SUPPORTING REPORT F

ENVIRONMENT

TABLE OF CONTENTS

Page

SUPPORTING REPORT F: ENVIRONMENT

LIST OF TABLES

Page

SUPPORTING REPORT F: ENVIRONMENT

1. ENVIRONMENTAL ASPECTS

1.1 Existing Environmental Conditions (Water)

(1) Seawater monitoring

Monitoring of the quality of the beaches in the RMR was started in 1974, when samplings were carried out during certain periods of the year, especially the summer.

In 1986, a systematic program of assessment of bathing conditions was introduced along all the coast of Pernambuco. Forty five monitoring points were fixed with a weekly of collection in 16 and monthly in 29.

From 1992, to comply with the CONAMA Resolution 20/1986, all the points were monitored weekly.

The monitoring consists of collecting samples of seawater at a depth of 1m, the depth most used by bathers, and analyzing the samples in a laboratory.

Weekly Bulletins are issued giving the bathing conditions of the beaches with their classification based on the results of the analysis of coliform bacteria for that week and the four previous weeks.

The information in these Bulletins is given to the press for informing the public.

STANDARDS OF QUALITY:
The classification of the beaches is based on norms established in the CONAMA Resolution 20 of 18 June, 1986, in articles 26 and 27 which defines the quality of water for bathing. According to this Resolution, freshwater, brackish water, and salt water for the purpose of recreation with immediate contact can be divided into four categories: EXCELLENT, VERY GOOD, SATISFACTORY, AND UNSUITABLE. The criteria for classification is based on the concentration of coliforms or total coliforms in a set of samples from five consecutive weeks. The categories EXCELLENT, VERY GOOD, and SATISFACTORY can be combined in a single category – SUITABLE.

LIMITS OF COLIFORM BACTERIA FOR EACH CATEGORY

CATEGORY	MPN LIMIT OF COLIFORM BACTERIA/100ml
EXCELLENT	Maximum of 250 in 80% or more of samples
VERY GOOD	Maximum of 500 in 80% or more of samples
SATISFACTORY	Maximum of 1,000 in 80% or more of samples
UNSUITABLE	More than 1,000 in more than 20% of samples

Even with a coliform level lower than 1,000, a beach may be classified as unsuitable if:

- there is a relatively high or abnormal incidence of water-borne diseases;
- there are signs of pollution from drains, which can be seen and smelled;
- it shows the regular, intermittent or sporadic reception of wastewater from channels, bodies of water or canals, as well as rainwater drains;
- it indicates the presence of residues or the disposal of solids or liquids, including oil, grease and other substances liable to be a health risk or make recreation unpleasant;
- the pH is less than 5 or more than 8.5;
- there are parasites in the water which affect humans, or there is a presence of their infected hosts; and
- other factors which make the temporary or permanent practice of immediate contact recreation inappropriate.

(2) River water, effluent, and sediment aduring this study

The results of analyses are tabulated in the Data Book. River water qualities are the similar to the results reported by CPRH, which show high BOD and low DO values. Effluent from factories are also showing high BOD and COD and very low DO which are indicating high organic material concentrations. High values are reported in sediment sample especially for Pb and PCB. High concentration of Pb and PCB can be attributed to automobile and industry sources, respectively.

Compliance with water quality standard for water-bathing (%)

YEAR	ITAMARACA			PAULISTA				OLINDA				
	ITA-20	ITA-10	ITA-05	PAL-40	PAL-30	PAL-20	PAL-10	OLD-97	OLD-90	OLD-80	OLD-70	OLD-60
1993	92	100	100	98	43	42	46	90	84	94	100	82
1994	78	68	95	90	48	50	52	82	88	83	78	81
1995	56	82	100	88	59	50	60	100	71	96	94	100
1996	38	40	85	75	17	25	30	86	92	87	64	100
1997	51	65	87	100	52	58	35	82	79	96	77	100
1998	82	82	89	100	51	31	67	100	98	91	98	91
1999	77	69	100	92	25	100	100	100	100	100	80	96

YEAR	OLINDA					RECIFE						
	OLD-50	OLD-40	OLD-30	OLD-20	OLD-10	REC-90	REC-80	REC-70	REC-60	REC-50	REC-40	REC-30
1993	81	68	0	58	80	0	46	100	100	100	98	100
1994	78	56	0	32	63	-	58	100	100	98	94	100
1995	92	61	0	19	71	-	46	100	100	100	90	100
1996	68	45	0	8	63	-	36	100	100	100	96	92
1997	62	56	0	13	65	-	65	100	100	98	100	92
1998	95	60	0	32	84	-	43	100	100	100	98	96
1999	100	86	0	67	96	-	58	100	100	100	92	92

YEAR	RECIFE		JABOATAO								CABO	IPOJUCA
	REC-20	REC-10	JAB-80	JAB-70	JAB-60	JAB-50	JAB-40	JAB-30	JAB-20	JAB-10	CBO-10	IPO-20
1993	100	100	100	94	92	94	88	82	71	40	98	100
1994	100	94	100	100	70	75	70	64	57	20	100	92
1995	100	100	100	88	46	64	70	43	53	2	100	100
1996	91	76	77	81	83	51	42	47	34	4	87	91
1997	96	96	96	83	61	58	48	42	25	6	92	100
1998	93	91	100	89	70	67	84	77	57	37	100	100
1999	100	100	100	90	86	84	90	78	67	63	100	94

1.2 Existing Water Environmental Conditions at Olho d'Agua Lagoon

(1) Introduction

Olho d'Agua lagoon, located in the coastal zone of the Municipality of Jaboatao dos Guararapes, has brackish water. The lagoon has an area of 375 ha and is an important wetland for various fauna and flora. However, because of lack of basic infrastructure, the households in the area practically deposit wastewater in the lagoon. It results in contamination of the lagoon with sewage and garbage.

There is a plan called "Olho d'Agua Lagoon Metropolitan Park Development" which aims to promote cultural, tourist, and leisure activities in the area surrounding the lagoon. The project is contributing not only to the environmental preservation and protection of the Olho d'Agua Lagoon, but also to the improvement of the quality of life and of the urban environment, thus promoting economic growth. Since the creation of a good drainage system is essential for the project, current conditions of the lagoon were studied.

(2) Water quality of the Lagoon

The geographical and physical condition of the lagoon is shown in the following table:

Environmental Conditions of Olho d'Agua Lagoon

Location	Conditions (refer to Fig. F2.6-4)
Area of Lagoon	375 ha
Area of the Basin	3,350 ha
Maximum depth in Rainy Season	90cm
Average depth directly after Rainy season	40cm
Inflow rate during spring tide	$3.8m^3$
Difference of minimum water level between dry and rain season	22cm
Major canals connected	Olho d'Agua Canal, Setubal Canal

The comparison of the results between 1991 and 1996 shows changes in the values of chemical and bacteriological parameters. The BOD and COD showed higher values in 1991 than in 1996 at the same sampling stations. There may be several causes for these changes such as 1) sampling time and season, 2) weather conditions, 3) drainage conditions from surrounding area, and 4) planktonic contributions. Therefore, it is not easy to determine the yearly trend only from these data. However, the value of BOD did not satisfy the Class 2 standard during these years. Fecal Coliforms drastically increased from 1991 to 1996, which might indicate an increasing influence of the wastewater from households to the Lagoon. In 1996 Fecal Coliforms were over the water quality standard at the monitoring stations in the

Setubal Canal and the Malaria Canal. Physical, chemical and bacteriological parameters measured in 1991 and 1996 are shown in the tables below.

Quality of Water in Olho d'Agua Lagoon, CPRH 1991

Parameters	Section1	Section2	Section3
Temperature (°C)	28.0	28.0	28.0
pH	9.4	9.0	9.0
BOD (mg/l)	268.9	118.0	80.0
COD (mg/l)	634.9	396.8	396.8
Ammonia (mg/l-N)	0.4	0.34	0.36
Nitrite (ug/l-N)	6.21	<1.0	7.14
Nitrate (ug/l-N)	<0.05	<0.05	<0.05
Phosphate (mg/l-P)	0.65	0.80	0.52
Fecal Coliforms (MPN/100ml)	<200	<200	<200

Section1: Setubal canal entrance to Lagoon; Section2: middle of the Lagoon; Section3: Olho d'Agua canal exit from Lagoon.

Source: Propostas Realizadas Na Bacia Da Lagoa Olho D'Auga vol.II, Jaboatao Dos Guararapes, Dez. 1999.

Quality of Water in Olho d'Agua Lagoon, UFPE 1996(Jul-Sep)

Parameters	Section0	Section1	Section2	Section3	Section4
Temperature (°C)	28.0	29.0	28.0	31.0	28.0
pH	7.1	7.2	9.7	9.8	9.2
Turbidity (NTU)	12	6	13	10	16
Chloride (mg/l)	79	107	481	280	750
Conductivity (uS/cm)	558	723	1320	1128	2720
Total solids (mg/l)	333	567	1788	817	1951
Alkalinity (mg/l $CaCO_3$)	132	168	87	69	89
DO (mg/l)	0.2	0.0	7.2	-	9
COD (mg/l)	68	166	113	-	250
BOD (mg/l)	28	67	38	60	41
Ammonia (mg/l-N)	4.2	1.3	1.0	0.6	1.0
Fecal Coliforms (MPN/100ml)	$1.1x10^6$	$7.6x10^5$	475	500	2100

Section0: Setubal canal-Vaquejada;
Section1: Setubal canal entrance to Lagoon;
Section2: middle of the Lagoon;
Section3: Olho d'Agua canal exit from Lagoon;
Section4: Malaria canal-Curcurana Street Bridge;
Source: Propostas Realizadas Na Bacia Da Lagoa Olho D'Auga vol.II, Jaboatao Dos Guararapes, Dez. 1999.

Metal concentration in the sediment of the Lagoon is as shown in Tables F.1-1. No extremely high values or disparity resulting from the sampling depth were observed except Lead (pb). Lead content in the lower part of the sediment is lower than that of the upper part, which indicates increased input of Lead from the overlaying water to the sediment possibly due to increase in atmospheric Lead from motor vehicles exhausts. In order to improve the condition of the lagoon environment, some measures for drainage and wastewater treatment will be needed.

2. INITIAL ENVIRONMENTAL EXAMINATION (IEE)

2.1 Existing Conditions of Priority Project Sites

The existing conditions of selected priority project sites are as follows:

PROJECT SITE	CURRENT CONDITIONS
Boa Viagem	A vacant site of around 4 hectares facing a canal connected to the estuary of the Tejipio river. The surrounding area is a densely populated low income residential area. On the river side of the canal is a mangrove forest. In the vacant land there are around 50-100 mango, cashew, olive, and palm trees. The central part is level and ready to be used as an athletic field. The residents seem to use this vacant land as a playground, possibly for soccer. See following Photo-1.
Cabanga	Cabanga sewage treatment facility is separated from residential area by a road on the northern side. The station was operating with an activated sludge treatment system, but now it is not in operation and discharges untreated wastewater into the river. At the entrance of the station there is a strong odor. See following Photo-2.
Conceicao	There is a cement factory (the operation is currently suspended). This cement factory is going to be removed and the construction of a theme park is planned for the area. The planned location of the wastewater treatment station is on a little top of a damp area where is the vacant land that a weed grows on currently. See following Photo-3.
Cordeiro	The planned location is next to the agricultural show ground of the State of Pernambuco Agriculture Department and is around 50 m away from the Capibaribe River. Currently it is vacant land with thick vegetation. There is a residential area next to it. See following Photo-4.
Curcurana	It was not possible to examine the planned wastewater treatment construction site, but the neighboring sites have shrubs and grassland. See following Photo-5.
Janga	There are no houses on the site itself, but there are some to the side of the access road. The distance from the station to the houses is around 200 m. According to the plan the station is going to be extended to the east of the site. The planned expansion area is vacant land (grassland) where goats graze. See following Photo-6.
Prazeres	The area is an industrial zone and there are no dwellings nearby. The planned wastewater treatment site is vacant land at present with shrubs and grasses. See following Photo-7.

Photo-1 (Boa Viagem)

Photo-2 (Cabanga)

