

- i) Touristic potential
 - j) Accessibility
- 2) Management and Personnel needs
 - 3) Support infrastructure for ecotourism in the neighbor communities
 - 4) Legal constitution and existing problems
 - 5) Budgetary requirements
- (4) Equipment, Supplies and Indicative Cost

Equipment & Supplies	Indicative Cost (US\$)
4 WD-Vehicle	27,000
Various camping Equipment	2,000
Fuel and Per-Diem	5,000
Total	US\$ 34,000

(5) Staff Requirements and Indicative Cost

Staff Requirements	Indicative Cost (US\$)
Technician (Superior Level) @ \$3,500/month x 3 months	10,500
Assistants (2x) @ \$1,000/month x 3 months	6,000
Total	US\$ 16,500

(6) Implementation Schedule

It is estimated that 3 months are required to complete the assessment . Every 5 years the assessment f the implemented management plans and existing conditions should be monitored.

(7) Source

- 1) Eng. Evandro da Silva Pinheiro, IAP, Conservation Areas Department
- 2) Eng. Wilson Laureiro, IAP, Conservation Areas Department

7.4.5 Program for the identification of the Periodically Inundated Lowlands (Varzea) along the Bitumirim River

(1) Introduction

Approximately 48,392 ha of lowlands along river margins are estimated by COPATI (35) to be located along the Tibagi, and Iapo rivers and their tributaries. Some 362,327 ha have been already drained and reclaimed by agricultural practices.

These areas are considered important as habitat for a variety of aquatic animals and birds, section 6.2.1, 2.9.1, and 3.1.1 of this report summarize the impacts, importance, and

historical reasons for the destruction of this habitat.

The present program aims at the basic study to identify the botanical associations with given soil types, and the animal associations occurring in this habitat, to provide the data base for the rehabilitation of degraded lowlands along the basin.

(2) Objectives

- 1) To establish the basic data on botanical associations and soil type along the Bitumirin river lowlands
- 2) To establish the criteria to rehabilitate and preserve this habitat adjacent to the urban area
- 3) To establish the data base for the rehabilitation of similar degraded areas along the Tibagi and Iapo rivers.

(3) Items to be Covered

- 1) Definition of soil types, textures, and hydromorphic characters
- 2) Definition of the existing botanical associations and their state of perturbation
- 3) Definition of the pioneering species, soil requirements, and nursery production requirements.
- 4) Definition of the second stage colonizing species, their soil requirements, and nursery production requirements

(4) Area to be covered

The area to be covered is the periodically inundated lowland of the Bitumirin river, the extension of the area is to be determined, and should include a significant stretch from the water limit up to the highest water mark inland. The length of the strip is to be determined.

(5) Staff Requirements and Indicative Cost

Staff Requirements	Indicative (US\$/year)	Cost
Botanist @ \$ 24,000/year	24,000	
Assistant (2x) @ \$ 7,200/year each	14,400	
Aquatic Biologist @ \$ 24,000/year	24,000	
Ornithologist @ \$24,000/year	24,000	
Per-diem @ \$50/day/person for 6 months	54,000	
Total	US \$ 140,400	

(6) Equipment Requirements and Indicative Cost

Equipment Requirements	Indicative Cost (US\$)
Laboratory analysis	25,000
Plant identification	40,000
Field equipment	30,000
Others	10,000
Total	US \$ 105,000

Total estimated cost for one year study is US\$ 245,000.

(7) Implementation Schedule

One year study is considered in this program, 6 months in the field, and 6 months in the laboratory

7.5 Monitoring Programs for Tibagi River Basin

7.5.1 Program for the Assessment of the Aquatic Environment through the use of Bioindicators

(1) Introduction

The use of bioindicators such as biodiversity of benthic macroinvertebrates, microcrustacean (*Daphnia magna*) toxicity tests, and fish liver condition as a central metabolic and detoxification organ represent desirable assessments for the aquatic ecosystem.

Results with bioindicators are complimentary to chemical analysis, the correlation of both test will give a comprehensive assessment of the water environment condition.

(2) Objectives

- 1) To provide a pollution criteria based on the aquatic biota response to pollutants.
- 2) To provide the data base on the pollutant effect upon living aquatic communities
- 3) To assess water pollution where punctual chemical analysis may overlook chronic deleterious effects on the biota.
- 4) To assess in situ the entrance periodicity of toxic substances to the water treatment plants.

(3) Items to be Covered

- 1) Benthonic macroinvertebrate community sampling and biodiversity assessment in agricultural areas, industrial areas and water intake locations.
- 2) Acute toxicity tests with *Daphnia magna* clone #5-EEC
- 3) Initial research efforts for the detection of suitable endemic fish species susceptible enough to environmental stress and liver tissue histopathology.

- 4) Data correlation with chemical analysis performed in the same sampling areas.

(4) Sampling Stations

Sampling locations should include, but not restricted to the following:

- 1) Water intake locations
- 2) Aquatic recreational areas
- 3) Point discharge of industrial areas, upstream, point location, and downstream.
- 4) Upstream, middle, and downstream from main urban areas.
- 5) Upstream, middle, and downstream from main agricultural areas.
- 6) Upstream, middle, and downstream from aquaculture areas.

Among the mentioned locations, 2 pilot studies are considered:

- 1) Microbasin study:
 - a) Including the Cafezal river microbasin, with agricultural pollution problems. 12 stations for benthic macroinvertebrate monitoring are to be selected in this microbasin.
 - b) Water intake locations:
 - i) Upper Tibagi
3 Daphnia monitors, for Arapongas, Cafezal, and Londrina water intakes
6 benthic macroinvertebrate monitoring stations upstream and downstream from the intakes
 - ii) Middle Tibagi
1 Daphnia monitor for Telémaco Borba water intake
6 benthic macroinvertebrate monitoring stations upstream and downstream from the intakes.
 - iii) Lower Tibagi
4 benthic macroinvertebrate stations to be allocated

(5) Sampling Frequency

- 1) Microbasin study
 - a) First 2 years, every 3 months, 12 stations for benthos monitoring
 - b) Following 2 years, every 6 months, 12 stations for benthos monitoring
 - c) Remaining 9 years, yearly monitoring, 12 stations for benthos monitoring
- 2) Water intake locations
 - a) First 3 years, every month, 8 stations for benthos monitoring

- b) Following 11 years, every 6 months, 8 stations for benthos monitoring
- c) Daphnia monitoring on a continuous basis through biomonitor equipment installed at the water treatment station.

(6) Items to be Managed

- 1) Identify the existing benthic macroinvertebrates in the area
- 2) Identify bioindicators of water quality.
- 3) Correlate information with chemical analysis.
- 4) Establishment a water quality criteria through the appearance of bioindicators.
- 5) Establishment of continuous monitoring equipment for Daphnia magna toxicity tests.

(7) Equipment Required and Indicative Cost

Equipment Requirements	Indicative Cost (US\$)
1) Integrated Ecotoxicology Laboratory	
Laboratory area, 70 m ² construction	
@ \$ 700/ m ² , for Londrina	49,000
Laboratory Equipment	200,000
4 WD-Vehicle	30,000
Fuel (one year)	5,000
Computers (5x)	20,000
Chemical Analysis	20,000
2) Biomonitor equipment	
Biomonitors (4x)	
@ \$110,000/each,	
with grapher and microprocessors	440,000
Lab.Equipment Support	15,000
Total	US \$ 779,000

Note:

- 1) Integrated Ecotoxicological Laboratory comprehends the following areas:
 - a) Daphnia bimonitoring support lab.
 - b) Benthic macroinvertebrate lab.
 - c) Microalgae lab.
 - d) Bacteriological lab.
 - e) Fish toxicology lab.
- 2) Laboratory Centers are conceived in:
 - a) Curitiba/IAP (existing)

b) Toledo /IAP (see section 7.3.1)

c) Londrina

3) Biomonitor equipment is to be installed in the water treatment plants. See Fig.7.6

(8) Staff Requirements and Indicative Cost

Staff Requirements	Indicative Cost (US\$/year)
1) Integrated Ecotoxicology Laboratory (Londrina)	
5 professionals, 1 per area mentioned, @ \$ 24,000/year/each	120,000
10 Assistants @ \$ 9,600/year/each	96,000
Training 5 persons @ \$ 10,000/each	50,000
Per-Diem 126 days @ \$ 50/day	6,300
2)Daphnia Monitoring	
Training 4 persons @ \$10,000/each	40,000
Daphnia Culture Staff (2x) 2 hours/day=3months/year/each @ \$ 800/month/each	4,800
Total/Year	US \$ 317,100

Additional years will have a staff cost of US \$ 231,900/year

(9) Source

Dr. Vivianne Toniollo, IAP Limnological Laboratory.

Dr. Maria Lucia Vizcalla Medeiros, IAP Limnological Laboratory.

Dr. Ana Marcia da Silva, IAP Limnological Laboratory.

7.5.2 Program for the Identification and Monitoring of the River Margin Vegetation and Lowlands Along Water Courses.

(1) Introduction

Total reported area for lowlands along river margins in the Tibagi river basin are 342,822 ha, being 268,260 ha with some kind of restriction for agriculture, by 1989, 9,387 ha where incorporated into the agricultural activities.

Anthropic pressure upon these areas is based on the expansion of the agricultural and cattle raising areas, through drainage and deforestation. As a consequence, increased water temperature and turbidity, influx of pesticides, and disappearance of fruit and nut eating fish are some of the detected consequences upon the water environment.

The identification of remaining areas, and their subsequent monitoring is a basic consideration to maintain control upon this habitat. Future regeneration practices could benefit from the study of the remaining areas and their biological communities.

(2) Objectives

- 1) To geographically define the existing areas on the basin allocating the river margin vegetation on pertinent maps.
- 2) To monitor in a regular basis (every 5 years) the extension (increase/decrease) of river margin vegetation.
- 3) To provide the data base for the implementation of the existing regulations, conservation, and rehabilitation projects.

(3) Methodology

The Remote Sensing Laboratory available at SEMA/IAP could be used to provide the service. Eighteen months are estimated to complete the assessment, and after it's done, regular monitoring of the area is to take place every 5 years.

(4) Areas to be Covered

Areas to be covered should be at least the following:

- 1) Main course of the Tibagi river
- 2) Margins of existing reservoirs
- 3) Main tributaries of the Tibagi river
- 4) Water intake locations

(5) Equipment, Materials, and Indicative Cost

Equipment & Materials	Indicative Cost (US\$)
SPOT Images (Pan/XS)	142,500
4WD-Vehicle	20,000
Fuel/oils	2,500
Plotter	4,000
Total	US\$ 169,000

(6) Staff Requirements and Indicative Cost

Staff Requirements	Indicative Cost (US\$)
Digitator	9,000
Medium Level Technicians (2x)	18,000
Forestry Engineers (2x)	72,000
Per Diem	7,500
Total	US\$ 106,500

Each subsequent monitoring @ 5 years has an estimated cost of US\$ 257,500 per monitoring effort.

(7) Implementation Schedule

The initial monitoring is estimate to conclude in 9 months. Subsequent monitoring are to be done @ 5 years.

(8) Source

Eng. Donivaldo Pereira, Projeto Água Limpa, IAP.

