROJECT DESIGN DOCUMENT FORM
FOR AFFORESTATION AND REFORESTATION PROJECT ACTIVITIES (CDM-AR-PDD) - Version 04

History of the document

Version	Date	Nature of revision
04	EB35, Annex 20 19 October 2007	• Restructuring of section A; • Section "Monitoring of forest establishment and management" replaces sections: "Monitoring of the project boundary", and "Monitoring of forest management"; • Introduced a new section allowing for explicit description of SOPs and quality control/quality assurance (QA/QC) procedures if required by the selected approved methodology; • Change in design of the section "Monitoring of the baseline net GHG removals by sinks" allowing for more efficient presentation of data.
03	EB26, Annex 19 29 September 2006	Revisions in different sections to reflect equivalent forms used by the Meth Panel and assist in making more transparent the selection of an approved methodology for a proposed A/R CDM project activity.
02	EB23, Annex 15a/b 24 February 2006	Inclusion of a section on the assessment of the eligibility of land and the Sampling design and stratification during monitoring
01	EB15, Annex 6 03 September 2004	Initial adoption