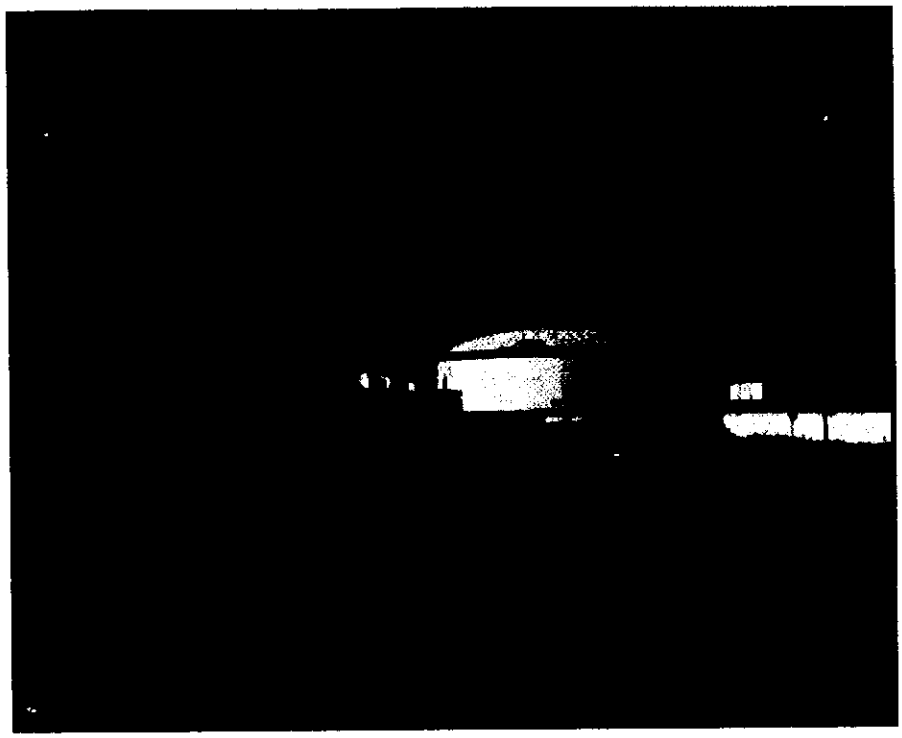


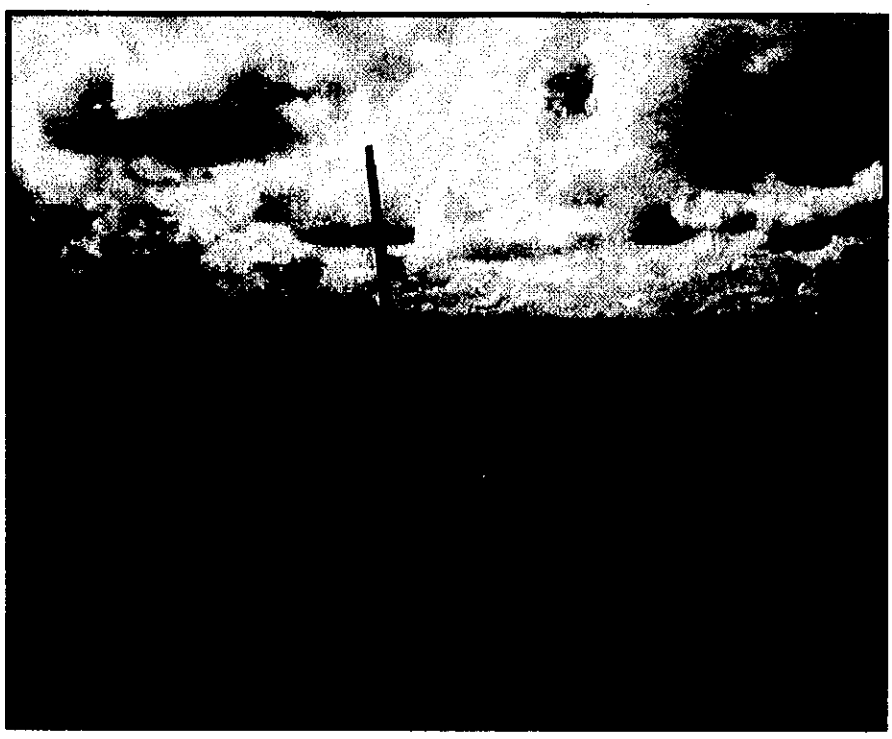
Photo-3 (Conceicao)

Photo-4 (Cordeiro)

Photo-5(Curcurana)

Photo-6 (Janga)

Photo-7 (Prazeres)



Screening check list

No	Environmental Items	Content	Evaluations	Grounds
Socio-economic Environment				
1	Resettlement	Resettlement by occupancy of proposed land (removal of rights or residence and land ownership)	No	No human settlement is to be removed by implementation of this project.
2	Economic activities	Loss of a productive opportunity such as land, and change of economic structure	No	Construction or/and rehabilitation of the sewerage treatment facility and drainage network will not cause any economic activities.
3	Traffic and public facilities	Influence of existing traffic such as congestion, accidents on schools etc.	No	No public facility exists the the sites.
4	Split of communities	Split of communities by obstruction of traffic	No	Split of community by implementation of the project is not anticipated.
5	Cultural property	Loss of cultural property and falling of value	No	No cultural property exists in the project area.
6	Water rights and rights of common	Obstruction of fishing rights, water rights, common rights of forest	No	No disputes with regard to fishing rights and water rights are likely to occur.
7	Health and sanitation	Deterioration of hygienic environment by production of refuse by noxious insects	Unkonwn	It is going to be checked in EIA.
8	Waste	Occurrences of waste dumps and solid waste	Yes	Sludge will be generated.
9	Hazards	Increase of possibility of danger of landslide and accident	No	No possibility of occurrence of hazards.
Natural Environment				
10	Topography and Geology	Change of valuable topography and geology by digging or fill	No	No permanent change in valuable topography and geology is expected.
11	Soil Erosion	Flow of surface soil by rain water after land development and forest felling	No	No forest felling is envisaged and there is no planting area involved.
12	Ground Water	Pollution by drainage or leach water by digging construction	No	Ground water will not be polluted.
13	Hydrological Situation	Change of flow pattern and the change in river water quality by inflow of drainage	Yes	Change in flow pattern and quality of the water by drainage from the treatment station can be expected.
14	Coast and Sea area	Change of beach erosion and vegetation by a change of declamation or sea condition	No	No facilities are planned to be constructed on the coastline.
15	Flora and Fauna	Breeding obstruction and extinction of species by a change of an inhabitable condition	No	Habitat of valuable flora and fauna does not exist.
16	Climate	Change of temperature and wind conditions by the large land development and architecture	No	Large scale felling and construction of high building are not planned.
17	Landscape	Change of topography by land development and harmonious obstruction by structural objects	Unknown	It is going to be checked in EIA.
Environmental Pollution				
18	Air Pollution	Pollution by emission gas and dust from vehicles or/and facilities	Yes	Impact by emission gas from the facilities or sludge transportation is anticipated.
19	Water Pollution	Pollution by inflow of earth and sand and industrial waste water	Yes	There may be change in water quality because of discharge of treated wastewater.
20	Soil Contamination	Pollution by drainage or leach water	Unknown	It is going to be checked in EIA.
21	Noise and Vibration	Occurrence of noise and vibration by facilities	No	Impact on noise and vibration by facilities could be very small.
22	Ground Subsidence	Subsidence by change of ground and fall of ground water level	No	No ground subsidence is expected.
23	Offensive odor	Occurrence of exhaust gas and offensive odor	Yes	Wastewater treatment facilities may give off offensive odor.
Comprehensive assessment: Is it necessary to implement EIA for the Project?			Yes	Many items are possibly affected.

Scoping check list

No	Environmental Items	Evaluations	Grounds
Socio-economic Environment			
1	Resettlement	D	No human settlement is to be removed by implementation of this project.
2	Economic activities	D	Construction or/and rehabilitation of the wastewater treatment plant and drainage network will not cause any economic activities.
3	Traffic and public facilities	D	No public facility exists the the sites.
4	Split of communities	D	Split of community by implementation of the project is not anticipated.
5	Cultural property	D	No cultural property exists in the project area.
6	Water rights and rights of common	D	No disputes with regard to fishing rights and water rights are likely to occur.
7	Health and sanitation	C	It is going to be checked in EIA.
8	Waste	B	Sludge will be generated.
9	Hazards	D	No possibility of occurrence of hazards.
Natural Environment			
10	Topography and Geology	D	No permanent change in valuable topography and geology is expected.
11	Soil Erosion	D	No forest felling is envisaged and there is no planting area involved.
12	Ground Water	D	Ground water will not be polluted.
13	Hydrological Situation	B	Change in flow pattern and quality of the water by drainage from the treatment station can be expected.
14	Coast and Sea area	D	No facilities are planned to be constructed on the coastline.
15	Flora and Fauna	D	Habitat of valuable flora and fauna does not exist.
16	Climate	D	Large scale felling and construction of high building are not planned.
17	Landscape	C	It is going to be checked in EIA.
Environmental Pollution			
18	Air Pollution	B	Impact by emission gas from the facilities or sludge transportation is anticipated.
19	Water Pollution	B	There may be change in water quality because of discharge of treated wastewater.
20	Soil Contamination	C	It is going to be checked in EIA.
21	Noise and Vibration	D	Impact on noise and vibration by facilities could be very small.
22	Ground Subsidence	D	No ground subsidence is expected.
23	Offensive Odors	B	Wastewater treatment facilities may give off offensive odor.

Classification of Evaluation:

A	Serious impact will be anticipated.
B	Impact will be more or less anticipated.
C	Unknown (it needs investigation)
D	No impact will be anticipated.

3. ENVIRONMENTAL IMPACT ASSESSMENT

3.1 Existing Environmental Conditions of the Priority Project Sites

(1) Conceicao

1) The existing conditions of the surroundings of the Conceicao STF project site

This STF project site is located in the north side of Paulista City and is about 250m distance from State Road Route 22. A cement company (CIMENTO POTY) owns the land. There is a residential area of around 150 houses in the East of the STF and Warehouse of mineral water company (Indaia) is located in the south side. The west side is vacant land, but a mangrove is found in the low land, which is around 100m distance of a southwestern side of the STF. In2.2 Required EIA situations such as hospital, school, and library do not exist in peripheral within 500m of the STF.

2) The existing conditions of the Conceicao STF project site

View of Conceicao STF Project Site From North Side

The project area of Conceicao STF is about 8.2ha. It is a vacant land and there are no residence or factories inside of the project site. Coconut trees and other shrubs are densely populated in the area. The vegetation is mostly anthropologic rather than natural vegetation, which is the same as other 6 sites. Major species are *Alternanthera philoxeroides, Brachiaria decumbens, Ipomoea asarifolia, Sida cordifolia, Spermacoce verticillara, and Turnera.* There is no flora in risk of extinction and rare species in the STF project site.

As for the animal, birds are the most predominant species found by field observation in the site. *Pitangus sulphuratus, Coereba flaveola, Crotophaga ani, Fluvicola nengeta, and Troglodytes aedon* were the major species observed. None of animal species in the site are listed in any official track of extinction risk species.

(2) Janga

1) The existing conditions of the surroundings of the Janga STF project site

The Janga STF project site is located in Paulista City and is about 1km eastward from the State Highway Route 22. The forest area spreads through the East and the south side of the STF project site where no houses are existing. In north side of the site a house of around 15 scatters in about 50m distance and the densely populated residential area is located in several hundred meters away. The Maranguape II estate is located in approximately 200m west

which is the closest heavily populated residential area near the site. There are a school and a church in The Maranguape II estate.

2) The existing conditions of the Janga STF project site

View of Janga STF Project Site From North Side

The area of the Janga STF project site is about 12.3 ha. The existing Janga STF is operating adjacent to the area. On the coast of the municipality of Paulista, where the Janga STF is planned, there are remains of the evergreen Atlantic rainforest. There are three types of vegetation, resulting from human intervention. In the project site vegetation was introduced in a landscaping scheme (e.g., Cashew, Tamarind Coconut), also there is the typical vegetation of wetlands, and those typically invasive species forming bush normally found in areas with human occupation. Finally, to the east of the site and in the southern part of the COMPESA land, there are the remains of the Atlantic rainforest in early stages of regeneration.

Most of the remains of the forest are outside the site, except a small wood to the south, which will not be affected by the rehabilitation and expansion of the Janga STF. In the first stages of regeneration (especially to the south), there is low vegetation, sometimes dense and sometimes scattered. In the next stages (to the east), it is with more mature trees with occasional saplings. *Alternanthera philoxeroides, Brachiaria decumbens, Ipomoea asarifolia, Sida cordifolia, Spermacoce verticillara, and Turnera ulmifolia* are the majority, which is similar to the other sites. There is no flora in risk of extinction and rare species in the Janga STF project site.

As for animals, birds are the most predominant species found by field observation in the site. *Pitangus sulphuratus, Coereba flaveola, Crotophaga ani, Fluvicola nengeta, and Troglodytes aedon* were the major species observed. None of animal species in the site are listed in any official track of extinction risk species.

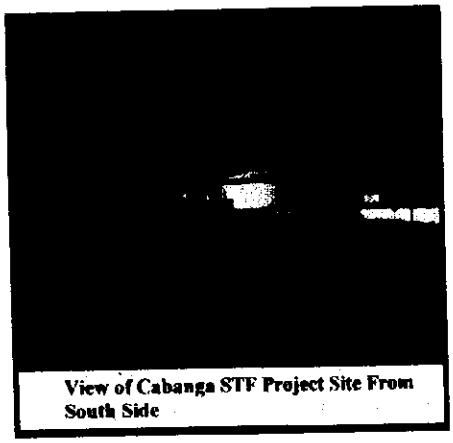
(3) Cabanga

1) The existing conditions of the surroundings of the Cabanga STF project site

The Cabanga STF project site is located in the Cabanga district of Recife City in near the Governor Bridge. The south side of the project site is the Pina Estuary. There is an office of COMPESA in the east side. There is Cabanga Yacht Club at a distance of about 300m

separated from the site by a road. In the west, there is Office of Ministry of Defense and there is Army Quarter in the north side. Institutions such as hospital, school, library do not exist in peripheral within 500m from the project site.

2) The existing conditions of the Cabanga STF project site



View of Cabanga STF Project Site From South Side

The area of the Cabanga STF project site is about 3.8 ha. Existing sewage treatment facilities exist in the site. There are Sedimentation Tank, Sludge Drying Bed, Sludge Digester, Grit Chamber, and management office. About 60% of the STF construction project site are utilized by the existing sewage treatment facilities. The rest of around 40% are used as soccer grounds and open space. Flora in this site is either planted or invasive species. Coconut is the main tree in the site. Weedy plants cover the most of open space and some shrubs are found in the site. The precious animals and plants are not found in the site.

(4) Boa Viagem

1) The existing conditions of the surroundings of the Boa Viagem STF project site

The Boa Viagem STF project site is located in Boa Viagem district of Recife city and is located in the north side of railway of Sul street. Jordan River flows to the East of this project site. Mangrove community is well developed in the swamp between Jordan River and Pina River. The swamp zone around the Pina River and Jordan River is designated as a mangrove park by Recife City. The north side is vacant land, but house and factory (Steel tube, Liquor, and Plaster factories) exist in the south side. In the west, some houses are existing, but it is mainly factory occupied area. Institutions such as hospital, school, and library do not exist in peripheral within 500m of the project site.

2) The existing conditions of the Boa Viagem STF project site

View of Boa Viagem STF Project Site From West Side

The area of the Boa Viagem STF project site is about 8.7 ha. There is a road extended till Jordan River from the railway at the south side of the project site. Both sides of the road are packed with houses of more than 50. Near the south boundary of the project site there is factory ruin. A house of around 15 scatters in around center of the site. In addition, there is one shoe factory in the site.

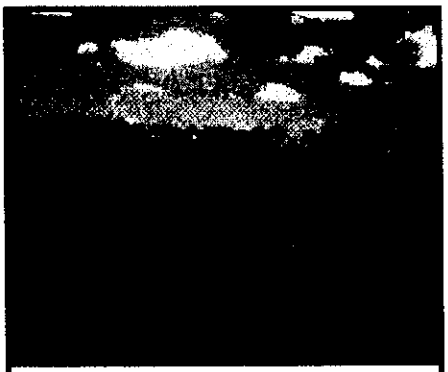
There are scattered distribution of Mango, Cashou, and Coconuts trees in the middle of the site, and these trees are growing more densely in the north side. Shrubs are found other than these trees, and the most part of ground is covered with weeds. In addition, there is a playground in center of north part of the site, where a goalpost of soccer is installed. Riverside of the center of the project site is low land and Mangrove community of about 0.6 ha exists. The construction of Boa Viagem STF is planned at the area where it does not influence the Mangrove community; therefore, there is no significant impact on the mangrove by this project anticipated.