7.6 Summary of Program Objectives and Indicative Costs

The following table summarizes the area of influence of each one of the proposed projects:

Table-7.1 Summary of Program Objectives and Indicative Costs

Program	Cost US\$ x 100	Objectives			
		Conserve	Economic	Sanitation	Monitor
IGUAÇU RIVER BASIN					
Preservation Programs					
7.2.1	881	X			X
7.2.2	487	X	X		
7.2.3	493	X	X		
7.2.4	2'620	X	X		X
7.2.5	31	X	X		
7.2.6	585	X	X	X	
7.2.7	241	X	X		
7.2.8	Not Determined	X	X		X
Environmental Education Program					
7.2.9	860	X		X	
Monitoring Programs					
7.3.1	1'286	X		X	X
7.3.2	670	X		X	X
7.3.3	414			X	X
TIBAGI RIVER BASIN					
Preservation Programs					
7.4.1	664	X			X
7.4.2	487	X	X		
7.4.3	493	X	X		
7.4.4	51	X	X		
7.4.5	245	X			
Monitoring Programs					
7.5.1	1'096	X		X	X
7.5.2	670	X		X	X

NOTE: Notation of the programs is as follows;

1. Preservation Oriented Programs for Iguaçu River Basin

- 7.2.1 Inventory of Fish Population
- 7.2.2 Assessment of Fish population Dynamics
- 7.2.3 Artificial Reproduction of Endemic Fish
- 7.2.4 Assessment and Experimental Aquaculture in Reservoirs
- 7.2.5 Upgrading Management Plans for Existing Conservation Units
- 7.2.6 Establishment of Preservation Area in Serra da Baitaca
- 7.2.7 Establishment of Preservation Area Corredeiras Eng. Bley
- 7.2.8 Biodiversity Institute
- 7.2.9 Environmental Education

2. Monitoring Programs for Iguaçu River Basin

- 7.3.1 Monitoring of aquatic Environment through Bioindicators
- 7.3.2 Monitoring of River Margin Vegetation Cover through Geographic Information System
- 7.3.3 Monitoring and control of sandflies

3. Preservation Programs for Tibagi River Basin

- 7.4.1 Inventory of Fish Population
- 7.4.2 Assessment of Fish population Dynamics
- 7.4.3 Artificial Reproduction of Endemic Fish
- 7.4.4 Upgrading Management Plans for Existing Conservation Units
- 7.4.5 Periodically Inundated Lowland (Varzea) Study along the Bitumirim River

4. Monitoring Programs for Tibagi River Basin

- 7.5.1 Monitoring of aquatic Environment through Bioindicators
- 7.5.2 Monitoring of River Margin Vegetation Cover through Geographic Information System

Interrelationship between preservation and monitoring programs is summarized under Fig.7.1

7.7 Implementation Schedule

The following table summarizes the extent, frequency and implementation period for each program:

Program Number	Extension in Years	Frequency	Implementation Period			
			1996 2000	2001 2005	2006 2010	2011 2015
7.2.1	4	2 years @ 3 months, 2 years lab. 14 years @ 5 years	X----->			
7.2.2		2 years @ 3 months	X			
7.2.3	2	2 years research, then continuous		X----->		
7.2.4	2	1 year @ month 2 years @ 3 months 15 years @ 5 years	X----->			
7.2.5	0.6	CONTINUOUS	X----->			
7.2.6	3	CONTINUOUS	X			
7.2.7	1	CONTINUOUS	X			
7.2.8	2	CONTINUOUS	X----->			
7.2.9	3	CONTINUOUS	X----->			
7.3.1	13	2 years @ 3 months 2 years @ 6 months 9 years @ year	X X	X----->		
7.3.2	13	0.8 years data base, then @ 5 years	X----->			
7.3.3	1	1 year @ 2 months, then once a year	X----->			
7.4.1	2	@ 3 months	X----->			
7.4.2	2	@ 3 months	X			
7.4.3	2	2 years research, then continuous		X----->		
7.4.4	0.6	CONTINUOUS	X----->			
7.4.5	1	CONTINUOUS	X			
7.5.1	13	2 years @ 3 months 2 years @ 6 months 9 years @ year	X X	X----->		
7.5.2	0.8	0.8 years data base, then @ 5 years	X----->			

NOTE: Notation of the programs is as follows:

1. Preservation Oriented Programs for Iguacu River Basin

7.2.1 Inventory of Fish Population

7.2.2 Assessment of Fish population Dynamics

- 7.2.3 Artificial Reproduction of Endemic Fish
 - 7.2.4 Assessment and Experimental Aquaculture in Reservoirs
 - 7.2.5 Upgrading Management Plans for Existing Conservation Units
 - 7.2.6 Establishment of Preservation Area in Serra da Baitaca
 - 7.2.7 Establishment of Preservation Area Corredeiras Eng. Bley
 - 7.2.8 Biodiversity Institute
 - 7.2.9 Environmental Education
2. Monitoring Programs for Iguaçu River Basin
- 7.3.1 Monitoring of aquatic Environment through Bioindicators
 - 7.3.2 Monitoring of River Margin Vegetation Cover through Geographic Information System
 - 7.3.3 Monitoring and control of sandflies
3. Preservation Programs for Tibagi River Basin
- 7.4.1 Inventory of Fish Population
 - 7.4.2 Assessment of Fish population Dynamics
 - 7.4.3 Artificial Reproduction of Endemic Fish
 - 7.4.4 Upgrading Management Plans for Existing Conservation Units
 - 7.4.5 Periodically Inundated Lowland (Varzea) Study along the Bitumirim River
4. Monitoring Programs for Tibagi River Basin
- 7.5.1 Monitoring of aquatic Environment through Bioindicators
 - 7.5.2 Monitoring of River Margin Vegetation Cover through Geographic Information System

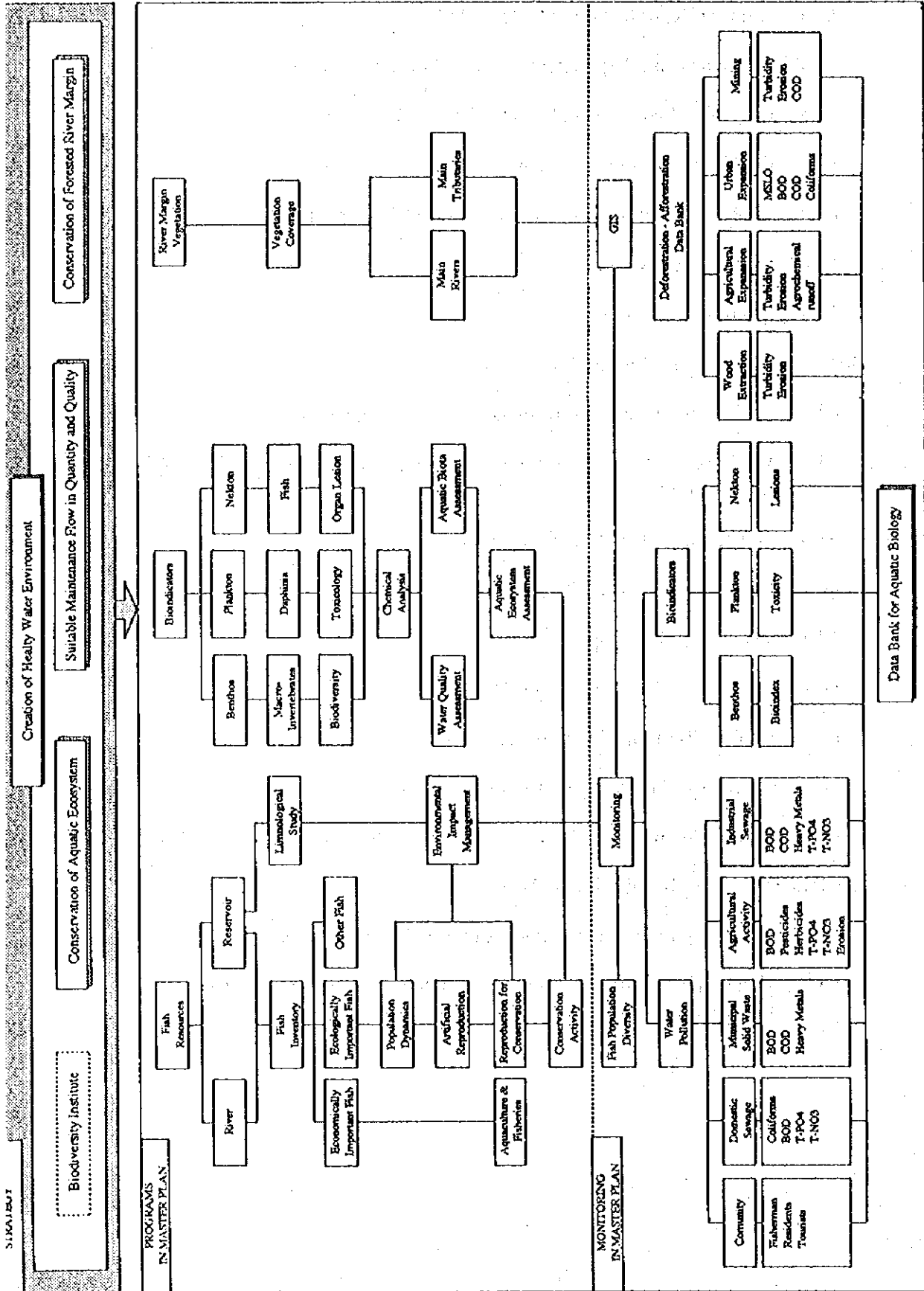


Figure-7.1 Interrelationship Between Monitoring and Preservation Programs

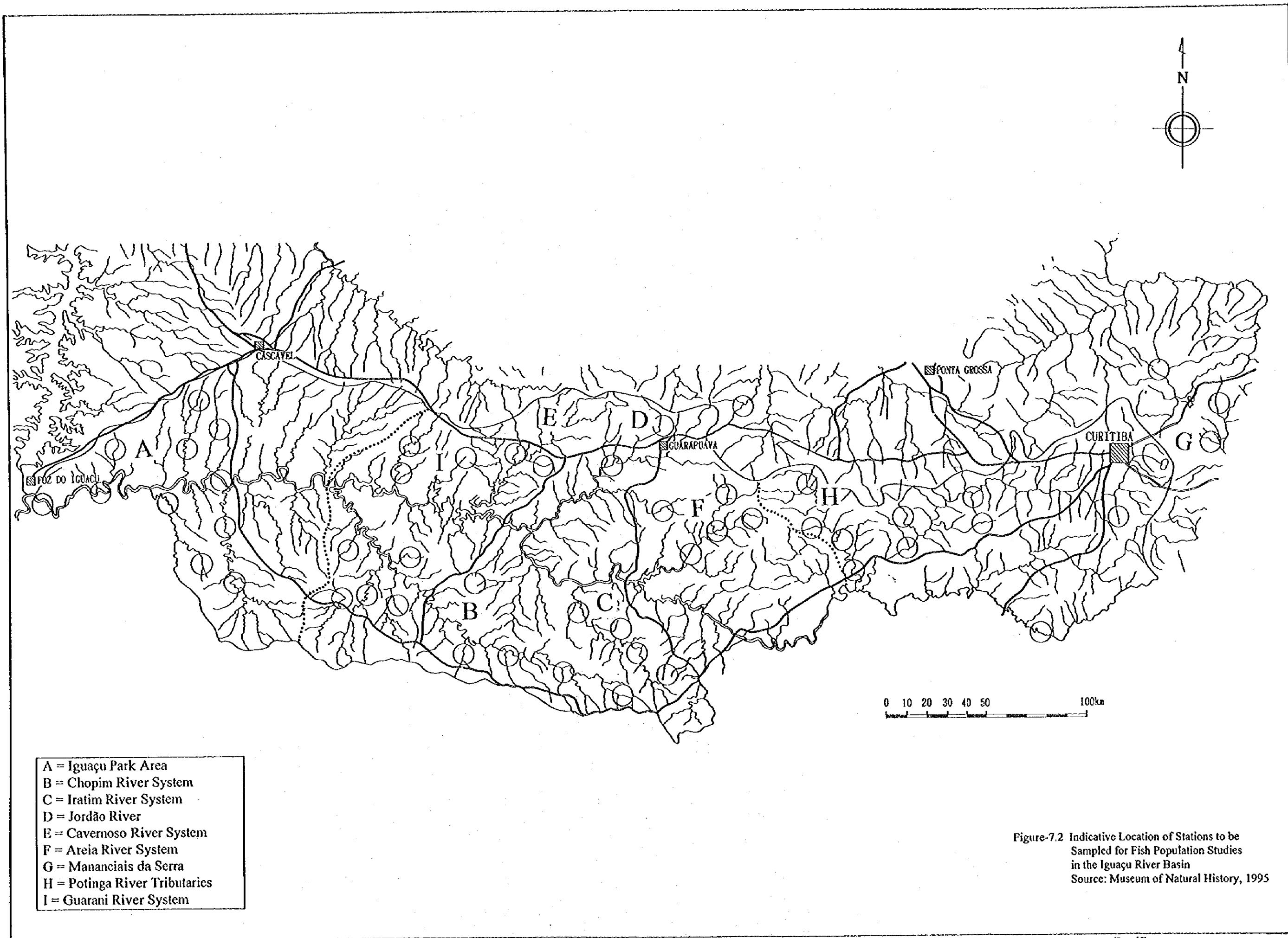


Figure-7.2 Indicative Location of Stations to be Sampled for Fish Population Studies in the Iguazu River Basin
Source: Museum of Natural History, 1995