(5) Cordeiro

1) The existing conditions of the surroundings of the Cordeiro STF project site

The Cordeiro STF project site is located in Cordeiro district of Recife City and is about 800m in the north side from Caxanga Avenue. The north side of the site faces the Capibaribe River. There is a residential area in the other side of the Capibaribe River. The west side is a park, where soccer grounds are prepared. The Eastern bloc of the project site is vacant land generally, but about 15 residences exist in the inside. The south side of the project site is a densely populated residential area. The road between the site and the residential area is planned to expand in near future by Recife City. Hospitals do not exist in peripheral within 500m of the project site but there is a school.

2) **The existing conditions of the Cordeiro STF project site**



View of East Side of Cordeiro STF Project Site

The area of the Cordeiro STF project site is about 4 ha. There is 10m wide unpaved road extending to Capibaribe River in a middle of the project site. Both sides of the road are hollow where become damp because of bad stormwater drainage in heavy rain. There are a lot of shrubs and weeds in the west half of the site. On the other hand in the east half, Coconuts trees are found other than a shrub and a weed. Several houses exist in a boundary side of the east half. Important fauna and flora were not identified in this site by field survey.

(6) Prazeres

(1) The existing conditions of the surroundings of the Prazeres STF project site

This STF project site is located in a Prazeres district of Jaboatao City and is at about 700m westward from the cross section between National highway No. 101 and Avenue Mascarenhas de Morais. The surroundings of this STF is a factory site, and a residential area does not exist around the site. The north side and the west of this project site are vacant lands broadly, and factories do not exist, either. A drinking water factory and a soccer ground exist in the eastern part of the project site. There are Concrete, Coca-Cola, Plastic tube, and Paint factories in the south side beyond a road. Institutions such as hospital, school, and library do not exist in peripheral within 500m of the site.

(2) The existing conditions of the Prazeres STF project site

The area of the Prazeres STF project site is about 12.1 ha. The center of this project site is hollow, where becomes a small pond in case of heavy rain. Therefore, plants are not found in the center of the site, but there are shrubs to the north side and the south side. Weeds are growing thickly. In Prazeres a lower number of plant species are observed compared to other STF sites because the area is mostly wetland. Particular precious fauna and flora were not identified in the site by field survey.

(7) Curcurana

1) The existing conditions of the surroundings of the Prazeres STF project site

This STF project site is located in low land of the south side of Olho d'Agua Lagoon and is at the east side of Barras Street about 2km from National highway No. 101. The north side of this project site is low land or swamp and houses do not exist. The west side is vacant land and houses are scatteredly distributed at the distance of around 200m from the site. In the south side, there are several houses and transformer substation. Coconut trees are existing between a residential area and the east side of the project site. Mangrove community exists on north side swamp of the project site, but there is no direct impact by the construction of STF. Institutions such as hospital, school, and library do not exist in peripheral within 500m of the project site.

(2) The existing conditions of the Prazeres STF project site

View of Curcurana STF Project Site From South Side

The area of the Curcurana STF project site is about 10 ha. Coconuts trees, shrubs and weeks are growing in the project site. There is one house in middle of the site which is possessed by a relative of the landowner. Altitude of this area is low; therefore, this area is flooded in case of heavy rain. Particular precious fauna and flora were not identified in the site by field survey.

3.2 Environmental Impacts Assessment

1) Environmental impacts during construction and operation

The results of evaluation of the impacts on the environment during construction and operation are compiled in Tables F.3-1 to F.3-48.

2) Families and species of common plants and animals found in the sites

The results of the field surveys on the fauna and flora are listed and shown in Tables F.3-49 to F.3-62.

Table F.1-1 Metal Concentrations in the Lagoon Sediments.

Sediment from 0.6m down from the bottom	Number of locations	Average	Standared deviation	Minimum	Maximum	Sediment from the bottom surface	Number of locations	Number of samples	Average	Standared deviation	Minimum	Maximum
Ag (ppm)	1	0.5	0	0.5	0.5	Ag (ppm)	1	0	-	-	-	-
Al (%)	7	0.2	0.31	0.01	0.89	Al (%)	7	34	0.11	0.17	0.01	0.74
As (ppm)	8	6.06	1.18	5	8.4	As (ppm)	8	14	7.06	1.97	5	12
Ba (ppm)	5	1.22	0.15	1	1.4	Ba (ppm)	5	4	1.28	0.22	1	1.6
Be (ppm)	0	-	-	-	-	Be (ppm)	0	0	-	-	-	-
Bi (ppm)	0	-	-	-	-	Bi (ppm)	0	1	-	-	-	-
Ca (%)	46	0.75	0.27	0.12	1.23	Ca (%)	46	46	0.34	0.23	0.13	1.06
Cd (ppm)	0	-	-	-	-	Cd (ppm)	0	0	-	-	-	-
Co (ppm)	1	3	0	3	3	Co (ppm)	1	6	1.88	0.32	1.4	2.3
Cr (ppm)	4	1.63	0.45	1.3	2.4	Cr (ppm)	4	4	1.5	0.3	1	1.8
Cu (ppm)	14	0.99	0.84	0.5	3.8	Cu (ppm)	14	26	1.62	1.26	0.5	5.1
Fe (%)	46	0.13	0.22	0.01	1.23	Fe (%)	46	46	0.37	0.21	0.02	0.87
K (%)	46	0.03	0.02	0.01	0.08	K (%)	46	46	0.05	0.03	0.01	0.15
Li (ppm)	46	1.88	1.73	1	9.9	Li (ppm)	46	46	4.17	2.86	1	9.9
Mg (%)	46	0.14	0.07	0.03	0.37	Mg (%)	46	46	0.23	0.13	0.03	0.58
Mn (%)	0	-	-	-	-	Mn (%)	0	0	-	-	-	-
Mo (ppm)	3	3.2	1.06	2.4	4.7	Mo (ppm)	3	4	3.23	1.17	2.3	5.2
Na (%)	46	0.81	0.24	0.39	1.46	Na (%)	46	46	0.97	0.38	0.4	2.41
Ni (ppm)	11	3.52	1.96	2	9.3	Ni (ppm)	11	36	4.04	1.52	2	8.1
P (%)	0					P (%)	0	1	0.02	0	0.02	0.02
Pb (ppm)	27	3.31	1.76	2.1	9.7	Pb (ppm)	27	38	21.85	98.05	2	618
Sb (ppm)	0	-	-	-	-	Sb (ppm)	0	0	-	-	-	-
Sc (ppm)	0	-	-	-	-	Sc (ppm)	0	7	1.38	0.37	1	2.1
Sn (ppm)	0	-	-	-	-	Sn (ppm)	0	0	-	-	-	-
Sr (ppm)	46	15.65	5.87	2	28	Sr (ppm)	46	46	9.39	7	1	39
Ti (%)	0	-	-	-	-	Ti (%)	0	0	-	-	-	-
V (ppm)	3	8.37	1.86	7	11	V (ppm)	3	22	8.4	2.68	5.1	16
W (ppm)	0	-	-	-	-	W (ppm)	0	1	10	0	10	10
Y (ppm)	45	3.47	2.25	1.1	15	Y (ppm)	45	45	5.63	5.72	1.2	37
Zn (ppm)	46	14.83	13.87	2	86	Zn (ppm)	46	46	20.7	11.81	1	55
Zr (ppm)	3	1.43	0.12	1.3	1.6	Zr (ppm)	3	20	1.41	0.29	1	2.2
La (ppm)	45	13.17	2.75	6.5	21	La (ppm)	45	44	9.49	3.91	5.4	25
Se (ppm)	0	-	-	-	-	Se (ppm)	0	0	-	-	-	-
Te (ppm)	0	-	-	-	-	Te (ppm)	0	0	-	-	-	-
Hg (ppb)	0	-	-	-	-	Hg (ppb)	0	0	-	-	-	-
F (ppm)	46	287.43	105.49	80	480	F (ppm)	46	46	258.02	70.68	110	400

Table F.3-1 Conceição STF - Environmental Impacts Evaluation. Action I– Delimitation and licensing of the work areas

Environmental factor Analyzed	Impacts Description	ADOPTED CRITERIA								
		Attributes of the Impacts						Mitigation/ Maximization Measures		
		Classification	Occurrence Probability	Duration	Reversibility	Intensity	Area of Influence	Identification	Nature	Responsible
2	Restriction for land use and occupation in the construction areas	Negative	Certain	Permanent	Irreversible	Low	Local	23	—	—
5	Use of Timbó river estuary for discharging of treated effluents	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA
6	Vegetation suppression for construction of STF	Negative	Certain	Permanent	Irreversible	Low	Local	2	Corrective	COMPESA/ Planner
10	Negative revalorization of the land estate around the STF	Negative	Certain	Permanent	Irreversible	High	Local	23	-	-

Table F.3-2 Conceição STF - Environmental Impacts Evaluation. Action II– Preliminary work services

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional development of erosive processes due to superficial soil layer removal at the work site	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
6	Vegetation cover removal for the land cleaning	Negative	Certain	Permanent	Irreversible	Low	Local	3 and 4	Corrective	Contractor
6	Fauna species removal from close forest vegetation and anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income rates increase due to employees hiring for the work site	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
12	Utilization of the permanent preserved zone of water streams where some of the system units will be installed	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA

Table F.3-3 Conceição STF - Environment Impact Evaluation. Action III – Equipment and material transport

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Use of the STF area for material storage	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Occasional disturbance to the population due to the vehicles flux increase at the work site and close areas	Negative	Probable	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-4 Conceição STF - Environment Impact Assessment. Action IV – Work site setting up, operation and deactivation

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional erosive processes occurrence due to leveling of the ground and excavation	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
2	Possible installation of drying and wetting processes on the clayey soils causing soil erosion and slope instability.	Negative	Probable	Temporary	Reversible	Low	Local	4 and 7	Preventive	Contractor
2	Production of waste material during the civil works and construction site dismounting	Negative	Certain	Temporary	Reversible	Low	Local	8	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Certain	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
7	Completion of construction will cause unemployment and consequent income rate reduction	Negative	Probable	Permanent	Irreversible	Low	Metropolitan	23	–	—
9	Possibility of domestic waste discharge (solid and liquid) on the construction site may cause pollution and contamination problems	Negative	Probable	Temporary	Reversible	Low	Local	10	Preventive	Contractor

Table F.3-5 Conceição STF - Environmental Impacts Assessment. Action V– Earthworks (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional occurrence of erosive processes due to land leveling, embankment and excavation activities	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particle suspended matter and gases liberation due to machinery and equipment operation for the land leveling work	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Possibility of soil erosion due to the earthwork near to the water streams, which may cause silting up and increasing water turbidity	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-5 Conceição STF - Environmental Impact Assessment . Action V – Earthwork (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the construction site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Preventive	Contractor

Table F.3-6 Conceição STF - Environmental Impacts Assessment. Action VI–Civil work (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional installation of erosive processes due to geo-technical work	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particulate suspended matter and gases liberation due to machinery and equipment operation	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Occasional contamination of the underground water	Negative	Probable	Temporary	Reversible	Low	Local	12	Preventive	Planner/ Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropoli tan	5	Maximize	Contractor

Table F.3-6 Conceição STF - Environmental Impacts Assessment. Action VI–Civil work (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the work site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Increase of construction material purchase (lime, cement, tubes, sand, etc)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	13	Maximize	Contractor
10	Increase in tax collection	Positive	Certain	Temporary	Reversible	Low	Metropolitan	23	–	—
11	STF construction might provoke changes on the landscape	Negative	Certain	Permanent	Irreversible	Low	Local	2	Preventive	Planner/ COMPESA
12	Occasional conflicts with the current legislation due to the construction site installation	Negative	Probable	Temporary	Reversible	Low	Local	1	Preventive	COMPESA

Table F.3-7 Conceição STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
3	Occasional odor liberation from the STF	Negative	Probable	Permanent	Reversible	Low	Local	14 and 15	Preventive	COMPESA
3	Gases liberation from RAFA	Negative	Certain	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
3	Aerosol formation	Negative	Certain	Permanent	Reversible	Low	Local	2 and 15	Preventive	Planner / COMPESA
4	Increase of the noise level at the STF area due to machines, equipment and vehicles operation	Negative	Certain	Permanent	Reversible	Low	Local	14 and 17	Preventive	COMPESA
5	Decease of the organic pollution load in the Timbo river and other water bodies, which are drained from the urban area, due to construction of STF	Positive	Certain	Permanent	Reversible	Medium	Local	14, 18 and 20	Maximize	COMPESA
5	Potential coliform level increase in the Timbo river	Negative	Probable	Permanent	Reversible	Low	Local	18 and 19	Preventive	Planner / COMPESA
7	Employment and income increase due to workers hiring for the operation and maintenance of the construction site	Positive	Probable	Permanent	Irreversible	Low	Metropolitan	5	Maximize	COMPESA

Table F.3-7 Conceição STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Production of excess sludge to be disposed	Negative	Certain	Permanent	Irreversible	Low	Local	14 and 21	Preventive	COMPESA
9	Occasional disturbance caused to the population due to the odor liberation from STF	Negative	Probable	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
9	Insects proliferation in Lagoon	Negative	Probable	Temporary	Reversible	Low	Local	14	Preventive	COMPESA
9	Improvement on the Conceicao system sanitary conditions due to the elimination of raw wastewater discharges	Positive	Certain	Permanent	Irreversible	High	Metropolitan	14	Maximize	COMPESA
9	Improvement on the environment quality	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	–
10	Improvement of the economic situation due to the implantation of better infrastructure	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	—

Table F.3-8 Janga STF - Environment Impact Evaluation. Action I – Delimitation and licensing of the work areas

Environmental Factor Analyzed	Impact Description	CRITERIA ADOPTED								
		Impact attributes						Mitigation Measures/Maximization		
		Classification	Occurrence probability	Period	Reversibility	Intensity	Influence Area	Identification	Nature	Responsible
2	Restriction for land use and occupation in the construction areas	Negative	Certain	Permanent	Irreversible	Low	Local	23	—	—
5	Use of Timbó river estuary for treated effluents reception	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA
6	Vegetation suppression for construction of STF	Negative	Certain	Permanent	Irreversible	Low	Local	2	Corrective	COMPESA/ Planner
10	Negative revalorization of the land estate around the STF	Negative	Certain	Permanent	Irreversible	High	Local	23	-	-

Table F.3-9 Janga STF - Environmental Impact Evaluation. Action II – Preliminary work services

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
1	Occasional development of erosive processes due to superficial soil layer removal at the work site	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
6	Vegetation cover removal for the land cleaning	Negative	Certain	Permanent	Irreversible	Low	Local	3 and 4	Corrective	Contractor
6	Fauna species removal from close forest vegetation and anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	-	-
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
12	Utilization of the permanent preserved zone of water streams where some of the system units will be installed	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA

Table F.3-10 Janga STF - Environment Impact Evaluation. Action III – Equipment and material transport

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
2	Use of the STF area for material storage	Negative	Certain	Temporary	Reversible	Low	Local	23	-	-
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Occasional disturbance to the population due to the vehicles flux increase at the work site and close areas	Negative	Probable	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-11 Janga STF - Environment Impact Evaluation. Action IV – Work site setting up, operation and deactivation (1/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
1	Erosive Processes eventual installation due to embankment and excavation	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
2	Possible installation and drying and wetting processes on the argyle soils causing erosion and slope instability	Negative	Probable	Temporary	Reversible	Low	Local	4 and 7	Corrective	Contractor
2	Production of waste material during the civil works and construction site dismounting	Negative	Certain	Temporary	Reversible	Low	Local	8	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Certain	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-11 Janga STF - Environment Impact Evaluation. Action IV – Work site setting up, operation and deactivation (2/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
7	Completion of construction will cause unemployment and consequent income rate reduction	Negative	Probable	Permanent	Irreversible	Low	Metropolitan	23	-	-
9	Possibility of domestic waste discharge (solid and liquid) on the construction site may cause pollution and contamination problems	Negative	Probable	Temporary	Reversible	Low	Local	10	Preventive	Contractor

Table F.3-12 Janga STF - Environmental Impact Evaluation. Action V – Earthwork (1/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
1	Occasional occurrence of erosive processes due to land leveling, embankment and excavation activities	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particle suspended matter and gases liberation due to machinery and equipment operation for the land leveling work	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
6	Fauna species and close forest vegetation removal from the anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	-	-
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-12 Janga STF - Environmental Impact Evaluation. Action V – Earthwork (2/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the construction site and vicinity areas	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Preventive	Contractor-

Table F.3-13 Janga STF - Environmental Impacts Evaluation. Action VI – Civil work (1/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
1	Occasional installation of erosive processes due to geo-technical work	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particulate suspended matter and gases liberation due to machinery and equipment operation	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Eventual contamination of the ground water	Negative	Probable	Temporary	Reversible	Low	Local	12	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-13 Janga STF - Environmental Impacts Evaluation. Action VI – Civil work (2/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the work site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Increase of construction material purchase (lime, cement, tubes, sand, etc)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	13	Maximize	Contractor
10	Increase in tax collection	Positive	Certain	Temporary	Reversible	Low	Metropolitan	23	-	-
11	STF construction might provoke changes on the landscape	Negative	Certain	Permanent	Irreversible	Low	Local	2	Preventive	COMPESA/ Planner
12	Occasional conflicts with the current legislation due to the construction site installation	Negative	Probable	Temporary	Reversible	Low	local	1	Preventive	COMPESA

Table F.3-14 Janga STF - Environmental Impacts Evaluation. Action VII – System operation and maintenance (1/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
3	Occasional odor liberation from the STF	Negative	Probable	Permanent	Reversible	Low	Local	14 and 15	Preventive	COMPESA
3	Gases liberation from RAFA	Negative	Certain	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	COMPESA/ Planner
3	Aerosol and scum formation	Negative	Certain	Permanent	Reversible	Low	Local	2 and 15	Preventive	COMPESA
4	Increase of the noise level at the STF area due to the machines, equipment and vehicles operation	Negative	Certain	Permanent	Reversible	Low	Local	14 and 17	Preventive	COMPESA
5	Decease of the organic pollution load in the Timbo river and other water bodies, which are drained from the urban area, due to construction of STF	Positive	Certain	Permanent	Reversible	Medium	Local	14 ,18 and 20	Maximize	COMPESA
5	Potential coliform level increase in the Timbo river	Negative	Probable	Permanent	Reversible	Low	Local	18 and 19	Preventive	COMPESA/ Planner
7	Employment and income increase due to workers hiring for the operation and maintenance of the construction site	Positive	Probable	Permanent	Irreversible	Low	Local	5	Maximize	COMPESA

Table F.3-14 Janga STF - Environmental Impacts Evaluation. Action VII – System operation and maintenance (2/2)

Environmental factor analyzed	Impact description	CRITERIA ADOPTED								
		Impact Attributes						Mitigation Measures/Maximization		
		Classification	Occurrence Probability	Length of time	Reversibility	Intensity	Influenced Area	Identification	Character	Responsible
8	Production of excess sludge to be disposed	Negative	Certain	Permanent	Irreversible	Low	Local	14 and 21	Preventive	COMPESA
9	Occasional disturbance caused to the population due to the odor liberation from STF	Negative	Probable	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	COMPESA/Planner
9	Insects proliferation in Lagoon	Negative	Probable	Temporary	Reversible	Low	Local	14	Preventive	COMPESA
9	Improvement on the Janga system sanitary conditions due to the elimination of raw wastewater discharges	Positive	Certain	Permanent	Irreversible	High	Metropolitan	14	Maximize	COMPESA
9	Improvement on the environment quality	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	-	-
10	Improvement of the economic situation due to the implantation of better infrastructure	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	-	-

Table F.3-15 STF Cabanga - Environmental Impacts Evaluation. Action I– Delimitation and licensing of the work areas

Environmental factor Analyzed	Impacts Description	ADOPTED CRITERIA								
		Attributes of the Impacts						Mitigation/ Maximization Measures		
		Classification	Occurrence Probability	Duration	Reversibility	Intensity	Area of Influence	Identification	Nature	Responsible
5	Use of the Pina estuary for discharging treated effluents	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA
6	Vegetation suppression for construction of STF	Negative	Certain	Permanent	Irreversible	Low	Local	2	Corrective	Planner / COMPESA

Table F.3-16 STF Cabanga - Environmental Impacts Evaluation. Action II– Preliminary work services

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
6	Vegetation cover removal for the land cleaning	Negative	Certain	Permanent	Irreversible	Low	Local	3 and 4	Corrective	Contractor
6	Fauna species removal from close forest vegetation and anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
12	Utilization of the permanent preserved zone of water streams where some of the system units will be installed	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA

Table F.3-17 STF Cabanga - Environment Impact Evaluation. Action III – Equipment and material transport

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Use of the STF area for material storage	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Occasional disturbance to the population due to the vehicles flux increase at the work site and close areas	Negative	Probable	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-18 STF Cabanga - Environment Impact Assessment. Action IV – Work site setting up, operation and deactivation

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Production of waste material during the civil works and construction site dismounting	Negative	Certain	Temporary	Reversible	Low	Local	8	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Certain	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
7	Completion of construction will cause unemployment and consequent income rate reduction	Negative	Probable	Permanent	Irreversible	Low	Metropolitan	23	–	—
9	Possibility of domestic waste discharge (solid and liquid) on the construction site may cause pollution and contamination problems	Negative	Probable	Temporary	Reversible	Low	Local	10	Preventive	Contractor

Table F.3-19 STF Cabanga - Environmental Impacts Assessment. Action VI–Civil work

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
3	Particulate suspended matter and gases liberation due to machinery and equipment operation	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the work site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Increase of construction material purchase (lime, cement, tubes, sand, etc)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	13	Maximize	Contractor
10	Increase in tax collection	Positive	Certain	Temporary	Reversible	Low	Metropolitan	23	–	—
12	Occasional conflicts with the current legislation due to the construction site installation	Negative	Probable	Temporary	Reversible	Low	Local	1	Preventive	COMPESA

Table F.3-20 STF Cabanga - Environmental Impacts Assessment. Action VII– System operation and maintenance (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
3	Occasional odor liberation from the STF	Negative	Probable	Permanent	Reversible	Low	Local	14 and 15	Preventive	COMPESA
3	Gases liberation from RAFA	Negative	Certain	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
4	Increase of the noise level at the STF area due to machines, equipment and vehicles operation	Negative	Certain	Permanent	Reversible	Low	Local	14 and 17	Preventive	COMPESA
5	Decease of the organic pollution load in the Pina river and other water bodies, which are drained from the urban area, due to construction of STF	Positive	Certain	Permanent	Reversible	Medium	Local	14,18 and 20	Maximize	COMPESA
5	Potential coliform level increase in the Pina river	Negative	Probable	Permanent	Reversible	Low	Local	18 and 19	Preventive	Planner / COMPESA
7	Employment and income increase due to workers hiring for the operation and maintenance of the construction site	Positive	Probable	Permanent	Irreversible	Low	Metropolitan	5	Maximize	COMPESA

Table F.3-20 STF Cabanga - Environmental Impacts Assessment. Action VII– System operation and maintenance (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Production of excess sludge to be disposed	Negative	Certain	Permanent	Irreversible	Low	Local	14 and 21	Preventive	COMPESA
9	Occasional disturbance caused to the population due to the odor liberation from STF	Negative	Probable	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
9	Improvement on the Cordeiro system sanitary conditions due to the elimination of raw wastewater discharges	Positive	Certain	Permanent	Irreversible	High	Metropolitan	14	Maximize	COMPESA
9	Improvement on the environment quality	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	–
10	Improvement of the economic situation due to the implantation of better infrastructure	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	—

Table F.3-21 Boa Viagem STF - Environmental Impacts Evaluation. Action I – Delimitation and licensing of the work areas

Environmental factor Analyzed	Impacts Description	ADOPTED CRITERIA								
		Attributes of the Impacts						Mitigation/ Maximization Measures		
		Classification	Occurrence Probability	Duration	Reversibility	Intensity	Area of Influence	Identification	Nature	Responsible
2	Restriction for land use and occupation	Negative	Certain	Permanent	Irreversible	Low	Local	23	—	—
5	Use of Jordan river for discharging of treated effluents	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA
6	Vegetation suppression for construction of STF	Negative	Certain	Permanent	Irreversible	Low	Local	2	Corrective	COMPESA/ Planner
10	Negative revalorization of the land estate around the STF	Negative	Certain	Permanent	Irreversible	High	Local	23	-	-

Table F.3-22 Boa Viagem STF - Environmental Impacts Evaluation. Action II– Preliminary work services

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional development of erosive processes due to superficial soil layer removal at the work site	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
6	Vegetation cover removal for the land cleaning	Negative	Certain	Permanent	Irreversible	Low	Local	3 and 4	Corrective	Contractor
6	Fauna species removal from close forest vegetation and anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
12	Utilization of the permanent preserved zone of water streams where some of the system units will be installed	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA

Table F.3-23 Boa Viagem STF - Environment Impact Evaluation. Action III – Equipment and material transport

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Use of the STF area material storage	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Occasional disturbance to the population due to the vehicles flux increase at the work site and close areas	Negative	Probable	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-24 Boa Viagem STF - Environment Impact Assessment. Action IV – Work site setting up, operation and deactivation

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Production of waste material during the civil works and construction site dismounting	Negative	Certain	Temporary	Reversible	Low	Local	8	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Certain	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
7	Completion of construction will cause unemployment and consequent income rate reduction	Negative	Probable	Permanent	Irreversible	Low	Metropolitan	23	–	—
9	Possibility of domestic waste discharge (solid and liquid) on the construction site may cause pollution and contamination problems	Negative	Probable	Temporary	Reversible	Low	Local	10	Preventive	Contractor

Table F.3-25 Boa Viagem STF - Environmental Impacts Assessment. Action V– Earthworks (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional occurrence of erosive processes due to land leveling, embankment and excavation activities	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particle suspended matter and gases liberation due to machinery and equipment operation for the land leveling work	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Possibility of soil erosion due to the earthwork near to the water streams, which may cause silting up and increasing water turbidity	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropoli tan	5	Maximize	Contractor

Table F.3-25 - Boa Viagem STF - Environmental Impact Assessment . Action V – Earthwork (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the construction site and vicinity areas	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Preventive	Contractor

Table F.3-26 Boa Viagem STF - Environmental Impacts Assessment. Action VI–Civil work (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional installation of erosive processes due to geo-technical work.	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particulate suspended matter and gases liberation due to machinery and equipment operation	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Occasional impact on the natural water color and turbidity due to the suspended matter load.	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Planner/ Contractor
5	Occasional contamination of the underground water	Negative	Probable	Temporary	Reversible	Low	Local	12	Preventive	Planner/ Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropoli tan	5	Maximize	Contractor

Table F.3-26 Boa Viagem STF - Environmental Impacts Assessment. Action VI–Civil work (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the work site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Increase of construction material purchase (lime, cement, tubes, sand, etc)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	13	Maximize	Contractor
10	Increase in tax collection	Positive	Certain	Temporary	Reversible	Low	Metropolitan	23	–	—
11	STF construction might provoke changes on the landscape	Negative	Certain	Permanent	Irreversible	Low	Local	2	Preventive	Planner/ COMPESA
12	Occasional conflicts with the current legislation due to the construction site installation	Negative	Probable	Temporary	Reversible	Low	Local	1	Preventive	COMPESA