Area	Monitoring Stations	IAP Station #
A =	6 Benthos Stations · Canguiri River (2x) · Passaúna River (2x) · Timbu River (2x) 2 Daphnia Monitors · Iral Water Intake · Iguaçu Water Intake	44 16 02
B =	6 Benthos Stations · Barigui River (2x) · Barigui River (2x) · Passaúna River (2x)	10 60 11
C =	Benthos Station · Passaúna River (2x) · Barigui River (2x) 1 Daphnia Monitor · Passaúna Water Intake	32 57
D =	4 Benthos Stations · Cambui River (2x) · Cambui River (2x)	68 69

Area	Monitoring Stations	IAP Station #
E =	12 Benthos Stations to be allocated	Middle Iguaçu
F =	12 Benthos Stations to be allocated 1 Daphnia Monitor · Cascavel Water Intake	Lower Iguaçu Cascavel River
G =	6 Benthos Stations to be allocated 1 Daphnia Monitor · Francisco Beltrão Water Intake	Francisco Beltrão Area Marrecas River
LAB. 1	Integrated Regional Laboratory	Curitiba
LAB. 2	Integrated Regional Laboratory	Toledo

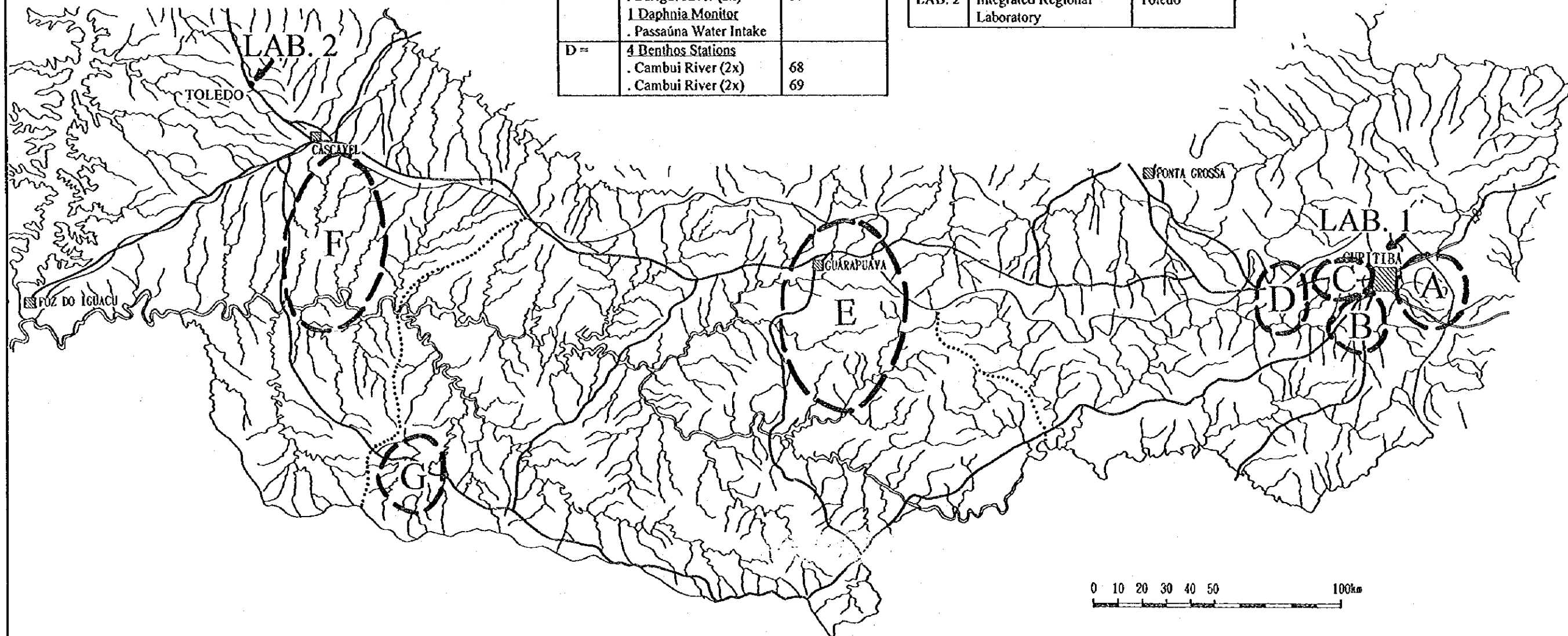
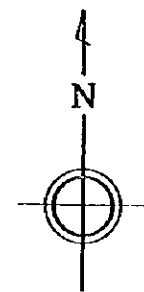


Figure-7-3 Indicative Location of Bioindicator Sampling Stations in the Iguaçu River Basin

Stations	River	Stations	River
01	Iral River	15	da Várzea River
02	Timbu River	16	Negro River
03	Palmital River	17	Potinga River
04	Iguaçu River - BR277	18	Jordão River
05	Iguaçu River - Araucaria	19	Salto Santiago Hydroelectric Station
06	Miringuava River	20	Segredo Hydroelectric Station
07	Atuba River	21	Foz do Areia Hydroelectric Station
08	Padilha River	22	Chopim River
09	Barigui River	23	Salto Caxias Hydroelectric Station
10	Passaúna River	24	Capanema River
11	Verde River	25	Salto Osório Hydroelectric Station
12	Belém River	26	Andrada River
13	Piraquara River	27	Espingarda River
14	Pequeno River	28	Jangada River

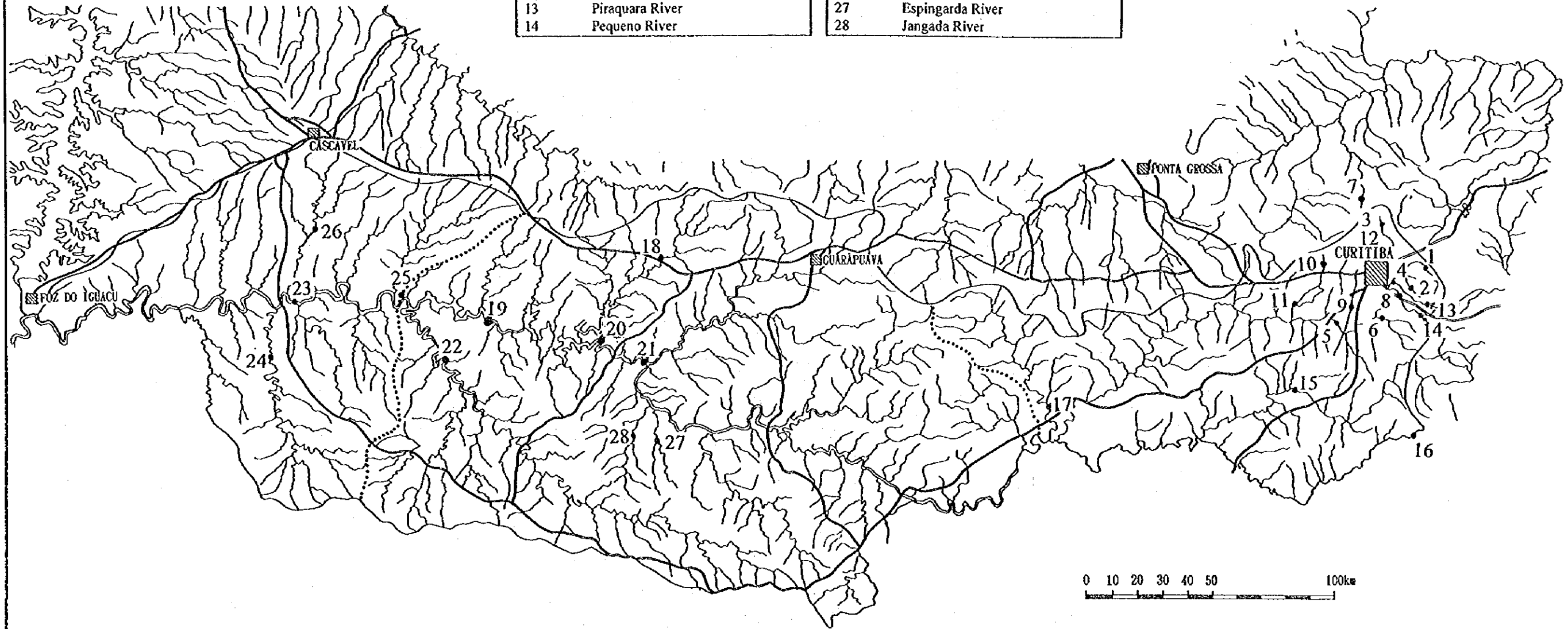
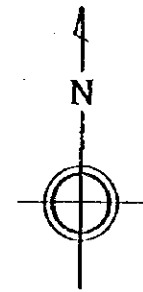
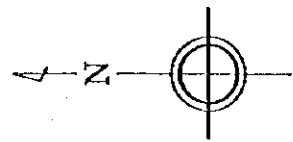


Figure-7.4 Indicative Location of Monitoring Stations for the Control of Sandfly *Simulium* sp in the Iguazu River Basin



Area	Monitoring Stations	LAP Station #
A =	16 Benthos Stations to be allocated 2 Daphnia Monitors Arapongas Water Intake Cafazal Water Intake	Ribeirão dos Apertados Cafazal River Tibagi River
B =	2 Benthos Stations 1 Daphnia Monitor Londrina Water Intake	Tibagi River Telémaco Borba Telémaco Borba
C =	1 Daphnia Monitor At Water Intake	Ponta Grossa
D =	4 Benthos Stations to be defined	Londrina
LAB. 3	Integrated Regional Laboratory	