Table F.3-27 Boa Viagem STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
3	Occasional odor liberation from the STF	Negative	Probable	Permanent	Reversible	Low	Local	14 and 15	Preventive	COMPESA
3	Gases liberation from RAFA	Negative	Certain	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner
3	Aerosol formation	Negative	Certain	Permanent	Reversible	Low	Local	2 and 15	Preventive	Planner / COMPESA
4	Increase of the noise level at the STF area due to machines, equipment and vehicles operation	Negative	Certain	Permanent	Reversible	Low	Local	14 and 17	Preventive	COMPESA
5	Decease of the organic pollution load in the Jordan river and other water bodies, which are drained from the urban area, due to construction of STF	Positive	Certain	Permanent	Reversible	Medium	Local	14, 18 and 20	Maximize	COMPESA
5	Potential coliform level increase in the Jordan river	Negative	Probable	Permanent	Reversible	Low	Local	18 and 19	Preventive	Planner / COMPESA
7	Employment and income increase due to workers hiring for the operation and maintenance of the construction site	Positive	Probable	Permanent	Irreversible	Low	Metropolitan	5	Maximize	COMPESA

Table F.3-27 Boa Viagem STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Production of excess sludge to be disposed	Negative	Certain	Permanent	Irreversible	Low	Local	14 and 21	Preventive	COMPESA
9	Occasional disturbance caused to the population due to the odor liberation from STF	Negative	Probable	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
9	Insects proliferation in Lagoon	Negative	Probable	Temporary	Reversible	Low	Local	14	Preventive	COMPESA
9	Improvement on the Boa Viagem system sanitary conditions due to the elimination of raw wastewater discharges.	Positive	Certain	Permanent	Irreversible	High	Metropolitan	14	Maximize	COMPESA
9	Improvement on the environment quality	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	–
10	Improvement of the economic situation due to the implantation of better infrastructure	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	—

Table F.3-28 Cordeiro STF - Environmental Impacts Evaluation. Action I– Delimitation and licensing of the work areas

Environmental factor Analyzed	Impacts Description	ADOPTED CRITERIA								
		Attributes of the Impacts						Mitigation/ Maximization Measures		
		Classification	Occurrence Probability	Duration	Reversibility	Intensity	Area of Influence	Identification	Nature	Responsible
2	Restriction for land use and occupation in the construction areas	Negative	Certain	Permanent	Irreversible	Medium	Municipal	23	—	—
5	Use of Capibaribe river for discharging of treated effluents	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA
6	Vegetation suppression for construction of STF	Negative	Certain	Permanent	Irreversible	Low	Local	2	Corrective	COMPESA/ Planner
9	Deactivation of a public school, a church and two carpenter associations	Negative	Certain	Permanent	Irreversible	Medium	Local	22	Corrective	COMPESA
10	Negative revalorization of the land estate around the STF	Negative	Certain	Permanent	Irreversible	High	Local	23	-	-

Table F.3-29 Cordeiro STF - Environmental Impacts Evaluation. Action II– Preliminary work services

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional development of erosive processes due to superficial soil layer removal at the work site	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
6	Vegetation cover removal for the land cleaning	Negative	Certain	Permanent	Irreversible	Low	Local	3 and 4	Corrective	Contractor
6	Fauna species removal from close forest vegetation and anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
12	Utilization of the permanent preserved zone of water streams where some of the system units will be installed	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA

Table F.3-30 Cordeiro STF - Environment Impact Evaluation. Action III – Equipment and material transport

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Use of the STF area for material storage	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Occasional disturbance to the population due to the vehicles flux increase at the work site and close areas	Negative	Probable	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-31 Cordeiro STF - Environment Impact Assessment. Action IV – Work site setting up, operation and deactivation

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Production of waste material during the civil works and construction site dismounting	Negative	Certain	Temporary	Reversible	Low	Local	8	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Certain	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
7	Completion of construction will cause unemployment and consequent income rate reduction	Negative	Probable	Permanent	Irreversible	Low	Metropolitan	23	–	—
9	Possibility of domestic waste discharge (solid and liquid) on the construction site may cause pollution and contamination problems	Negative	Probable	Temporary	Reversible	Low	Local	10	Preventive	Contractor

Table F.3-32 Cordeiro STF - Environmental Impacts Assessment. Action V– Earthworks (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional occurrence of erosive processes due to land leveling, embankment and excavation activities	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particle suspended matter and gases liberation due to machinery and equipment operation for the land leveling work	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Possibility of soil erosion due to the earthwork near to the water streams, which may cause silting up and increasing water turbidity	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-32 Cordeiro STF - Environmental Impact Assessment . Action V – Earthwork (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the construction site and vicinity areas	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Preventive	Contractor

Table F.3-33 Cordeiro STF - Environmental Impacts Assessment. Action VI–Civil Work

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional installation of erosive processes due to geo-technical work	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Enterprise
3	Particulate suspended matter and gases liberation due to machinery and equipment operation	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the work site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Increase of construction material purchase (lime, cement, tubes, sand, etc)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	13	Maximize	Contractor
10	Increase in tax collection	Positive	Certain	Temporary	Reversible	Low	Metropolitan	23	–	—
11	STF construction might provoke changes on the landscape	Negative	Certain	Permanent	Irreversible	Medium	Local	2	Preventive	COMPESA/ Planner
12	Occasional conflicts with the current legislation due to the construction site installation	Negative	Probable	Temporary	Reversible	Low	Local	1	Preventive	COMPESA

Table F.3-34 Cordeiro STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
3	Occasional odor liberation from the STF	Negative	Probable	Permanent	Reversible	Low	Local	14 and 15	Preventive	COMPESA
3	Gases liberation from RAFA	Negative	Certain	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
4	Increase of the noise level at the STF area due to machines, equipment and vehicles operation	Negative	Certain	Permanent	Reversible	Low	Local	14 and 17	Preventive	COMPESA
5	Decease of the organic pollution load in the Capibaribe river and other water bodies, which are drained from the urban area, due to construction of STF	Positive	Certain	Permanent	Reversible	Medium	Local	14, 18 and 20	Maximize	COMPESA
5	Potential coliform level increase in the Capibaribe river	Negative	Probable	Permanent	Reversible	Low	Local	18 and 19	Preventive	Planner / COMPESA
7	Employment and income increase due to workers hiring for the operation and maintenance of the construction site	Positive	Probable	Permanent	Irreversible	Low	Metropolitan	5	Maximize	COMPESA

Table F.3-34 Cordeiro STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximinization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Production of excess sludge to be disposed	Negative	Certain	Permanent	Irreversible	Low	Local	14 and 21	Preventive	COMPESA
9	Occasional disturbance caused to the population due to the odor liberation from STF	Negative	Probable	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
9	Improvement on the Cordeiro system sanitary conditions due to the elimination of raw wastewater discharges	Positive	Certain	Permanent	Irreversible	High	Metropolitan	14	Maximize	COMPESA
9	Improvement on the environment quality	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	–
10	Improvement of the economic situation due to the implantation of better infrastructure	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	—

Table F.3-35 Prazeres STF - Environmental Impacts Evaluation. Action I– Delimitation and licensing of the work areas

Environmental factor Analyzed	Impacts Description	ADOPTED CRITERIA								
		Attributes of the Impacts						Mitigation/ Maximization Measures		
		Classification	Occurrence Probability	Duration	Reversibility	Intensity	Area of Influence	Identification	Nature	Responsible
2	Restriction for land use and occupation in the construction areas	Negative	Certain	Permanent	Irreversible	Low	Local	23	—	—
5	Use of Jaboatão river for discharging of treated effluents	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA
6	Vegetation suppression for construction of STF	Negative	Certain	Permanent	Irreversible	Low	Local	2	Corrective	COMPESA/ Planner
6	Vegetation suppression for effluent discharge line construction	Negative	Certain	Permanent	Irreversible	Low	Local	3	Corrective	Contractor
10	Negative revalorization of the land estate around the STF	Negative	Certain	Permanent	Irreversible	Low	Local	23	-	-

Table F.3-36 Prazeres STF - Environmental Impacts Evaluation. Action II– Preliminary work services

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional development of erosive processes due to superficial soil layer removal at the work site	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
6	Vegetation cover removal for the land cleaning	Negative	Certain	Permanent	Irreversible	Low	Local	3 and 4	Corrective	Contractor
6	Fauna species removal from close forest vegetation and anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
12	Utilization of the permanent preserved zone of water streams where some of the system units will be installed	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA

Table F.3-37 Prazeres STF - Environment Impact Evaluation. Action III – Equipment and material transport

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Use of the STF area for material storage	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Occasional disturbance to the population due to the vehicles flux increase at the work site and close areas	Negative	Probable	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-38 Prazeres STF - Environment Impact Assessment. Action IV – Work site setting up, operation and deactivation

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Production of waste material during the civil works and construction site dismounting	Negative	Certain	Temporary	Reversible	Low	Local	8	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Certain	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
7	Completion of construction will cause unemployment and consequent income rate reduction	Negative	Probable	Permanent	Irreversible	Low	Metropolitan	23	–	—
9	Possibility of domestic waste discharge (solid and liquid) on the construction site may cause pollution and contamination problems	Negative	Probable	Temporary	Reversible	Low	Local	10	Preventive	Contractor

Table F.3-39 Prazeres STF - Environmental Impacts Assessment. Action V– Earthworks (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional occurrence of erosive processes due to land leveling, embankment and excavation activities	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particle suspended matter and gases liberation due to machinery and equipment operation for the land leveling work	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Possibility of soil erosion due to the earthwork near to the water streams, which may cause silting up and increasing water turbidity	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-39 Prazeres STF - Environmental Impacts Assessment. Action V– Earthworks (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the construction site and vicinity areas	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Preventive	Contractor

Table F.3-40 Prazeres STF - Environmental Impacts Assessment. Action VI–Civil Work (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional installation of erosive processes due to geo-technical work.	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particulate suspended matter and gases liberation due to machinery and equipment operation	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Occasional impact on the natural water color and turbidity due to the suspended matter load.	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
5	Occasional contamination of the underground water	Negative	Probable	Temporary	Reversible	Low	Local	12	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-40 Prazeres STF - Environmental Impacts Assessment. Action VI–Civil Work (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the work site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Increase of construction material purchase (lime, cement, tubes, sand, etc)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	13	Maximize	Contractor
10	Increase in tax collection	Positive	Certain	Temporary	Reversible	Low	Metropolitan	23	–	—
11	STF construction might provoke changes on the landscape	Negative	Certain	Permanent	Irreversible	Medium	Local	2	Preventive	COMPESA/ Planner
12	Occasional conflicts with the current legislation due to the construction site installation	Negative	Probable	Temporary	Reversible	Low	Local	1	Preventive	COMPESA

Table F.3-41 Prazeres STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
3	Occasional odor liberation from the STF	Negative	Probable	Permanent	Reversible	Low	Local	14 and 15	Preventive	COMPESA
3	Gases liberation from RAFA	Negative	Certain	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
3	Aerosol formation	Negative	Certain	Permanent	Reversible	Low	Local	2 and 15	Preventive	Planner / COMPESA
4	Increase of the noise level at the STF area due to machines, equipment and vehicles operation	Negative	Certain	Permanent	Reversible	Low	Local	14 and 17	Preventive	COMPESA
5	Decease of the organic pollution load in the Jaboatao river and other water bodies, which are drained from the urban area, due to construction of STF	Positive	Certain	Permanent	Reversible	Medium	Local	14, 18 and 20	Maximize	COMPESA
5	Potential coliform level increase in the Jaboatao river	Negative	Probable	Permanent	Reversible	Low	Local	18 and 19	Preventive	Planner / COMPESA
7	Employment and income increase due to workers hiring for the operation and maintenance of the construction site	Positive	Probable	Permanent	Irreversible	Low	Metropolitan	5	Maxim	COMPESA

Table F.3-41 Prazeres STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Production of excess sludge to be disposed	Negative	Certain	Permanent	Irreversible	Low	Local	14 and 21	Preventive	COMPESA
9	Occasional disturbance caused to the population due to the odor liberation from the treatment process	Negative	Probable	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
9	Insects proliferation in Lagoon	Negative	Probable	Temporary	Reversible	High	Metropolitan	14	Preventive	COMPESA
9	Improvement on the Prazeres system sanitary conditions due to the elimination of raw wastewater discharges.	Positive	Certain	Permanent	Irreversible	High	Metropolitan	14	Maximize	COMPESA
9	Improvement on the environment quality	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	–
10	Improvement of the economic situation due to the implantation of better infrastructure.	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	—

Table F.3-42 Curcurana STF - Environmental Impacts Evaluation. Action I– Delimitation and licensing of the work areas

Environmental factor Analyzed	Impacts Description	ADOPTED CRITERIA								
		Attributes of the Impacts						Mitigation/ Maximization Measures		
		Classification	Occurrence Probability	Duration	Reversibility	Intensity	Area of Influence	Identification	Nature	Responsible
2	Restriction for land use and occupation in the construction areas	Negative	Certain	Permanent	Irreversible	Low	Local	23	—	—
5	Use of Jaboatão river estuary for discharging of treated effluents	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA
6	Vegetation suppression for construction of STF	Negative	Certain	Permanent	Irreversible	Low	Local	2	Corrective	COMPESA/ Planner
6	Vegetation suppression for construction of discharge line	Negative	Certain	Permanent	Irreversible	Low	Local	3	Corrective	Contractor
10	Negative revalorization of the land estate around the STF	Negative	Certain	Permanent	Irreversible	High	Local	23	—	—

Table F.3-43 Curcurana STF - Environmental Impacts Evaluation. Action II– Preliminary work services

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional development of erosive processes due to superficial soil layer removal at the work site	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
6	Vegetation cover removal for the land cleaning	Negative	Certain	Permanent	Irreversible	Low	Local	3 and 4	Corrective	Contractor
6	Fauna species removal from close forest vegetation and anthropic areas	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
12	Utilization of the permanent preserved zone of water streams where some of the system units will be installed	Negative	Certain	Permanent	Irreversible	Low	Local	1	Preventive	COMPESA

Table F.3-44 Curcurana STF - Environment Impact Evaluation. Action III – Equipment and material transport

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Use of the STF area for material storage	Negative	Certain	Temporary	Reversible	Low	Local	23	—	—
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Occasional disturbance to the population due to the vehicles flux increase at the work site and close areas	Negative	Probable	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-45 Curcurana STF - Environment Impact Assessment. Action IV – Work site setting up, operation and deactivation