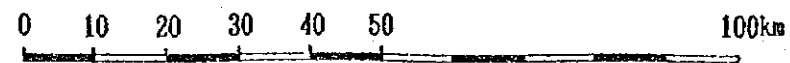
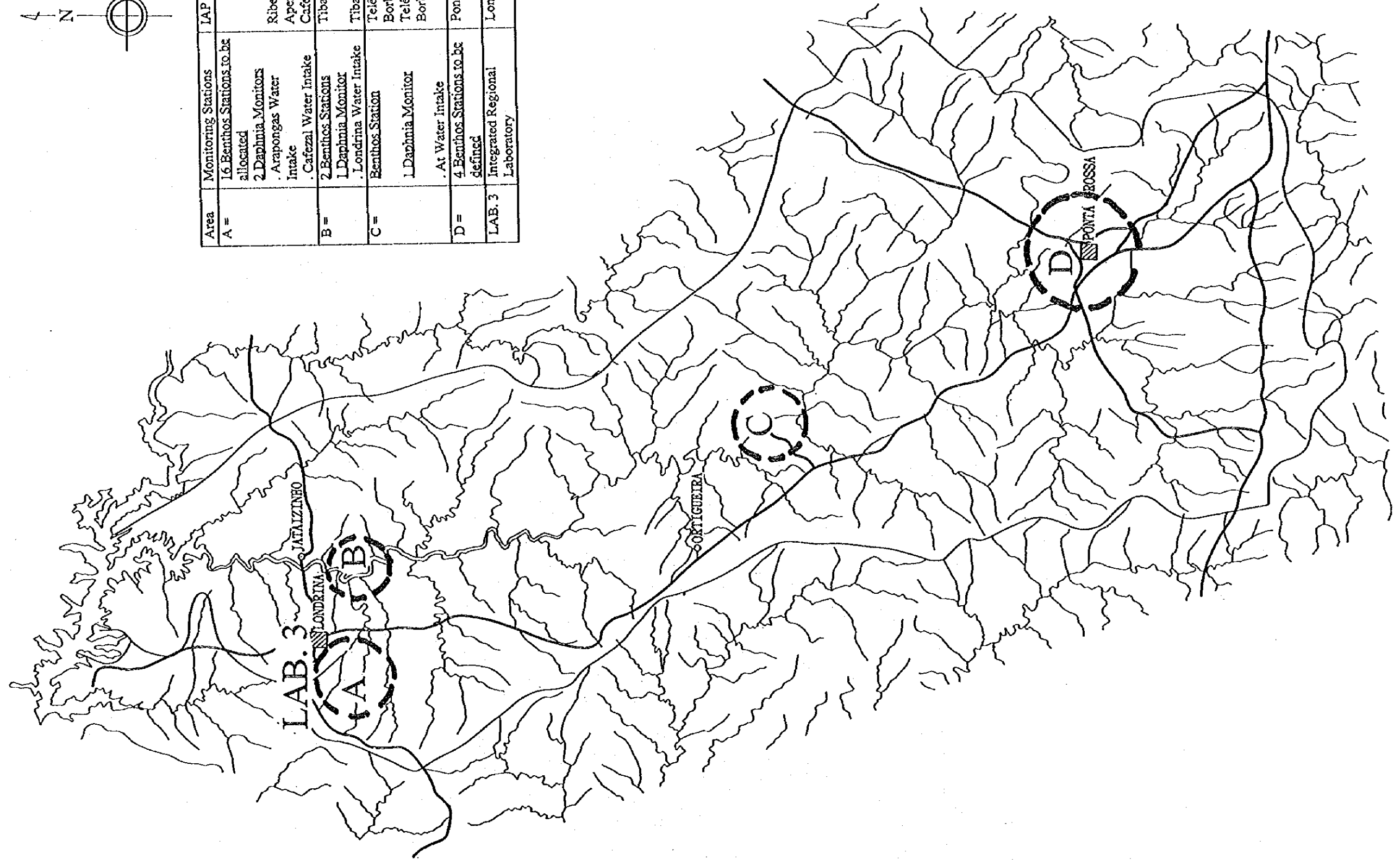
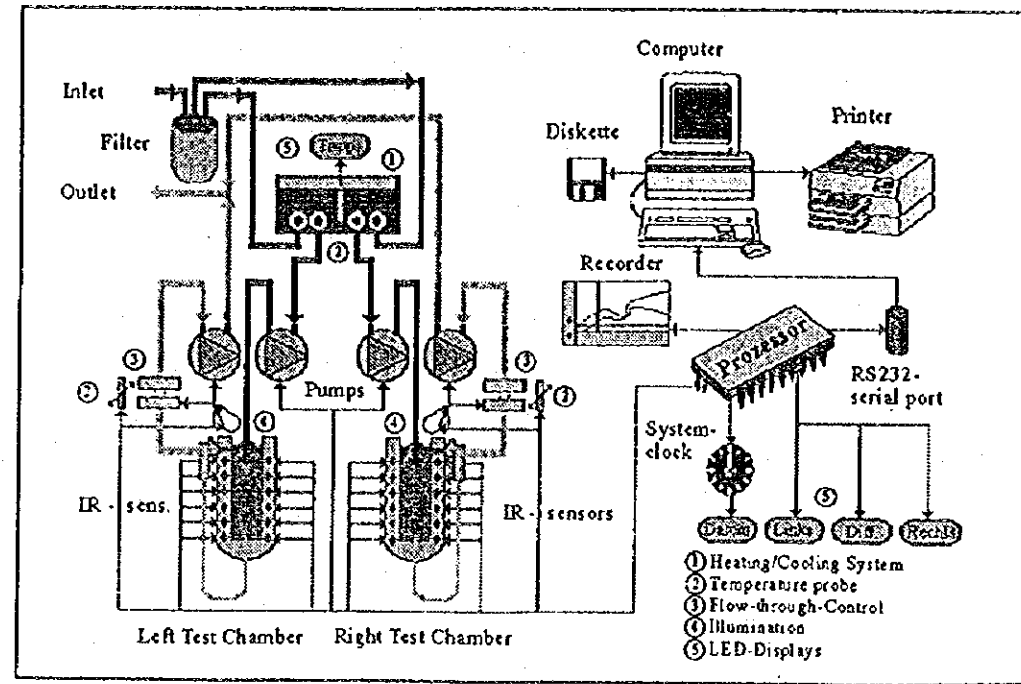
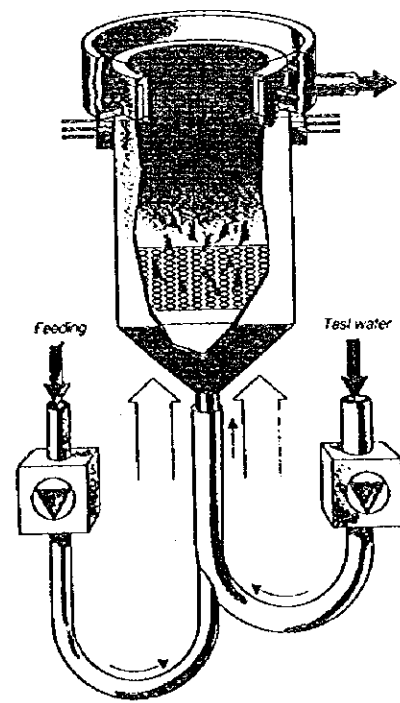


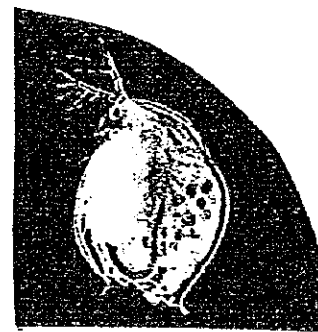
Figure-7.5 Indicative Location of Bioindicator Sampling Stations in the Tibagi River Basin



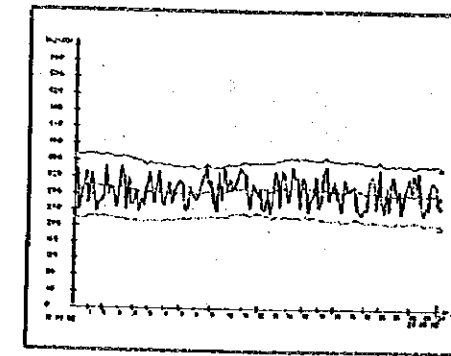
FLOW CHART



TEST CHAMBER



Daphnia magna



DAPHNIA ACTIVITY RECORDER

Figure-7.6 Schematic Diagram of Daphnia magna
Biomonitoring Equipment
Source: IAP Limnological Laboratory
& Elektron GmbH Gesell/Schaft