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
2	Production of waste material during the civil works and construction site dismounting	Negative	Certain	Temporary	Reversible	Low	Local	8	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Certain	Temporary	Reversible	Low	Local	9	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor
7	Completion of construction will cause unemployment and consequent income rate reduction	Negative	Probable	Permanent	Irreversible	Low	Metropolitan	23	–	—
9	Possibility of domestic waste discharge (solid and liquid) on the construction site may cause pollution and contamination problems	Negative	Probable	Temporary	Reversible	Low	Local	10	Preventive	Contractor

Table F.3-46 Curcurana STF - Environmental Impacts Assessment. Action V– Earthworks (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional occurrence of erosive processes due to land leveling, embankment and excavation activities	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particle suspended matter and gases liberation due to machinery and equipment operation for the land leveling work	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Possibility of soil erosion due to the earthwork near to the water streams, which may cause silting up and increasing water turbidity	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-46 Curcurana STF - Environmental Impacts Assessment. Action V– Earthworks (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the construction site and vicinity areas	Negative	Certain	Temporary	Reversible	Medium	Local	6	Preventive	Contractor
10	Possibility of hiring some local companies for material transport (trucks)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Preventive	Contractor

Table F.3-47 Curcurana STF - Environmental Impacts Assessment. Action VI–Civil work (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
1	Occasional installation of erosive processes due to geo-technical work	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
3	Particulate suspended matter and gases liberation due to machinery and equipment operation	Negative	Probable	Temporary	Reversible	Low	Local	9 and 11	Preventive	Contractor
4	Increase of the noise level due to the machines, equipment and vehicles operation during the civil works	Negative	Probable	Temporary	Reversible	Low	Local	9	Preventive	Contractor
5	Occasional impact on the natural water color and turbidity due to the suspended matter load.	Negative	Probable	Temporary	Reversible	Low	Local	4	Preventive	Contractor
5	Eventual contamination of the ground water	Negative	Probable	Temporary	Reversible	Low	Local	12	Preventive	Planner/ Contractor
7	Employment and income increase due to hiring for construction work	Positive	Probable	Temporary	Reversible	Low	Metropolitan	5	Maximize	Contractor

Table F.3-47 Curcurana STF - Environmental Impacts Assessment. Action VI–Civil work (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Increase of vehicles flux on access road to the work site causes higher accident risks	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
9	Accident risks increase due to the machinery operation and traffic of vehicles on the work site and vicinity areas	Negative	Certain	Temporary	Reversible	Low	Local	6	Preventive	Contractor
10	Increase of construction material purchase (lime, cement, tubes, sand, etc)	Positive	Probable	Temporary	Reversible	Low	Metropolitan	13	Maximize	Contractor
10	Increase in tax collection	Positive	Certain	Temporary	Reversible	Low	Metropolitan	23	–	—
11	STF construction might provoke changes on the landscape	Negative	Certain	Permanent	Irreversible	Low	Local	2	Preventive	COMPESA/ Planner
12	Occasional conflicts with the current legislation due to the construction site installation	Negative	Probable	Temporary	Reversible	Low	Local	1	Preventive	COMPESA

Table F.3-48 Curcurana STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (1/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
3	Occasional odor liberation from the STF	Negative	Probable	Permanent	Reversible	Low	Local	14 and 15	Preventive	COMPESA
3	Gases liberation from RAFA	Negative	Certain	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
3	Aerosol formation	Negative	Certain	Permanent	Reversible	Low	Local	2 and 15	Preventive	Planner / COMPESA
4	Increase of the noise level at the STF area due to machines, equipment and vehicles operation	Negative	Certain	Permanent	Reversible	Low	Local	14 and 17	Preventive	COMPESA
5	Decease of the organic pollution load in the Jaboatao river and other water bodies, which are drained from the urban area, due to construction of STF	Positive	Certain	Permanent	Reversible	Medium	Local	14, 18 and 20	Maximize	COMPESA
5	Potential coliform level increase in the Jaboatao river	Negative	Probable	Permanent	Reversible	Low	Local	18 and 19	Preventive	Planner / COMPESA
7	Employment and income increase due to workers hiring for the operation and maintenance of the construction site	Positive	Probable	Permanent	Irreversible	Low	Metropolitan	5	Maximize	COMPESA

Table F.3-48 Curcurana STF - Environmental Impacts Assessment. Action VII– System operation and maintenance (2/2)

Environmental factor Analyzed	Impacts description	ADOPTED CRITERIA								
		Impacts Attributes						Mitigation/Maximization Measures		
		Classification	Occurrence Probability	Length	Reversibility	Intensity	Area of Influence	Identification	Character	Responsible
8	Production of excess sludge to be disposed	Negative	Certain	Permanent	Irreversible	Low	Local	14 and 21	Preventive	COMPESA
9	Occasional disturbance caused to the population due to the odor liberation from STF	Negative	Probable	Permanent	Reversible	Low	Local	14, 15 and 16	Preventive	Planner / COMPESA
9	Insects proliferation in Lagoon	Negative	Probable	Permanent	Reversible	Low	Local	14	Preventive	COMPESA
9	Improvement on the Curcurana system sanitary conditions due to the elimination of raw wastewater discharges	Positive	Certain	Permanent	Irreversible	High	Metropolitan	14	Maximize	COMPESA
9	Improvement on the environment quality	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	–
10	Improvement of the economic situation due to the implantation of better infrastructure.	Positive	Certain	Permanent	Irreversible	High	Metropolitan	23	–	—

Table F.3-49 The families, genera and species of more common plants found in Conceição ETE area

FAMILIES / SPECIES	VULGAR NAME	TYPE
Anacardiaceae		
Anacardium occidentale L.	cajueiro	tree
Mangifera indica L.	mangueira	tree
Schinus terebinthifolius Raddi	aroeira-da-praia	small tree
Annonaceae		
Annona glabra L.	aticum-do-brejo	small tree
Arecaceae		
Acrocomia intumescens Drude	macaíba	tree
Cocos nucifera L.	coqueiro	tree
Elaeis guineensis Jacq.	dendê	tree
Cecropiaceae		
Cecropia sp.	embaúba	tree
Commelinaceae		
Commelina sp.	andaca	herb
Convolvulaceae		
Ipomoea asarifolia (Desr.) Roem.	jitirana	low herb
Cucurbitaceae		
Momordica charantia L.	melão-de-são-caetano	low herb
Cyperaceae		
Rhynchospora nervosa (Vahl) Boeck.	capim-estrela	herb
Euphorbiaceae		
Dalechampia sp.	tamiarana	tree herb
Fabaceae		
Cassia uniflora Spreng.		herb
Clitoria fairchildiana R.A. Howard	sombreiro	tree
Crotalaria incana L.	xique-xique	herb
Ingá sp.	ingá	tree
Senna obtusifolia (L.) Irwin & Barneby	fedegoso	bush
Senna occidentalis (L.) Link	manjerioba	bush
Stylosanthes aff. **viscosa** Sw.		herb
Lauraceae		
Cassytha americana Nees	macarrão, cipó-chumbo	liana
Lemnaceae		
Wolffia brasiliensis Wedd.	lentilha-d'água	acquatic herb
Malvaceae		
Sida linifolia Juss. ex Cav.	relógio	herb
Sida rhombifolia L.	relógio	herb
Myrtaceae		
Eucalyptus sp.	eucalípto	tree

Poaceae		
Aristida pallens Cav.	barba-de-bode	herb
Cenchrus echinatus L.	carrapicho	herb
Cynodon dactylon (L.) Pers.	grama-de-burro	herb
Paspalum maritimum Trin.	capim-gengibre	herb
Polypodiaceae		
Acrostichum aureum L.	samambaia-açu	
Rubiaceae		
Richardia gradiflora (Cham. & Schtdl.) Steud.	poaia-da-praia	herb
Spermacoce capitata Ruiz & Pavon	vassourinha	herb
Solanaceae		
Solanum paniculatum L.	jurubeba	bush
Tiliaceae		
Triumfetta semitriloba Jacq.	carrapicho	sub-bush
Turneraceae		
Turnera ulmifolia L.	chanana	herb
Verbenaceae		
Lantana camara L.	chumbinho	sub-bush.

Table F3-50 Families, genera and species of the most common animals at Conceição ETE

BIRDS	
FAMILIES/SPECIES	VULGAR NAMES
Ardeidae	
Bubulcus ibis	garça- vaqueira
Cathartidae	
Coragyps atratus	urubu-de-cabeça-preta
Coerebidae	
Coereba flaveola	caga-sebito
Cuculidae	
Crotophaga ani	anum–preto
Guira guira	anum–branco
Tapera naevia	peitica
Mimidae	
Mimus gilvus	sabiá-da-praia
Ploceidae	
Passer domesticus	pardal
Thraupidae	
Thraupis sayaca	sanhaçu
Troglodytidae	
Troglodytes aedon	roxinol
Turdidae	
Turdus rufiventris	sabiá
Tyrannidae	
Fluvicola nengeta	lavandeira
Pitangus sulphuratus	bem-te-vi
Todirostrum cinereum	relógio
Tytonidae	
Tyto alba	coruja-branca, rasga-mortalha
Vireonidae	
Cyclarhis gujanensis	pitiguarí
AMPHIBIAN	
Bufonidae	
Bufo sp	sapo-cururu
Hylidae	
Hyla minuta	rã
Leptodactylidae	
Leptodactylus ocellatus	caçote
REPTILES	
Amphisbaenidae	
Amphisbaena vermicularis	cobra-de-duas-cabeças
Colubridae	
Dromicus sp.	cobra-rainha
Philodryas nattereri	corre-campo
Philodryas sp.	cobra-verde

Teiidae	
Ameiva ameiva	calango
Tropiduridae	
Tropidurus gr. **Hispidus**	lagartixa
MAMMALS	
Cricetidae	
Oryzomys sp.	rato-do-mato
Didelphidae	
Didelphis sp.	timbú
Muridae	
Rattus rattus	guabirú

Table F.3-51 The families, genera and species of more common plants found in Janga ETE area

FAMÍLIES / SPÉCIES	VULGAR NAME	HÁBIT	TYPE
Amaranthaceae			
Amaranthus spinosus L.	bredo-de-porco	herb	AA[1]
Anacardiaceae			
Anacardium occidentale L.	cajueiro	tree	VI[2]
Tapirira guianensis Aubl.	pau-pombo	tree	RM[3]
Annonaceae			
Xylopia frutescens Aubl.	imbira-vermelha	tree	RM
Apocynaceae			
Himatanthus phagedaenicus (Mart.) Woodson	banana-de-papagaio	tree	RM
Araliaceae			
Schefflera morototoni (Aubl.) Maguire, Steyerm. & Frodin	sambaquim	tree	VI
Araceae			
Philodendron imbe Schott	imbé	hedge bindweed	RM
Arecaceae			
Acrocomia intumescens Drude	macaíba	tree	RM
Cocos nucifera L.	coqueiro	tree	VI
Elaeis guineensis Jacq.	dendê	tree	RM
Asteraceae			
Ageratum conyzoides L.	mentrasto	herb	AA
Sphagneticola trilobata (L.) Pruski	mal-me-quer	erva	AA
Boraginaceae			
Cordia nodosa Lam.	grão-de-galo	bush	RM
Capparaceae			
Cleome spinosa Jacq.	mussambê	bush	AA
Cecropiaceae			
Cecropia sp.	embaúba	tree	RM
Commelinaceae			
Commelina sp.	andaca	herb	AA
Convolvulaceae			
Ipomoea asarifolia (Desr.) Roem.	jitirana	shrub	AA
Cucurbitaceae			
Cucurbita pepo L	jirimum	shrub	AA
Momordica charantia L.	melão-de-são-caetano	shrub	AA
Cyperaceae			
Cyperus rotundus L.	capim-alho	herb	AA
Euphorbiaceae			
Chamaesyce hyssopifolia (L.) Small	burra-leiteira	herb	AA
Chamaesyce prostrata (Aiton) Small	burra-leiteira-rasteira	shrub	AA
Pera glabrata (Schott) Baill.	sete-cascas	tree	RM
Phyllanthus niruri L.	quebra-pedra	herb	AA
Ricinus comunis L.	carrapateira	bush	AA
Fabaceae			

Bowdichia virgiliodes H. B. K.	sucupira-mirim	tree	RM
Clitoria fairchildiana R.A. Howard	sombreiro	tree	VI
Crotalaria incana L.	xique-xique	herb	AA
Desmodium sp.	carrapicho	herb	AA
Hymenaea courbaril L.	jatobá	tree	RM
Senna alata (L.) Roxb.	mata-pasto	bush	AA
Senna obtusifolia (L.) Irwin & Barneby	fedegoso	bush	AA
Tamarindus indica L.	tamarinds	tree	VI
Heliconiaceae			
Heliconia psittacorum L. f.	paquevira	herb	RM
Lamiaceae			
Ocimum sp.	alfavaca-do-mato	herb	AA
Lauraceae			
Ocotea sp.	louro	tree	RM
Lecythidaceae			
Eschweilera ovata (Cambess.) Miers.	embiriba	tree	RM
Loganiaceae			
Spigelia anthelmia L.	pimenta-d'água	herb	AA
Malpighiaceae			
Byrsonima sericea DC.	murici	tree	RM
Malvaceae			
Sida cordifolia L.	relógio	herb	AA
Mimosaceae			
Mimosa pudica L.	malícia	herb	AA
Myrtaceae			
Psidium guajava L.	goiabeira	small tree	VI
Psidium guineense Sw.	araçá		AA
Poaceae			
Brachiaria decumbens Stapf.	capim-braquiária	herb	AA
Cynodon dactylon (L.) Pers.	grama-de-burro	herb	AA
Eleusine indica (L.) Gaertner	capim-pé-de-galinha	herb	AA
Rubiaceae			
Psychotria sp.	erva-de-rato	bush	RM
Spermacoce verticillata L.	vassourinha-de-botão	herb	AA
Solanaceae			
Solanum paniculatum L.	jurubeba	bush	AA
Turneraceae			
Turnera ulmifolia L.	chanana	herb	AA

1 (AA): vegetation of anthropizated area; 2 (VI): introduced vegetation; 3 (RM): reminiscent

Table F.3-52 Families, genera and species of the most common animals at Janga ETE