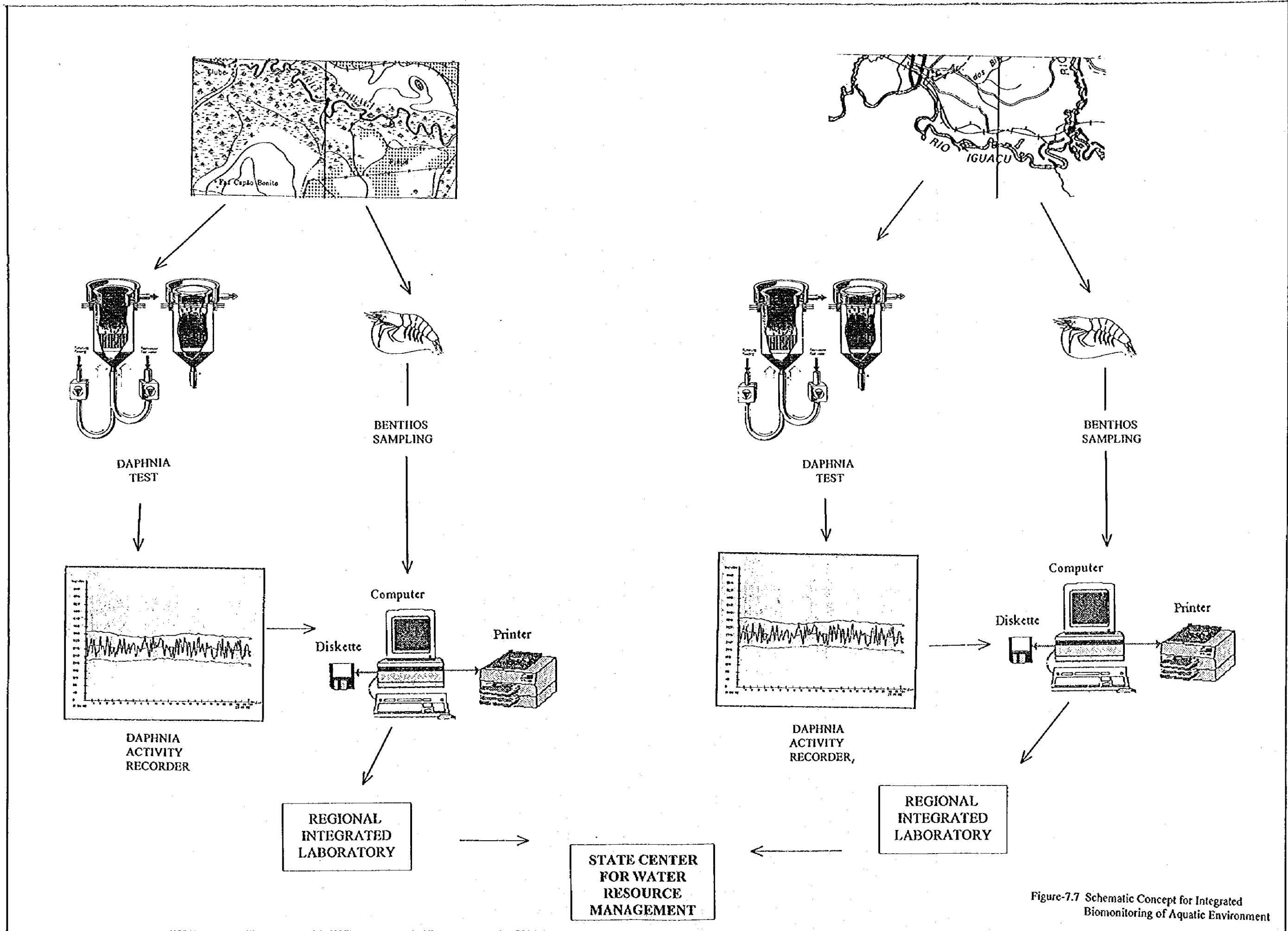


Figure-7.7 Schematic Concept for Integrated Biomonitoring of Aquatic Environment

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21	Projeto de Irrigação e Drenagem, Bacia do Alto Rio Iguaçu. EIA/RIMA. SEAB. Encibra S.A., Estudos e Projetos e Engenharia. 1989.	SUREHMA
22	Relatório de Impacto Ambiental-RIMA para a Implementação do Programa de Irrigação e Drenagem na Bacia Hidrográfica do Rio Piquiri e Paraná III. Companhia Agropecuária de Fomento Econômico do Paraná. Serviços Técnicos de Engenharia s.A. Vol I e II. 1989	SUREHMA
23	Bacia do Rio Ribeira do Iguape. MME, DNAEE, DCRH, Caracterização dos Usos e das Disponibilidades Hídricas. 1984.	COPEL
24	Relatório de Impacto Ambiental RIMA.Implantacao do Programa de Irrigacao e Drenagem. Bacia Hidrografica de Rio das Cinzas e Paranapanema I. Companhia Agropecuária de Fomento Econômico do Paraná "Café do Paraná". Vol I. 1989.	SUREHMA
25	Diretrizes Ambientais para o Desenvolvimento Integrado da Região Metropolitana de Curitiba. Síntese do Relatório Final. Item 4,5 Reunião Ordinária do CONAMA.1988	PROSAM
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NUMBER	TITLE	SOURCE
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28	Projeto Cutia/Serelepe. Povoamento de Áreas Verdes Urbanas com Espécies Silvestres. Curitiba, julho 1993	IAP
29	Handbook of Acute Toxicity of Chemicals to Fish and Aquatic Invertebrates. Johnson, W.W. & Finley, M.T. 1980. U.S. Department of the Interior, Fish and Wildlife Service, Resource Publication 137, Washington D.C.	URI
30	Agricultural Pesticide Use in Estuarine Drainage Areas, A Preliminary Summary of Selected Pesticides. Pait, A.S., Farrow, D.R.G., Lowe, J.A., and Pacheco, P.A. 1989. Pell Marine Science Library, University of Rhode Island, Narraganset Bay Campus.	URI
31	Toxicity of the Organophosphorus Insecticide Metamidophos to Larvae of the Freshwater Prawn <i>Macrobrachium rosenbergui</i> and the blue shrimp <i>Penaeus stylirostris</i> . Juarez, L.M. & Sanchez, J. 1989. Bull. Environ. Contam. Toxicol. (1989) 43: 302-309.	URI
32	Lista Vermelha da Fauna do Paraná. Programa de Impactos Ambientais de Barragens-PIAB. Convênio de Cooperação Técnica Brasil-Alemanha IAP/GTZ. Tossulino M.G.P., Margarido, T.C.C., Straube, F.C., Bernils, R.S., Moura-Leite, J.C. & Morato, S.A.A. 1994.	IAP
33	Lista Vermelha da Flora do Paraná. Programa de Impactos Ambientais de Barragens. PIAB. Convênio de Cooperação Técnica Brasil-Alemanha, IAP/GTZ. Hartsbach, G. 1994. Alemanha IAP/GTZ. Tossulino M.G.P., Margarido.	IAP

NUMBER	TITLE	SOURCE
34	Diagnóstico Preliminar da Ictiofauna do Estado Museu do Paraná. Adelinir Azevedo de Moura Cordeiro.Divisão do Museu de História Natural, Departamento de Pesquisa e Monitoramento do Meio Ambiente. Prefeitura Municipal de Curitiba. 1994	
35	Flora and Fauna Diagnosis. Inter Country Partnership for the Tibagi River Basin Environmental Protection (COPATI). Ibiporã, Paraná, March, 1995.	COPATI
36	Seminário de Avaliação de Impactos Ambientais sobre a Ictiofauna. Pereira, S.M., Hickson, R.G., Medeiros, M.L. SUREHMA/GTZ.1995	IAP
37	Biomonitoramento Na Avaliação de Impactos Ambientais. II Congresso Latino-Americano de Ecologia, I Congresso de Ecologia do Brasil. Caxambu, Minas Gerais, Brasil. SEMA/IAP/PIAB/GTZ.1992	IAP
38	Serra da Baitaca, Diagnóstico das Modificações da Cobertura Vegetal. Relatório Convênio CONCITEC-FUPEF-No.087088.1, Carlos Velloso Roderjan, Edson Strumiski and Yoshiko Saito Kumiyoshi, Curitiba, 1990	IAP
39	Projetos dos Sistemas de Água e Esgoto de Curitiba e Região Metropolitana, Barragem do Irai. Estudos Ambientais, EIA-RIMA, Vol.I-A SANEPAR,GEOTECNICA,PROENSI-OSM-SERENCO CONSULT, Curitiba, 1992	IAP
40	As Formações Vegetais da Área de Influência do Futuro Reservatório do Iraí-Piraquara-Quatro Barras PR. Uma Avaliação dos Impactos de Construção da Barragem. Sivia R. Ziller and Gerdt Hartschbach, Curitiba, 1993.	IAP
41	Subprojeto Revegetação de Área Degradada por Mineração de Areia em Formação Pioneira de Influência Marinha (Restinga), Paranaguá-PR Ziller, S.R., Embrapa, 1994.	EMBRAPA

NUMBER	TITLE	SOURCE
42	The Mining as Object of Soil Use Analysis in the Iguaçu River Watershed Area- Curitiba Metropolitan Region/Paraná Elbio Pellenz, Luciano Cordeiro de Loyola.	MINEROPAR

Appendix-1

APPENDIX I

FISHES OF THE IGUAÇU RIVER BASIN¹²

Superorder Ostariophysi

Series Otophysi

Order Cypriniformes

Suborder Cyprinoidei

Family CYPRINIDAE

(ex) *Cyprinus carpio* Linnaeus, 1758

Order Characiformes

Suborder Characoidei

Family CHARACIDAE

Subfamily Tetragonopterinae

(en) *Astyanax gymnogenys* Eigenmann, 1911

(en) *Astyanax* sp. A

(en) *Astyanax* sp B

(en) *Astyanax* sp C

(en) *Astyanax* sp D

(en) *Astyanax* sp E

(en) *Astyanax* sp F

(en) *Bryconamericus* sp A

(en) *Hasemania maxillaris* Ellis, 1909

(en) *Hasemania melanura* Ellis, 1911

(in) *Hyphessobrycon reticulatus* Ellis, 1911

(en) *Hyphessobrycon taurocephalus* Ellis, 1912

(ge) *Psalidodon gymnodontus* Eigenmann, 1911

Subfamily Acestrorhynchinae

(en) *Oligosarcus longirostris* Menezes & Gèry, 1983

Subfamily Characidiinae

(en) *Characidium* sp. A

(en) *Characidium* sp. B

Subfamily Glandulocaudinae

(en) *Glandulocauda melanopleura* Eigenmann, 1911

(in) *Mimagoniates microlepis* Steindachner, 1876

Family ERYTHRINIDAE

(in) *Hoplias malabaricus* (Bloch, 1794)

Family PARODONTIDAE

(en) *Apareiodon vittatus* Garavello, 1977

Order Siluriformes

Suborder Gymnotoidei

Family GYMNOTIDAE

(in) *Gymnotus carapo* Linnaeus, 1758

¹ Classification following Lauder & Liem (1983).

² Source: Severi & Cordeiro (1994).

- Suborder Siluroidei
 - Family AUCHENIPTERIDAE
 - (en) *Glanidium ribeiroi* Haseman, 1911
 - Family PIMELODIDAE
 - (en) *Heptapterus stewarti* Haseman, 1911
 - (en) *Partolius hollandi* Haseman, 1911
 - (en) *Pimelodus ortmanni* Haseman, 1911
 - (en) *Rhamdia branneri* Haseman, 1911
 - Rhamdia sebae* (Valenciennes, 1840)
 - (ge) *Rhamdiopsis moreirai* Haseman, 1911
 - (en) *Steindachneridion* sp.
 - Family TRICHOMYCTERIDAE
 - (en) *Trichomycterus davisii* Haseman, 1911
 - Family CALLICHTYIDAE
 - Callichthys callichthys* (Linnaeus, 1758)
 - Corydoras paleatus* Jenyns, 1842
 - Family LORICARIIDAE
 - (en) *Ancistrus* sp. Kner, 1840
 - Hypostomus* sp. Lacépède, 1803
 - (en) *Hypostomus derbyi* Haseman, 1911
 - (en) *Hypostomus myersi* Gosline, 1948
 - Microlepidogaster* sp.
- Superorder Atherinomorpha
 - Order Atheriniformes
 - Suborder Cyprinodontoidei
 - Family JENYNSIIDAE
 - (en) *Jenynsia eigenmanni* Haseman, 1911
 - Family POECILLIDAE
 - (en) *Cnesterodon carneglei* Haseman, 1911
 - Phalloceros caudimaculatus* (Hensel, 1868)
 - Superorder Acanthopterygii
 - Series Percomorpha
 - Order Perciformes
 - Suborder Labroidei
 - Family CICHLIDAE
 - Cichlasoma facetum* (Jenyns, 1842)
 - (en) *Crenicichla iguassuensis* Haseman, 1911
 - Geophagus brasiliensis* (Quoy & Gaimard, 1824)
 - (ex) *Tilapia* sp.
 - Suborder Percoidei
 - Family CENTRARCHIDAE
 - (ex) *Micropterus salmoides* (Lacépède, 1802)
 - Order Synbranchiformes

Family SYNBRANCHIDAE

Synbranchus marmoratus Bloch, 1795

NOTES: en = endemic; in = introduced; ex = exotic; ge = endemic genres

The assemblage of *Astyanax* fishes namely *Astyanax* sp. A, B, C, D, E and F comprises undescribed species still without specific denomination which were studied by SAMPAIO (1988).

FISHES OF LOWER IVAÍ RIVER BASIN³

Superorder Ostariophysi

Series Otophysi

Order Characiformes

Family Characidae

Subfamily Tetragonopterinae

Astyanax bimaculatus (Linnaeus, 1758)

Astyanax schubarti Britski 1964

Subfamily Cyponopotominae

Galeocharax knerii (Steindachner, 1879)

Subfamily Acestrorhynchinae

Acestrorhynchus lacustris (Reinhardt, 1874)

Subfamily Bryconinae

Brycon orbignyanus (Valenciennes, 1849)

Subfamily Salminae

Salminus maxillosus Valenciennes, 1840

Subfamily Serrasalminae

Serrasalmus spilopleura Kner, 1860

Serrasalmus marginatus (Valenciennes, 1847)

Subfamily Myleinae

Colossoma mitrei (Bert, 1985)

Family Erythrinidae

Hoplias malabaricus (Bloch, 1794)

Family Anostomidae

Leporinus elongatus (Valenciennes, 1847)

Leporinus friderice (Bloch, 1794)

Leporinus obtusidens (Valenciennes, 1874)

Schizodon borelii (Boulenger, 1985)

Schizodon knerii (Steindachner, 1875)

Family Curimatidae

Curimata insculpta Fernandez - Yopez, 1948

Curimata nagelii Steindachner, 1981

Family Prochilodontidae

Prochilodus scrofa Steindachner, 1882

Family Cynodontidae

Rhaphiodon vulpinis Agassiz, 1829

Order Siluriformes

Suborder Gymnotoidei

³ Source: NUPELIA (1988).

- Family Sternopygidae
Eigenmannia virescens (Valenciennes, 1847)
- Family Apteronotidae
Apteronotus sp.
Apteronotus albifrons (Linnaeus, 1766)
- Family Rhamphichthyidae
Rhamphichthys rostratus (Linnaeus, 1766)
- Suborder Siluroidei
- Family Doradidae
Rhinodoras dorbignyi (Kroeyer, 1855)
Trachydoras paraguayensis (Eigenmann & Ward, 1907)
Pterodoras granulosus (Valenciennes, 1833)
- Family Auchenipteridae
Parauchenipterus galeatus (Linnaeus, 1766)
- Family Ageneiosidae
Ageneiosus valenciennesi Kleecker, 1864
Ageneiosus brevifilis Valenciennes, 1840
Ageneiosus ucayalensis Castelnau, 1855
- Family Pimelodidae
Pimelodus sp.
Pimelodus maculatus Lacépède, 1803
- Subfamily Soruminae
Iheringichthys labrosus (Kroyer, 1874)
Sorubim lima (Schneider, 1861)
Pseudoplatystoma corruscans (Agassiz, 1829)
Hemisorubim platyrhynchus (Valenciennes, 1840)
- Subfamily Luciopimelodinae
Pimirampus pirinampu (Spix, 1829)
- Family Hypophthalmidae
Hypophthalmus edentatus Spix, 1829
- Family Loricariidae
- Subfamily Plecostominae
Hypostomus sp.
Megalancistrus aculeatus (Perugia, 1981)
- Subfamily Neoplecostominae
Rhinelepis strigosa Valenciennes, 1840
- Subfamily Loricariinae
Loricaria proluxa Isbrucker & Nijssen, 1978
Loricaria sp.
- Superorder Acanthopterygii
- Order Perciformes
- Family Cichlidae
Geophagus sp.
- Family Sciaenidae
Plagioscion squamosissimus (Heckel, 1840)

FISHES OF UPPER TIBAGI RIVER BASIN

Superorder Ostariophysi

Series Otophysi

Order Characiformes

Family Characidae

Subfamily Tetragonopterinae

Astyanax sp.

Astyanax cf. *bimaculatus* (Linnaeus, 1758)

Astyanax cf. *fasciatus* (Cuvier, 1819)

Bryconamericus sp.

Subfamily Acestrorhynchinae

Oligosarcus paranensis Menezes & Gery, 1983

Subfamily Salminae

Salminus hilarii Valenciennes, 1849

Family Erythrinidae

Hoplias malabaricus (Bloch, 1794)

Family Anostomidae

Leporinus striatus Kner, 1859

Leporinus octofasciatus Steindachner, 1917

Leporinus sp.

Schizodon nasutus Kner, 1859

Family Prochilodontidae

Prochilodus scrofa Steindachner, 1882

Family Parodontidae

Parodon cf. *tortuosus* Eigenmann & Norris, 1900

Order Siluriformes

Suborder Siluroidei

Family Pimelodidae

Pimelodus maculatus Lacépède, 1803

Pimelodella sp.

Rhamdia quelen (Quoy & Gaimard, 1824)

Family Callichthyidae

Corydoras sp.

Family Loricariidae

Subfamily Plecostominae

Hypostomus sp.

Loricaria sp.

Superorder Acanthopterygii

Order Perciformes

Family Cichlidae

Geophagus brasiliensis (Quoy & Gaimard, 1824)

Cichlasoma facetum (Jennyns, 1842)

**SPECIES FOUND IN THE LOWER TIBAGI RIVER DURING THE 4
SEASONS OF THE YEAR ACCORDING TO LONDRINA
UNIVERSITY**

SCIENTIFIC NAME **FREQUENCY OF OCURENCE**

% OF THE TOTAL

CONSTANT OCCURRING SPECIES:

<i>Astyanax bimaculatus</i>	19.8
<i>Hoplias malabaricus</i>	3.2
<i>Pimelodus maculatus</i>	4.2
<i>Steindachnerina insculpta</i>	10.7
<i>Serrasalmus spilopleura</i>	6.3
<i>Moenkhausia intermedia</i>	6.6
<i>Acestrorhynchus lacustris</i>	13.3
<i>Schizodon borellii</i>	15.2
<i>Schizodon nasutus</i>	4.2
<i>Leporinus obtusidens</i>	2.4
<i>Leporinus friderici</i>	1.6
<i>Leporinus elongatus</i>	2.1
<i>Pinirampus pinirampu</i>	5.3
<i>Myloplus levis</i>	0.8

ACCESSORY SPECIES:

<i>Cyphocharax modesta</i>	0.6
<i>Iheringichthys labrosus</i>	0.6
<i>Hypostomus</i> sp	0.5
<i>Eigenmania</i> sp	0.6
<i>Apteronotus brasiliensis</i>	0.6

ACCIDENTAL OCCURING SPECIES:

<i>Prochilodus scrofa</i>	0.2
<i>Rhinodoras dorbignyi</i>	0.3
<i>Aequidens plagiozonatus</i>	0.2
<i>Gymnotus carapo</i>	0.2
<i>Leporinus octofasciatus</i>	0.3
<i>Crenicichla lepidota</i>	0.2

FISHES OF LOWER PIQUIRI RIVER BASIN⁴

Superorder Ostariophysi

Series Otophysi

Order Characiformes

Family Characidae

Subfamily Tetragonopterinae

Astyanax bimaculatus (Linnaeus, 1758)

Astyanax fasciatus (Cuvier, 1819)

Bryconamericus sp.

Subfamily Cynopotaminae

Galeocharax knerii (Steindachner, 1879)

Subfamily Acestrorhynchinae

Oligosarcus sp.

Acestrorhynchus lacustris (Reinhardt, 1874)

Subfamily Salminae

Salminus maxillosus Valenciennes, 1840

Subfamily Serrasalminae

Serrasalmus spilopleura Kner, 1860

Serrasalmus marginatus (Valenciennes, 1847)

Family Erythrinidae

Hoplias malabaricus (Bloch, 1794)

Family Anostomidae

Leporinus elongatus (Valenciennes, 1847)

Leporinus friderici (Bloch, 1794)

Leporinus octofasciatus Steindacher, 1917

Leporinus sp.

Leporinus vittatus (Valenciennes, 1849)

Schizodon nasutus kner, 1859

Family Curimatidae

Curimata insculpta Fernandez - Yopez, 1948

Curimata sp.

Curimata nagelii Steindachner, 1881

Family Prochilodontidae

Prochilodus scrofa Steindachner, 1882

Family Parodontidae

Apareiodon affinis (Steindachner, 1879)

Parodon tortuosus Eigenmann & Norris, 1900

Order Siluriformes

Suborder Gymnotoidei

Family Gymnotidae

Gymnotus carapo Linnaeus, 1758

Family Sternopygidae

Eigenmania virescens (Valenciennes, 1847)

Sternopygus macrurus (Bloch & Schneider, 1801)

⁴ Source: NUPELIA (1988).

- Family Apterontidae
Apterontus albifrons (Linnaeus, 1766)
- Family Auchenipteriidae
Auchenipterus nuchalis (Spix, 1829)
Tatia neivae Ihering, 1930
- Family Pimelodidae
Pimelodus maculatus Lacépède, 1803
Pimelodus fur (Reinhardt, 1874)
Pimelodus sp.
Rhamdia sp.
- Subfamily Sorubiminae
Iheringichthys labrosus (Kroyer, 1874)
Pseudoplatystoma corruscans (Agassiz, 1829)
Hemisorubim platyrhynchus (Valenciennes, 1840)
- Subfamily Luceopimelodidae
Pinirampus pirinampu (Spix, 1829)
- Family Loricariidae
Hypostomus sp.
Megalancistrus aculeatus (Perugia, 1891)
- Superorder Acanthopterygii
Order Perciformes
Family Cichlidae
Crenicichla sp.
Crenicichla nederleinii (Holmberg, 1891)
Aequidans sp.

FISHES OF RIBEIRA RIVER BASIN

- Superorder Ostariophysi
 - Series Otophysi
 - Order Characiformes
 - Suborder Characoidei
 - Family Characidae
 - Subfamily Tetragnopterinae
 - Astyanax* sp.
 - Bryconamericus* sp.
 - Deuterodon* sp.
 - Hyphessobrycon* sp.
 - Hollandichthys* sp.
 - Subfamily Characidiinae
 - Characidium* sp.
 - Subfamily Glandulocaudinae
 - Mimagoniates* sp.
 - Subfamily Cheirodontinae
 - Probolodus* sp.
 - Subfamily Acestrorhynchinae
 - Oligosarcus* sp.
 - Family Curimatidae
 - Curimatus* sp.
 - Family Erythrinidae
 - Hoplias* sp.
- Order Siluriformes
 - Suborder Gymnotoidei
 - Family Rhamphiichthyidae
 - Eigenmania* sp.
 - Suborder Siluroidei
 - Family Pimelodidae
 - Rhamdia* sp.
 - Rhamdella* sp.
 - Pimelodella* sp.
 - Acentronichthys* sp.
 - Pimelodus* sp.
 - Pseudopimelodus* sp.
 - Imparfinis* sp.
 - Microglanis* sp.
 - Heptapterus* sp.
 - Family Trichomycteridae
 - Trichomycterus* sp.
 - Family Callichthyidae
 - Corydoras* sp.
 - Family Loricariidae
 - Harttia* sp.
 - Rineloricaria* sp.
 - Otocinclus* sp.

Hemipsilichthys sp.
Pareiorhaphis sp.
Kronichthys sp.
Ancistrus sp.
Parotoncinclus sp.
Microlepidogaster sp.
Otothyris sp.
Hypostomus sp.
Superorder Atherinomorpha
Order Atheriniformes
Suborder Cyprinodontoidei
Family Poecillidae
Phalloceros sp.
Superorder Acanthopterygii
Series Percomorpha
Order Perciformes
Suborder Labroidei
Family Cichlidae
Cichlasoma sp.
Geophagus sp.
Order Synbranchiformes
Family Synbranchidae
Synbranchus sp.

FISHES OF PARANÁ RIVER BASIN INCLUDING PARANÁ I, PARANÁ II,
PARANÁ III⁵

Class Chondrichthyes

Subclass Elasmobranchi

Superorder Hypotremata

Order Rajiformes

Family Potamotrygonidae

Potamotrygon motoro (Mueller & Henle, 1841)

Class Osteichthyes

Superorder Ostariophysi

Suborder Characoidei

Family Characidae

Subfamily Tetragonopterinae

Astyanax bimaculatus (Linnaeus, 1758)

Astyanax fasciatus (Cuvier, 1819)

Hyphessobrycon sp.

Moenkhausia intermedia (Eigenmann, 1908)

Bryconamericus sp.

Subfamily Cheirodontinae

Aphyocharax sp.

Cheirodon notomelas Eigenmann, 1915

Subfamily Cynopotaminae

Galeocharax knerii (Steindachner, 1879)

Subfamily Acestrorhynchinae

Acestrorhynchus lacustris (Reinhardt, 1874)

Subfamily Bryconidae

Brycon orbignyanus (Valenciennes, 1849)

Brycon hilarii (Valenciennes, 1849)

Subfamily Salminae

Salminus maxillosus Valenciennes, 1840

Subfamily Characinae

Roeboides paranensis Pignolberi, 1975

Subfamily Characidiinae

Characidium sp

Family Serrasalminidae

Subfamily Myleinae

Colossoma mitrei (Bert, 1895)

Mylossoma orbignyanum Valenciennes, 1848

Myloplus levis (Eigenmann & McAtee, 1907)

Subfamily Serrasalminae

Serrasalmus marginatus (Valenciennes, 1847)

Serrasalmus spilopleura Kner, 1860

Serrasalmus nattereri (Kner, 1860)

⁵ Source: Agostinho *et al.*, 1987.