BIRDS	
FAMÍLIES / SPÉCIE	VULGAR NAME
Ardeidae	
Bubulcus íbis	garça- vaqueira
Cathartidae	
Coragyps atratus	urubu-de-cabeça-preta
Columbidae	
Columbina minuta	rolinha
Cuculidae	
Crotophaga ani	anum – preto
Guira guira	anum – branco
Tyrannidae	
Fluvicola nengeta	lavandeira
Pitangus sulphuratus	bem-te-vi
Todirostrum cinereum	relógio
Troglodytidae	
Troglodytes aedon	rouxinol
Turdidae	
Turdus rufiventris	sabiá
Vireonidae	
Cyclarhis gujanensis	pitiguarí
Coerebidae	
Coereba flaveola	caga-sebito
Ploceidae	
Passer domesticus	pardal
AMPHIBIOUS	
Bufonidae	
Bufo sp	sapo-cururu
Hylidae	
Gastrotheca sp.	perereca
Hyla minuta	rã
Phyllomedusa sp.	perereca
Leptodactylidae	
Leptodactylus ocellatus	caçote
RÉPTILES	
Boidae	
Boa constrictor	jibóia
Colubridae	
Philodryas sp.	cobra-verde
Dromicus sp.	cobra-rainha
Elapidae	
Micrurus ibiboboca	cobra-coral
Gekkonidae	
Hemidactylus mabouia	briba
Igaunidae	

Iguana iguana	camaleão
Teiidae	
Ameiva ameiva	calango
Tupinambis teguixin	tejú
Tropiduridae	
Tropidurus gr. **Hispidus**	lagartixa
Amphisbaenidae	
Amphisbaena vermicularis	cobra-de-duas-cabeças
MAMALS	
Didelphidae	
Didelphis sp.	timbú
Callithricidae	
Callithrix jaccus	saguim
Dasypodidae	
Euphractus sexcinctus	tatu-peba
Cricetidae	
Oryzomys sp.	rato-do-mato
Muridae	
Rattus rattus	guabirú

Table F.3-53 The families, genera and species of the commonest plants in ETE Cabanga area

FAMILIES / SPECIES	VULGAR NAME	TYPE	LOC
Anacardiaceae			
Mangifera indica L.	mangueira	tree	PA
Annonaceae			
Annona muricata L.	graviola	small tree	PA
Arecaceae			
Cocos nucifera L.	coqueiro	tree	PA
Dypsis lutescens H. Wendl.	areca-bambu	small tree	PA
Roystonea oleracea (Jacq.) O. F. Cook	palmeira-real	tree	PA
Asteraceae			
Ageratum conyzoides L.	mentrasto	herb	AD
Sphagneticola trilobata (L.) Pruski	mal-me-quer	herb	AD
Caricaceae			
Carica papaya L.	mamoeiro	small tree	PA
Chrysobalanaceae			
Licania tomentosa (Benth.) Fritsch	oiti-da-praia	tree	PA
Combretaceae			
Laguncularia racemosa Gaertn.	mangue-branco	small tree	ME
Commelinaceae			
Tradescantia spathacea Sw.	arca-de-noé	herb	PA
Convolvulaceae			
Ipomoea asarifolia (Desr.) Roem.	jitirana	low herb	AD
Cucurbitaceae			
Cucurbita pepo L	jirimum	low herb	AD
Momordica charantia L.	melão-de-são-caetano	low herb	AD
Cyperaceae			
Cyperus rotundus L.	capim-alho	herb	AD
Euphorbiaceae			
Catharanthus roseus G. Don	bom-dia, boa-noite	herb	PA
Chamaesyce hyssopifolia (L.) Small	burra-leiteira	herb	AD
Chamaesyce prostrata (Aiton) Small	burra-leiteira-rasteira	low herb	AD
Croton lobatus L.	mandioquinha	herb	AD
Phyllanthus niruri L.	quebra-pedra	herb	AD
Ricinus comunis L.	carrapateira	bush	AD
Fabaceae (Leguminosae)			
Clitoria fairchildiana R.A. Howard	sombreiro	tree	PA
Crotalaria incana L.	xique-xique	herb	AD
Delonix regia (Bojer ex Hook.) Raf.	flamboaian	tree	PA
Desmodium sp.	carrapicho	herb	AD
Senna obtusifolia (L.) Irwin & Barneby	fedegoso	bush	AD
Heliconiaceae			
Heliconia psittacorum L. f.	paquevira	herb	PA
Liliaceae			
Dracaena marginata Lam.	coqueirinho-de-venus	bush	PA
Sansevieria trifasciata Hort. ex Paine	espada-de-são-jorge	herb	PA
Loganiaceae			

Spigelia anthelmia L.	pimenta-d'água	herb	AD
Malpighiaceae			
Malpighia emarginata DC.	acerola	small tree	PA
Malvaceae			
Hibiscus rosa-sinensis L.	papoula	bush	PA
Sida cordifolia L.	relógio	herb	AD
Mimosaceae			
Mimosa pudica L.	malícia	herb	AD
Moraceae			
Artocarpus altilis (Parkinson) Fosberg	fruta-pão	tree	PA
Myrtaceae			
Eucalyptus sp.	eucalípto	tree	PA
Eugenia sp.	jambeiro	tree	PA
Psidium guajava L.	goiabeira	small tree	PA
Poaceae			
Brachiaria decumbens Stapf.	capim-braquiária	herb	AD
Cenchrus echinatus L.	carrapicho	herb	AD
Cynodon dactylon (L.) Pers.	grama-de-burro	herb	AD
Eleusine indica (L.) Gaertner	capim-pé-de-galinha	herb	AD
Paspalum notatum L.	grama-batatais	herb	AD
Portulacaceae			
Portulaca oleracea L.	bredo-do-mato	low herb	AD
Rubiaceae			
Spermacoce verticillata L.	vassourinha-de-botão	herb	AD
Sapindaceae			
Filicium sp.	felício	tree	PA
Solanaceae			
Solanum paniculatum L.	jurubeba	bush	AD
Turneraceae			
Turnera ulmifolia L.	chanana	herb	AD

Table F.3-54 The families, genera and species of the commonest animal in ETE Cabanga area

BIRDS		
FAMILIES / SPECIES	VULGAR NAME	TYPE
Ardeidae		
Bubulcus íbis	garça - vaqueira	ME
Cuculidae		
Crotophaga ani	anum–preto	ME
Tyrannidae		
Fluvicola nengeta	lavandeira	GE
Pitangus sulphuratus	bem-te-vi	GE
Todirostrum cinereum	relógio	GE
Troglodytidae		
Troglodytes aedon	roxinol	GE
Coerebidae		
Coereba flaveola	caga-sebito	GE
Ploceidae		
Passer domesticus	pardal	GE
AMPHIBIANS		
Leptodactylidae		
Leptodactylus ocellatus	caçote	GE
REPTILES		
Gekkonidae		
Hemidactylus mabouia	briba	GE
Tropiduridae		
Tropidurus gr. hispidus	lagartixa	GE
MAMMALS		
Didelphidae		
Didelphis sp.	timbú	GE
Muridae		
Rattus rattus	guabirú	GE

Table F.3-55 The families, genera and species of more common plants found in Boa Viagem ETE area

FAMILIES / SPECIES	VULGAR NAME	TYPE
Amaranthaceae		
Alternanthera philoxeroides (Mart.) Griseb.	bredo-d'água	herb
Amaranthus spinosus L	bredo-de-porco	herb
Anacardiaceae		
Anacardium occidentale L.	cajueiro	tree
Mangifera indica L.	mangueira	tree
Schinus terebinthifolius Raddi.	aroeira-da-praia	tree
Spondias mombin L.	cajá	tree
Arecaceae		
Acrocomia intumescens Drude	macaíba	tree
Cocos nucifera L.	coqueiro	tree
Elaeis guineensis Jacq.	dendê	tree
Asteraceae		
Acanthospermum hispidum DC.	espinho-de-cigano	herb
Ageratum conyzoides L.	mentrasto	herb
Eclipta alba (L.) Hassk.	cravo-brabo	herb
Emilia coccinea (Sims) F. Don	pincel-de-estudante	herb
Galinsoga parviflora Cav.	botão-de-ouro	herb
Melampodium paniculatum Gardner	botão-de-ouro	herb
Sphagneticola trilobata (L.) Pruski	mal-me-quer	herb
Tridax procumbens L.	erva-de-touro	herb
Boraginaceae		
Heliotropium indicum L.	fedegoso	herb
Capparaceae		
Cleome spinosa Jacq.	mussambê	bush
Commelinaceae		
Commelina sp.	andaca	herb
Convolvulaceae		
Ipomoea asarifolia (Desr.) Roem.	jitirana	low herb
Merremia aegyptia (L.) Urb.	jitirana-branca	herb.
Merremia umbelata (L.) Hallier. f.	jitirana-amarela	herb
Cucurbitaceae		
Luffa aegyptiaca Mill.	bucha	herb
Momordica charantia L.	melão-de-são-caetano	low herb
Cyperaceae		
Cyperus brevifolius (Rottb.) Hassk.	junquinho	herb
Cyperus difformis L.	tiririca-do-brejo	herb
Cyperus rotundus L.	capim-alho	herb
Rhynchospora nervosa (Vahl) Boeck.	capim-estrela	herb
Euphorbiaceae		
Chamaesyce hirta (L.) Millsp.	burra-leiteira	herb
Chamaesyce hyssopifolia (L.) Small	burra-leiteira	herb
Chamaesyce prostrata (Aiton) Small	burra-leiteira	low herb
Croton lobatus L.	mandioquinha	herb
Dalechampia sp.	tamiarana	high herb

Phyllanthus niruri L.	quebra-pedra	herb
Ricinus comunis L.	carrapateira	bush
Fabaceae		
Clitoria fairchildiana R.A. Howard	sombreiro	tree
Crotalaria incana L.	xique-xique	herb
Desmodium adscendens (Sw.) DC.	carrapicho-beiço-de-boi	herb
Desmodium barbatum (L.) Benth.	carrapicho-beiço-de-boi	herb
Desmodium incanum DC.	carrapicho-beiço-de-boi	herb
Mimosa pudica L.	malícia	herb
Senna alata (L.) Roxb.	fedegoso	bush
Senna occidentalis (L.) Link	manjerioba	bush
Malvaceae		
Sida rhombifolia L.	relógio	herb
Urena lobata L.	malva-roxa	bush
Onagraceae		
Ludwigia elegans (Cambess.) H. Hara	cruz-de-malta	herb
Ludwigia aff. **leptocarpa** (Nutt.) H. Hara	cruz-de-malta	herb
Poaceae		
Brachiaria decumbens Stapf.	capim-braquiária	herb
Cenchrus echinatus L.	carrapicho	herb
Cynodon dactylon (L.) Pers.	grama-de-burro	herb
Dactyloctenium aegyptium (L.) P. Beauv.	capim-mão-de-sapo	herb
Eleusine indica (L.) Gaertn.	capim-pé-de-galinha	herb
Eragrostis ciliaris (L.) R. Br.	capim-penacho	herb
Paspalum maritimum Trin.	capim-gengibre	herb
Paspalum notatum Flügge	grama batatais	herb
Rubiaceae		
Diodia saponariifolia (Cham. & Schltdl.) Schum.	bredo-do-brejo	herb
Richardia grandiflora (Cham. & Schltdl.) Steud.	bredo	herb
Spermacoce capitata Ruiz & Pavon	vassourinha	herb
Spermacoce verticillata L.	vassourinha-de-botão	herb
Scrophulariaceae		
Scoparia dulcis L.	vassourinha	herb
Solanaceae		
Solanum americanum Mill.	erva-moura	herb
Solanum paniculatum L.	jurubeba	bus
Tiliaceae		
Triumfetta semitriloba Jacq.	carrapicho	sub-bush
Turneraceae		
Turnera ulmifolia L.	chanana	herb
Umbelliferae		
Hydrocotyle bonariensis Lam.	capitão	herb
Verbenaceae		
Lantana camara L.	chumbinho	sub-bush
Stachytarpheta elatior Schrad. ex Schult.	erva-de-grilo	herb

Table F.3-56 Families, genera and species of the most common animals at Boa Viagem ETE

BIRDS	
FAMILIES/SPECIES	VULGAR NAME
Ardeidae	
Bubulcus ibis	garça- vaqueira
Cathartidae	
Coragyps atratus	urubu-de-cabeça-preta
Coerebidae	
Coereba flaveola	caga-sebito
Cuculidae	
Crotophaga ani	anum – preto
Guira guira	anum – branco
Ploceidae	
Passer domesticus	pardal
Thraupidae	
Thraupis sayaca	sanhaçu
Troglodytidae	
Troglodytes aedon	roxinol
Turdidae	
Turdus rufiventris	sabiá
Tyrannidae	
Fluvicola nengeta	lavandeira
Pitangus sulphuratus	bem-te-vi
Todirostrum cinereum	relógio
Tytonidae	
Tyto alba	coruja-branca, rasga-mortalha
Vireonidae	
Cyclarhis gujanensis	pitiguarí
AMPHIBIAN	
Bufonidae	
Bufo sp	sapo-cururu
Hylidae	
Hyla minuta	rã
Leptodactylidae	
Leptodactylus ocellatus	caçote
REPTILES	
Amphisbaenidae	
Amphisbaena vermicularis	cobra-de-duas-cabeças
Boidae	
Boa constrictor	jibóia
Colubridae	
Clelia clelia	mussurana
Dromicus sp.	cobra-rainha

Philodryas nattereri	corre-campo
Philodryas sp.	cobra-verde
Teiidae	
Ameiva ameiva	calango
Tropiduridae	
Tropidurus gr. **hispidus**	lagartixa
MAMMALS	
Cricetidae	
Oryzomys sp.	rato-do-mato
Didelphidae	
Didelphis sp.	timbú
Muridae	
Rattus rattus	guabirú

Table F.3-57 The families, genera and species of more common plants found in Cordeiro ETE area