- Family Anostomidae
Leporinus friderici (Bloch, 1794)
Leporinus obtusidens (Valenciennes, 1847)
Leporinus elongatus (Valenciennes, 1847)
Leporellus vittatus (Valenciennes, 1849)
Schizodon borellii (Boulenger, 1895)
Schizodon knerii (Steindachner, 1875)
- Family Curimatidae
Curimata insculpta Fernandez- Yopez, 1948
Curimata nagelii Steindachner, 1881
- Family Prochilodontidae
Prochilodus scrofa Steindachner, 1882
- Family Erythrinidae
Hoplias malabaricus (Bloch, 1794)
- Family Cynodontidae
Raphiodon vulpinus Agassiz, 1829
- Family Parodontidae
Apareiodon affinis (Steindachner, 1879)
Parodon tortuosus Eigenmann & Norris, 1900
- Family Hemiodontidae
Hemiodus orthonops Eigenmann & Kennedy, 1903
- Order Siluriformes
- Suborder Gymnotoidei
- Family Gymnotidae
Gymnotus carapo Linnaeus, 1758
- Family Sternopygidae
Eigenmania virescens (Valenciennes, 1847)
Sternopygus macrurus (Bloch & Schneider, 1801)
- Family Apterontidae
Apterontus albifrons (Linnaeus, 1766)
Apterontus sp.
- Family Ramphichthyidae
Sternarchorhynchus sp.
Ramphichthys rostratus (Linnaeus, 1766)
- Suborder Siluroidei
- Family Doradidae
Oxydoras kneri Bleeker, 1862
Rhinodoras dorbignyi (Kroeyer, 1855)
Trachydoras paraguayensis (Eigenmann & Ward, 1907)
Pterodoras granulosus (Valenciennes, 1833)
- Family Auchenipteridae
Auchenipterus nuchalis (Spix, 1829)
Parauchenipterus galeatus (Linnaeus, 1766)
Tatia neivae Ihering, 1930
- Family Ageneiosidae
Ageneiosus valenciennesi Bleeker, 1864
Ageneiosus brevifilis Valenciennes, 1840
Ageneiosus ucayalensis Castelnau, 1855

Family Pimelodidae

Subfamily Pimelodinae

- Pimelodus maculatus* Lacépède, 1803
- Pimelodus ornatus* Kner, 1857
- Pimelodella gracillis* (Valenciennes, 1840)
- Rhamdia* cf. *hilari* (Valenciennes, 1840)
- Pseudopimelodus zungaro* (Humboldt, 1833)
- Bergiaria platana* (Steindachner, 1908)

Subfamily Sorubiminae

- Iheringichthys labrosus* (Kroyer, 1874)
- Hemisorubrim platyrhynchus* (Valenciennes, 1840)
- Pseudoplatystoma corruscans* (Agassiz, 1829)
- Paulicea luetkeni* (Steindachner, 1875)
- Sorubim* cf. *lima* (Schneider, 1861)

Subfamily Luciopimelodinae

- Pinirampus pirinampu* (Spix, 1829)

Family Hypophthalmidae

- Hypophthalmus edentatus* Spix, 1829

Family Callichthyidae

- Hoplosternum littorale* Hancock, 1828

Family Loricariidae

Subfamily Plecostominae

- Hypostomus* sp.
- Megalancistrus aculeatus* Perugia, 1891

Subfamily Neoplecostominae

- Rhinelepis strigosa* Valenciennes, 1840

Subfamily Loricariinae

- Loricaria* sp.
- Loricaria prolixa* Isbrucker & Nijssen, 1978
- Loricariichthys* sp.
- Farlowella* sp.

Superorder Acanthopterygii

Order Perciformes

Family Cichlidae

- Crenicichla niederleinii* (Holmberg, 1891)
- Crenicichla lepidota* Heckel, 1840
- Geophagus pappaterra* Heckel, 1840
- Cichla ocellaris* (Schneider, 1801)

Family Sciaenidae

- Plagioscion squamosissimus* (Heckel, 1840)

Order Synbranchiformes

Family Synbranchidae

- Synbranchus marmoratus* Bloch, 1795

Order Pleuronectiformes

Family Soleidae

- Catathyridium jenynsii* (Günther, 1862)

FISH SPECIES FOUND IN THE ATLANTIC BASIN⁶

Superorder Ostariophysi

Series Otophysi

Order Characiformes

Suborder Characoidei

Family Characidae

Subfamily Tetragonopterinae

Deuterodon sp.

Astyanax sp.

Hyphessobrycon sp.

Hollandichthys sp.

Bryconamericus sp.

Subfamily Characidiinae

Characidium sp.

Subfamily Glandulocaudinae

Mimagoniates sp.

Subfamily Acestrorhynchinae

Oligosarcus sp.

Subfamily Cheirodontinae

Phoxinopsis sp.

Probolodus sp.

Family Curimatidae

Curimatus sp.

Family Erythrinidae

Hoplias sp.

Order Siluriformes

Suborder Gymnotoidei

Family Gymnotidae

Gymnotus sp.

Suborder Siluroidei

Family Pimelodidae

Pimelodella sp.

Heptapterus sp.

Imparfinis sp.

Rhamdia sp.

Family Trichomycteridae

Trichomycterus sp.

Family Callichthyidae

Corydoras sp.

Family Loricariidae

Rineloricaria sp.

Loricarichthys sp.

Otocinclus sp.

⁶ Comprising Hydrographic Basin of Bafa das Laranjeiras, Bafa de Antonina, Rio Nhundiaquara, Bafa de Paranaguá and Bafa de Guaratuba.

Hemipsilichthys sp.
Pareiorhaephis sp.
Ancistrus sp.
Microleptidogaster sp.
Hypostomus sp.
Otothyris sp.
Parotocinclus sp.
Kronichthys sp.
Pseudotothyris sp.

Superorder Atherinomorpha

Order Atheriniformes

Suborder Cyprinodontoidei

Family Jenynsiidae

Jenynsia sp.

Family Poecillidae

Cnesterodon sp.

Phalloceros sp.

Family Cyprinodontidae

Rivulus sp.

Superorder Acanthopterygii

Series Percomorpha

Order Perciformes

Suborder Labroidei

Family Cichlidae

Cichlasoma sp.

Crenicichla sp.

Geophagus sp.

Order Synbranchiformes

Family Synbranchidae

Synbranchus sp.

FISHES OF PARANAPANEMA I RIVER BASIN⁷

Superorder Ostariophysi

Series Otophysi

Order Characiformes

Family Characidae

Subfamily Tetragonopterinae

Astyanax bimaculatus (Linnaeus, 1758)

Astyanax fasciatus (Cuvier, 1819)

Bryconamericus sp.

Subfamily Salminae

Salminus maxillosus (Valenciennes, 1840)

Subfamily Serrasalminae

Serrasalmus spilopleura (Kner, 1860)

Family Erythrinidae

Hoplias malabaricus (Bloch, 1794)

Family Anostomidae

Leporinus obtusidens (Valenciennes, 1847)

Leporinus elongatus (Valenciennes, 1847)

Family Curimatidae

Curimatus sp.

Family Prochilodontidae

Prochilodus scrofa (Steindachner, 1882)

Order Siluriformes

Suborder Siluroidei

Family Pimelodidae

Subfamily Pimelodinae

Pimelodus maculatus (Lacépède, 1803)

Pimelodella gracilis (Valenciennes, 1840)

Subfamily Sorubiminae

Pseudoplatystoma corruscans (Agassiz, 1829)

Pauliceia luetkeni (Steindachner, 1875)

Subfamily Luciopimelodinae

Pinirampus pirinampu (Spix, 1829)

⁷ Source: CESP (without date).

FISHES OF PARANAPANEMA II RIVER BASIN⁸

Superorder Ostariophysi

Series Otophysi

Order Characiformes

Family Characidae

Subfamily Tetragonopterinae

Astyanax bimaculatus (Linnaeus, 1758)

Astyanax fasciatus (Cuvier, 1819)

Bryconamericus sp.

Subfamily Salminae

Salminus maxillosus (Valenciennes, 1840)

Subfamily Serrasalminae

Serrasalmus spilopleura (Kner, 1860)

Family Erythrinidae

Hoplias malabaricus (Bloch, 1794)

Family Anostomidae

Leporinus obtusidens (Valenciennes, 1847)

Leporinus elongatus (Valenciennes, 1847)

Family Curimatidae

Curimatus sp.

Family Prochilodontidae

Prochilodus scrofa (Steindachner, 1882)

Order Siluriformes

Suborder Siluroidei

Family Pimelodidae

Subfamily Pimelodinae

Pimelodus maculatus (Lacépède, 1803)

Pimelodella gracilis (Valenciennes, 1840)

Subfamily Sorubiminae

Pseudoplatystoma corruscans (Agassiz, 1829)

Pauliceia luetkeni (Steindachner, 1875)

Subfamily Luciopimelodinae

Pinirampus pirinampu (Spex, 1829)

⁸ Source: CESP (without date).

FISHES OF PIRAPÓ RIVER BASIN⁹

Superorder Ostariophysi

Series Othophysii

Order Characiformes

Family Characidae

Subfamily Tetragonopterinae

Astyanax bimaculatus (Linnaeus, 1758)

Astyanax fasciatus (Cuvier, 1819)

Astyanax schubarti Britski, 1964

Moenkhausia intermedia (Eigenmann, 1908)

Bryconamericus sp.

Subfamily Cheirodontinae

Cheirodon notomelas Eigenmann, 1915

Subfamily Bryconinae

Brycon orbignyianus (Valenciennes, 1849)

Subfamily Acestrorhynchinae

Acestrorhynchus lacustris (Reinhardt, 1874)

Subfamily Salminae

Salminus maxillosus Valenciennes, 1840

Salminus hilarii Valenciennes, 1849

Subfamily Myleinae

Myloplus levis (Eigenmann & McAtee, 1907)

Subfamily Serrasalminae

Serrasalmus spilopleura Kner, 1860

Serrasalmus marginatus (Valenciennes, 1847)

Family Erythrinidae

Hoplias malabaricus (Bloch, 1794)

Family Anostomidae

Leporinus friderici (Bloch, 1794)

Leporinus elongatus (Valenciennes, 1847)

Schizodon nasutus Kner, 1859

Family Curimatidae

Curimata modesta Fernandez - Yepez, 1948

Family Prochilodontidae

Prochilodus scrofa Steindachner, 1882

Family Cynodontidae

Raphiodon vulpinus Agassiz, 1829

Family Parodontidae

Apareiodon piracabae (Eigenmann, 1907)

Order Siluriformes

Suborder Gymnotoidei

Family Gymnotidae

Gymnotus carapo Linnaeus, 1758

Family Sternopygidae

Eigenmannia virescens (Valenciennes, 1847)

⁹ Source: CESP (1990).

Suborder Siluroidei

Family Doradidae

Pterodoras granulosus (Valenciennes, 1833)

Family Auchenipteridae

Auchenipterus nuchalis (Spix, 1829)

Family Pimelodidae

Subfamily Pimelodinae

Pimelodus maculatus Lacépède, 1803

Pimelodella gracilis (Valenciennes, 1840)

Pseudopimelodus zungaro (Humboldt, 1833)

Subfamily Sorubiminae

Hemisorubim platyrhynchos (Valenciennes, 1840)

Pseudoplatystoma corruscans (Agassiz, 1829)

Paulicea luetkeni (Steindachner, 1875)

Subfamily Luciopimelodinae

Pinirampus pirinampu (Spix, 1829)

Family Hypophthalmidae

Hypophthalmus edentatus Spix, 1829

Family Loricariidae

Rhinelepis strigosa Valenciennes, 1840

Superorder Acanthopterygii

Order Perciformes

Suborder Labroidei

Family Cichlidae

Geophagus brasiliensis (Quoy & Gaimard, 1824)

Suborder Percoidei

Family Sciaenidae

Plagioscion squamosissimus (Heckel, 1840)