FAMILIES / SPECIES	VULGAR NAME	TYPE
Amaranthaceae		
Alternanthera philoxeroides (Mart.) Griseb.	bredo-d'água	herb
Amaranthus spinosus l.	bredo-de-porco	herb
Arecaceae		
Acrocomia intumescens Drude	macaíba	tree
Asteraceae		
Ageratum conyzoides L.	mentrasto	herb
Emilia coccinea (Sims) F. Don	algodão-de-preá	herb
Sphagneticola trilobata (L.) Pruski	mal-me-quer	herb
Spilanthes acmella (L.) Murray	coentro-do-pará	herb
Bignoniaceae		
Tecoma stans (L.) Juss. ex Kunth	paudarquinho	bush
Capparaceae		
Cleome spinosa Jacq.	mussambê	bush
Combretaceae		
Laguncularia racemosa Gaertn.	mangue-branco	small tree
Commelinaceae		
Commelina sp.	andaca	herb
Convolvulaceae		
Ipomoea asarifolia (Desr.) Roem.	jitirana	Low herb
Ipomoea carnea Jacq. subsp. **fistulosa** (Mart. ex Choisy) D. F. Austin	algodão-brabo	bush
Cucurbitaceae		
Momordica charantia L.	melão-de-são-caetano	Low herb
Cyperaceae		
Cyperus rotundus L.	capim-alho	herb
Euphorbiaceae		
Chamaesyce hyssopifolia (L.) Small	burra-leiteira	herb
Ricinus comunis L.	carrapateira	bush
Fabaceae		
Crotalaria incana L.	xique-xique	herb
Desmodium sp.	carrapicho	herb
Dimorphandra sp.	canafístula	bush
Mimosa pudica L.	malícia	herb
Senna alata (L.) Roxb.	mata-pasto	bush
Senna obtusifolia (L.) Irwin & Barneby	fedegoso	bush
Senna occidentalis (L.) Link	manjerioba	bush
Lamiaceae		
Ocimum micranthum Willd.	alfavaca-do-mato	herb
Lemnaceae		
Wolffia brasiliensis Wedd.	lentilha-d'água	Acquatic herb
Limnocharitaceae		
Limnocharia flava (L.)Buchenau	chapéu-de-coro	Acquatic herb

Malvaceae		
Sida cordifolia L.	malva	herb
Onagraceae		
Ludwigia sp.	cruz-de-malta	herb
Pontederiaceae		
Eichhornia paniculata (Spreng.) Solms	baronesa	Acquatic herb
Poaceae		
Brachiaria decumbens Stapf.	capim-braquiária	herb
Cynodon dactylon (L.) Pers.	grama-de-burro	herb
Echinochloa polystachya (Kunth) Hitchc.	canarana	herb
Paspalum notatum Flügge	grama batatais	herb
Rubiaceae		
Diodia saponariifolia (Cham. & Schltdl) Schum.	bredo-do-brejo	herb
Spermacoce capitata Ruiz & Pavon	bredo-do-brejo	herb
Spermacoce verticillata L.	vassourinha-de-botão	herb
Scrophulariaceae		
Scoparia dulcis L.	vassourinha	herb
Solanaceae		
Solanum paniculatum L.	jurubeba	bush
Turneraceae		
Turnera ulmifolia L.	chanana	herb
Urticaceae		
Urtica dioica L.	urtiga-braba	herb
Verbenaceae		
Stachytarpheta elatior Scharad. ex Scult.	erva-de-grilo	herb

Table F.3-58 Families, genera and species of the most common animals at Cordeiro ETE area.

BIRDS	
FAMILIES / SPECIES	VULGAR NAME
Ardeidae	
Bubulcus íbis	garça- vaqueira
Cathartidae	
Coragyps atratus	urubu-de-cabeça-preta
Coerebidae	
Coereba flaveola	caga-sebito
Columbidae	
Columbina minuta	rolinha
Cuculidae	
Crotophaga ani	anum – preto
Guira guira	anum – branco
Tapera naevia	peitica
Fringillidae	
Sicalis flaveola	canário
Sporophila albogularis	patativa-golada
Sporophila bouvreuil	caboclinho
Sporophila nigricollis	papa-capim
Furnariidae	
Phacellodomus rufifrons	casaca-de-couro
Ploceidae	
Passer domesticus	pardal
Psittacidae	
Aratinga solstitialis	jandaia
Thraupidae	
Thraupis sayaca	sanhaçu
Troglodytidae	
Troglodytes aedon	roxinol
Turdidae	
Turdus rufiventris	sabiá
Tyrannidae	
Fluvicola nengeta	lavandeira
Pitangus sulphuratus	bem-te-vi
Todirostrum cinereum	relógio
Tytonidae	
Tyto Alba	coruja-branca, rasga-mortalha
Vireonidae	
Cyclarhis gujanensis	pitiguarí
ANPHIBIAN	
Bufonidae	
Bufo sp	sapo-cururu
Hylidae	
Hyla minuta	rã

Leptodactylidae	
Leptodactylus ocellatus	caçote
REPTILES	
Amphisbaenidae	
Amphisbaena vermicularis	cobra-de-duas-cabeças
Boidae	
Boa constrictor	jibóia
Colubridae	
Clelia Clélia	mussurana
Dromicus sp.	cobra-rainha
Philodryas nattereri	corre-campo
Philodryas sp.	cobra-verde
Teiidae	
Ameiva ameiva	calango
Tropiduridae	
Tropidurus gr. **Hispidus**	lagartixa
MAMALS	
Cricetidae	
Oryzomys sp.	rato-do-mato
Didelphidae	
Didelphis sp.	timbú
Muridae	
Rattus rattus	guabirú

Table F.3-59 The families, genera and species of more common plants found in Prazeres ETE area

FAMILIES / SPECIES	VULGAR NAME	HABIT
Amaranthaceae		
Alternanthera philoxeroides (Mart.) Griseb.	bredo-d'água	herb
Arecaceae		
Acrocomia intumescens Drude	macaíba	tree
Elaeis guineensis Jacq.	dendê	tree
Asteraceae		
Ageratum conyzoides L.	mentrasto	herb
Sphagneticola trilobata (L.) Pruski	mal-me-quer	herb
Combretaceae		
Terminalia catappa L.	castanhola	tree
Commelinaceae		
Commelina sp.	andaca	herb
Convolvulaceae		
Ipomoea asarifolia (Desr.) Roem.	jitirana	low herb
Cucurbitaceae		
Momordica charantia L.	melão-de-são-caetano	low herb
Cyperaceae		
Cyperus rotundus L.	capim-alho	herb
Euphorbiaceae		
Chamaesyce hyssopifolia (L.) Small	burra-leiteira	herb
Ricinus comunis L.	carrapateira	bush
Fabaceae		
Clitoria fairchildiana R.A. Howard	sombreiro	tree
Crotalaria incana L.	xique-xique	herb
Mimosa pudica L.	malícia	herb
Malvaceae		
Sida cordifolia L.	malva	herb
Poaceae		
Brachiaria decumbens Stapf.	capim-braquiária	herb
Cynodon dactylon (L.) Pers.	grama-de-burro	herb
Paspalum notatum Flügge	grama batatais	herb
Rubiaceae		
Diodia saponariifolia (Cham. & Schltdl) Schum.	bredo-do-brejo	herb
Spermacoce verticillata L.	vassourinha-de-botão	herb
Scrophulariaceae		
Scoparia dulcis L.	vassourinha	herb
Solanaceae		
Solanum paniculatum L.	jurubeba	bush
Turneraceae		
Turnera ulmifolia L.	chanana	herb
Typhaceae		
Typha angustifolia L.	tabôa	herb

Table F.3-60 Families, genera and species of the most common animals at Prazeres ETE

BIRDS	
FAMILIES / SPECIES	VULGAR NAME
Ardeidae	
Bubulcus íbis	garça- vaqueira
Coerebidae	
Coereba flaveola	caga-sebito
Cuculidae	
Crotophaga ani	anum – preto
Guira guira	anum – branco
Ploceidae	
Passer domesticus	pardal
Tyrannidae	
Fluvicola nengeta	lavandeira
Pitangus sulphuratus	bem-te-vi
AMPHIBIAN	
Bufonidae	
Bufo sp	sapo-cururu
Hylidae	
Hyla minuta	rã
Leptodactylidae	
Leptodactylus ocellatus	caçote
REPTILES	
Amphisbaenidae	
Amphisbaena vermicularis	cobra-de-duas-cabeças
Boidae	
Boa constrictor	jibóia
Colubridae	
Clelia clélia	mussurana
Philodryas nattereri	corre-campo
Philodryas sp.	cobra-verde
Teiidae	
Ameiva ameiva	calango
Tropiduridae	
Tropidurus gr. **Hispidus**	lagartixa
MAMMALS	
Cricetidae	
Oryzomys sp.	rato-do-mato
Muridae	
Rattus rattus	guabirú

Table F.3-61 The families, genera and species of more common plants found in Curcurana ETE area

FAMILIES / SPECIES	VULGAR NAME	TYPE
Amaranthaceae		
Alternanthera maritima St. Hil.	bredo	herb
Alternanthera philoxeroides (Mart.) Griseb.	bredo-d'água	herb
Iresine portulacoides Moq.	bredo-da-praia	herb
Anacardiaceae		
Anacardium occidentale L.	cajueiro	tree
Tapirira guianensis Aubl.	pau-pombo	tree
Apocynaceae		
Hancornia speciosa Gomes	mangabeira	small tree
Arecaceae		
Acrocomia intumescens Drude	macaíba	tree
Cocos nucifera L.	coqueiro	tree
Elaeis guineensis Jacq.	dendê	tree
Asteraceae		
Ageratum conyzoides L.	mentrasto	herb
Centratherum punctatum Cass.	perpétua	herb
Emilia coccinea (Sims) F. Don	pincel-de-estudante	herb
Sphagneticola trilobata (L.) Pruski	mal-me-quer	herb
Clusiaceae		
Vismia guianensis (Aubl.) Choisy	lacre	bush
Combretaceae		
Laguncularia racemosa Gaertn.	mangue-branco	small tree
Commelinaceae		
Commelina sp.	andaca	herb
Convolvulaceae		
Ipomoea asarifolia (Desr.) Roem.	jitirana	low herb
Cucurbitaceae		
Momordica charantia L.	melão-de-são-caetano	low herb
Cyperaceae		
Cyperus brevifolius (Rottb.) Hassk.	junquinho	herb
Cyperus difformis L.	tiririca-do-brejo	herb
Cyperus sesquiflorus (Torrey) Mattf. & Kük.	junquinho	herb
Cyperus rotundus L.	capim-alho	herb
Eleocharis interstincta (Vahl) Roem. & Scult.	junco	herb
Rhynchospora nervosa (Vahl) Boeck.	capim-estrêla	herb
Euphorbiaceae		
Chamaesyce hirta (L.) Millsp.	burra-leiteira	herb
Chamaesyce hyssopifolia (L.) Small	burra-leiteira	herb
Phyllanthus niruri L.	quebra-pedra	herb
Ricinus comunis L.	carrapateira	bush
Sebastiania corniculata (Vah.) Mull. Arg.	guaxuma	herb
Fabaceae		
Chamaecrista sp.	mata-pasto	herb
Crotalaria incana L.	xique-xique	herb
Desmodium sp.	carrapicho	herb

Mimosa pudica L.	malícia	herb
Senna alata (L.) Roxb.	mata-pasto	bush
Heliconiaceae		
Heliconia psittacorum L. f.	paquevira	herb
Malvaceae		
Sida cordifolia L.	relógio	herb
Urena lobata L.	malva-roxa	sub-bush.
Myrtaceae		
Psidium guineense Sw.	araçá	
Melastomataceae		
Clidemia sp.		sub-bush.
Poaceae		
Brachiaria decumbens Stapf.	capim-braquiária	herb
Cynodon dactylon (L.) Pers.	grama-de-burro	herb
Eleusine indica (L.) Gaertner	capim-pé-de-galinha	herb
Paspalum maritimum Trin.	capim-gengibre	herb
Paspalum notatum Flügge	grama-batatais	herb
Rubiaceae		
Richardia gradiflora (Cham. & Schtdl.) Steud.	poaia-da-praia	herb
Spermacoce ecapitata Ruiz & Pavon	vassourinha	herb
Spermacoce verticillata L.	vassourinha-de-botão	herb
Solanaceae		
Solanum paniculatum L.	jurubeba	bush
Turneraceae		
Turnera ulmifolia L.	chanana	herb
Umbelliferae		
Hydrocotyle bonariensis L.	capitão	herb
Verbenaceae		
Lantana camara L.	chumbinho	sub-bush

Table F.3-62 Families, genera and species of the most common animals at Curcurana ETE

BIRDS	
FAMILIES / SPECIES	VULGAR NAME
Ardeidae	
Bubulcus íbis	garça- vaqueira
Egretta thula	garça-branca-pequena
Cathartidae	
Coragyps atratus	urubu-de-cabeça-preta
Coerebidae	
Coereba flaveola	caga-sebito
Cuculidae	
Crotophaga ani	anum–preto
Guira guira	anum–branco
Tapera naevia	peitica
Mimidae	
Mimus gilvus	sabiá-da-praia
Ploceidae	
Passer domesticus	pardal
Thraupidae	
Thraupis sayaca	sanhaçu
Troglodytidae	
Troglodytes aedon	roxinol
Turdidae	
Turdus rufiventris	sabiá
Tyrannidae	
Fluvicola nengeta	lavandeira
Pitangus sulphuratus	bem-te-vi
Todirostrum cinereum	relógio
Tytonidae	
Tyto Alba	coruja-branca, rasga-mortalha
Vireonidae	
Cyclarhis gujanensis	pitiguarí
AMPHIBIANS	
Bufonidae	
Bufo sp	sapo-cururu
Hylidae	
Hyla minuta	rã
Leptodactylidae	
Leptodactylus ocellatus	caçote
RÉPTILES	
Amphisbaenidae	
Amphisbaena vermicularis	cobra-de-duas-cabeças
Colubridae	
Dromicus sp.	cobra-rainha

Philodryas nattereri	corre-campo
Philodryas sp.	cobra-verde
Teiidae	
Ameiva ameiva	calango
Tropiduridae	
Tropidurus gr. **Hispidus**	lagartixa
MAMMALS	
Canidae	
Cerdocyon thous	raposa
Cricetidae	
Oryzomys sp.	rato-do-mato
Didelphidae	
Didelphis sp.	timbú
Muridae	
Rattus rattus	guabirú
FISH	
Centropomus sp.	camorim
CRUSTÁCEANS	
Cardisoma guanhumi	guaiamum
Macrobrachium acanthurus	camarão
Uca rapax	chama-maré
Uca leptodactyla	chama-maré
Uca mordax	chama-maré