Appendix-2

APPENDIX 2 - RED LIST OF REPORTED TREE PLANTS FOR PARANÁ STATE

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
Litorânea e Ribeira	<i>Duvernoia paranaensis</i> Rizz.	Acanthaceae	1
	<i>Geissomeria pubescens</i> Nees	Acanthaceae	1
	<i>Geissomeria schottiana</i> Ness	Acanthaceae	1
	<i>Sericographis cordifolia</i> Rizz.	Acanthaceae	1
	<i>Guatteria fruticosa</i> R. E. Fries	Annonaceae	1
	<i>Aspidosperma australis</i> M.Arg.	Apocynaceae	1
	<i>Aspidosperma ramiflorum</i> M.Arg.	Apocynaceae	1
	<i>Malouetia arborea</i> (Vell.) Miers.	Apocynaceae	1
	<i>Baccharis araquatubensis</i> Teod. & Hatschbach	Asteraceae	6
	<i>Baccharis grandimucronata</i> Teod.	Asteraceae	6
	<i>Dasycondylus dusenii</i> K. & R.	Asteraceae	1
	<i>Senecio pluricephalus</i> Cabr.	Asteraceae	1
	<i>Hymenaea courbaril</i> L.	Caesalpinaceae	1,5
	<i>Senna angulata</i> (Vog.) I. & B. var. <i>miscadena</i> (Vog.) I. & B.	Caesalpinaceae	1
	<i>Swartzia acutifolia</i> Vog.	Caesalpinaceae	1
	<i>Jacaratia spinosa</i> (Aubl.) DC.	Caricaceae	1,5
	<i>Buchenavia kleinii</i> Exell	Combretaceae	1
	<i>Erythroxylum pelleterianum</i> St. Hil.	Erythroxylaceae	1
	<i>Croton lobatus</i> L.	Euphorbiaceae	1
	<i>Savia dictyocarpa</i> Muell. Arg.	Euphorbiaceae	1,5
	<i>Tetrorchidium rubrivenium</i> Poepp. & Endl.	Euphorbiaceae	1
	<i>Myrocarpus frondosus</i> Fr. Allem	Fabaceae	1,5
	<i>Casearia paranaensis</i> Sleumer	Flacourtiaceae	1
	<i>Ocotea bicolor</i> Vattimo	Lauraceae	1
	<i>Buddleja hatschbachii</i> E.M.Norman & L.B.Smith	Loganiaceae	1
	<i>Leandra echinata</i> Cogn.	Melastomataceae	1
	<i>Leandra hatschbachii</i> Brade	Melastomataceae	1
	<i>Leandra humilis</i> (Cogn.) Wurd. var. <i>glabrata</i> (Cogn.) Wurd.	Melastomataceae	6
	<i>Miconia doriana</i> Cogn.	Melastomataceae	1
	<i>Miconia eichleri</i> Cogn.	Melastomataceae	1
	<i>Miconia fasciculata</i> Gardn.	Melastomataceae	1
	<i>Tibouchina dusenii</i> Cogn.	Melastomataceae	1
	<i>Trichilia lepidota</i> Mart. ssp. <i>schumanniana</i> (Harms) Penn.	Meliaceae	1
	<i>Trichilia pseudostipularis</i> (Adr. Juss.) C. DC.	Meliaceae	1
	<i>Calyptranthes hatschbachii</i> Legr.	Myrtaceae	1
	<i>Calyptranthes kleinii</i> Legr.	Myrtaceae	1
	<i>Calyptranthes pileata</i> Legr.	Myrtaceae	1
	<i>Calyptranthes rubella</i> (Bg.) Legr.	Myrtaceae	1

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Eugenia bocainensis</i> Mattos	Myrtaceae	1
	<i>Eugenia jcnsonii</i> Kausel	Myrtaceae	1
	<i>Eugenia klappenbachiana</i> Mattos & Legr.	Myrtaceae	1
	<i>Eugenia macrobracteolata</i> Mattos	Myrtaceae	1
	<i>Eugenia pachyclada</i> Legr.	Myrtaceae	1
	<i>Eugenia pruinosa</i> Legr.	Myrtaceae	1
	<i>Eugenia rostratofalcata</i> Mattos & Legr.	Myrtaceae	1
	<i>Eugenia striata</i> Mattos & Legr.	Myrtaceae	1
	<i>Myrceugenia franciscensis</i> (Bg.) Landrum	Myrtaceae	1,3
	<i>Myrceugenia gertii</i> Landrum	Myrtaceae	1,2
	<i>Myrcia plusiantha</i> Kiaerk.	Myrtaceae	1
	<i>Myrcia rupicola</i> Legr.	Myrtaceae	1,6
	<i>Myrcia tenuivenosa</i> Kiaersk.	Myrtaceae	1
	<i>Myrciaria hatschbachii</i> Mattos	Myrtaceae	1
	<i>Piper hatschbachii</i> Yuncker	Piperaceae	1
	<i>Piper viminifolium</i> Trel.	Piperaceae	1
	<i>Coccoloba glaziovii</i> Lindau	Polygonaceae	1
	<i>Coccoloba spinescens</i> Morong.	Polygonaceae	1,6
	<i>Euplassa incana</i> (Kl.) Johnst.	Proteaceae	1
	<i>Roupala asplenioides</i> Sleumer	Proteaceae	1,6
	<i>Sabicea villosa</i> R. & S.	Rubiaceae	1
	<i>Tocoyena sellowiana</i> (C. & S.) Schum.	Rubiaceae	1
	<i>Almeidea caerulea</i> St. Hil. ex G. Don	Rutaceae	1
	<i>Balfourodendron riedellianum</i> (Engl.) Engl.	Rutaceae	1,5,2
	<i>Chrysophyllum paranaense</i> T. D. Pennington	Sapotaceae	1
	<i>Pouteria bullata</i> (S. Moore) Bachni	Sapotaceae	1
	<i>Pradosia lactescens</i> (Vell.) Radlk.	Sapotaceae	1
	<i>Solanum gertii</i> S. Knapp	Solanaceae	1
Paraná 1, 2 e 3 Paranapanema 1-4	<i>Streblacanthus dubiosus</i> (Lindau) V.M.Baum	Acanthaceae	5
Pirapó Estacional - 5	<i>Achatocarpus bicomutus</i> Schintz et Autran	Achatocarpaceae	5
	<i>Astronium graveolens</i> Jacq.	Anacardiaceae	5
	<i>Rollinia salicifolia</i> Schlecht.	Annonaceae	5
	<i>Xylopia aromatica</i> (Lam.) M.C.Dias	Annonaceae	5
	<i>Aspidosperma cylindrocarpon</i> M.Arg.	Apocynaceae	5
	<i>Aspidosperma polyneuron</i> M.Arg.	Apocynaceae	5
	<i>Aspilia attenuata</i> (Gardn.) Baker	Asteraceae	5
	<i>Aspilia silphioides</i> (H. & A.) Benth.	Asteraceae	5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Tabebuia heptaphylla</i> (Vell.) Toledo	Bignoniaceae	5
	<i>Zeyheria tuberculosa</i> (Vell.) Bur.	Bignoniaceae	5
	<i>Hymenaea courbaril</i> L.	Caesalpinaceae	1,5
	<i>Jacaratia spinosa</i> (Aubl.) DC.	Caricaceae	1,5
	<i>Erythroxylum anguifugum</i> Mart.	Erythroxylaceae	5
	<i>Erythroxylum passerinum</i> Mart.	Erythroxylaceae	5
	<i>Savia dictyocarpa</i> Muell. Arg.	Euphorbiaceae	1,5
	<i>Aeschynomene montevidensis</i> Vog. var <i>microphylla</i> Chod. et Hassler	Fabaceae	5
	<i>Centrolobium tomentosum</i> Guill. ex Benth.	Fabaceae	5
	<i>Crotalaria subdecurrens</i> Mart.	Fabaceae	5
	<i>Gleditsia amorphoides</i> (Griseb.) Taubert	Fabaceae	5
	<i>Lonchocarpus muehlenbergianus</i> Hassler	Fabaceae	5
	<i>Myrocarpus frondosus</i> Fr. Allem	Fabaceae	1,5
	<i>Myroxylon peruiferum</i> L.f.	Fabaceae	5
	<i>Casearia arguta</i> H.B.K.	Flacourtiaceae	5
	<i>Casearia gossypiosperma</i> Briq.	Flacourtiaceae	5
	<i>Cinnamomum australe</i> Vattimo	Lauraceae	5
	<i>Nectandra angustifolia</i> Nees	Lauraceae	5
	<i>Ocotea laxa</i> (Nees) Mez	Lauraceae	5
	<i>Ocotea odorifera</i> (Vell.) Rohwer	Lauraceae	2,5
	<i>Cuphea melvilla</i> Lindl.	Lythraceae	5
	<i>Hibiscus lambertianus</i> H.B.K.	Malvaceae	5
	<i>Hibiscus linearis</i> St. Hil.	Malvaceae	5
	<i>Miconia jucunda</i> (DC.) Tr. var. <i>sellowia</i> (Cham.) Cogn.	Melastomataceae	5
	<i>Acacia parviceps</i> (Speg.) Burk.	Mimosaceae	5
	<i>Albizia hassleri</i> (Chod.) Burk.	Mimosaceae	5
	<i>Inga fagifolia</i> Willd.	Mimosaceae	5
	<i>Calycorectes psidiiflorus</i> (Bg.) Sobral	Myrtaceae	5
	<i>Eugenia gardneriana</i> Bg.	Myrtaceae	2,5
	<i>Myrcia microcarpa</i> Camb.	Myrtaceae	4,5
	<i>Trichostigma octandrum</i> (L.) H. Walter	Phytolaccaceae	5
	<i>Piper flavicans</i> C. DC.	Piperaceae	5
	<i>Balfourodendron riedellianum</i> (Engl.) Engl.	Rutaceae	1,5,2
	<i>Pouteria salicifolia</i> (Spr.) Radlk.	Sapotaceae	5
	<i>Escallonia chlorophylla</i> C. & S.	Saxifragaceae	5
	<i>Lycianthes santonetii</i> (Carr. ex Lesc.) Bitter	Solanaceae	5
	<i>Lycium glomeratum</i> Sendtn.	Solanaceae	5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Byttneria catalpeaeifolia</i> Jacq. subsp. <i>sidaefolia</i> (St. Hil.) Crist.	Sterculiaceae	5
	<i>Clavija nutans</i> (Vell.) Stahl	Theophrastaceae	5
Itararé e Cinzas	<i>Streblacanthus dubiosus</i> (Lindau) V.M.Baum	Acanthaceae	5
	<i>Achatocarpus bicornutus</i> Schintz et Autran	Achatocarpaceae	5
	<i>Anacardium humile</i> St. Hil.	Anacardiaceae	4
	<i>Astronium graveolens</i> Jacq.	Anacardiaceae	5
	<i>Annona coriacea</i> Mart.	Annonaceae	4
	<i>Annona dioica</i> St. Hil.	Annonaceae	4
	<i>Duguetia furfuracea</i> (St. Hil.) Benth. & Hook	Annonaceae	4
	<i>Rollinia salicifolia</i> Schlecht.	Annonaceae	5
	<i>Xylopia aromatica</i> (Lam.) M.C.Dias	Annonaceae	5
	<i>Aspidosperma cylindrocarpon</i> M.Arg.	Apocynaceae	5
	<i>Aspidosperma polyneuron</i> M.Arg.	Apocynaceae	5
	<i>Angelphytum arnotii</i> (Bak.) H. Rob.	Asteraceae	3
	<i>Aspilia attenuata</i> (Gardn.) Baker	Asteraceae	5
	<i>Aspilia silphioides</i> (H. & A.) Benth.	Asteraceae	5
	<i>Baccharis elliptica</i> Gardner	Asteraceae	3
	<i>Baccharis megapotamica</i> Spr. var. <i>weirii</i> (Bak.) G.M.Barroso	Asteraceae	3
	<i>Chromolaena hatschbachii</i> K. & R.	Asteraceae	3
	<i>Chromolaena rhinanthacea</i> (DC.) K. & R.	Asteraceae	3
	<i>Chrysolaena nicolackii</i> H. Rob.	Asteraceae	3
	<i>Disynaphia variolata</i> (B.L.Rob.) K. & R.	Asteraceae	4
	<i>Gochnatia argyrea</i> Malme	Asteraceae	3
	<i>Gochnatia orbiculata</i> (Malme) Cabr.	Asteraceae	3
	<i>Gochnatia rotundifolia</i> Less.	Asteraceae	3
	<i>Vernonia westermanii</i> Ekman & Dusen ex Malme	Asteraceae	4
	<i>Zexmenia viguerioides</i> (Bak.) Hassl.	Asteraceae	4
	<i>Tabebuia heptaphylla</i> (Vell.) Toledo	Bignoniaceae	5
	<i>Zeyheria montana</i> Mart.	Bignoniaceae	4
	<i>Zeyheria tuberculosa</i> (Vell.) Bur.	Bignoniaceae	5
	<i>Caesalpinia stipularis</i> (Veg.) Benth.	Caesalpinaceae	3
	<i>Hymenaea courbaril</i> L.	Caesalpinaceae	1,5
	<i>Jacaratia spinosa</i> (Aubl.) DC.	Caricaceae	1,5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Caryocar brasiliense</i> Camb.	Cariocaraceae	3,4
	<i>Cochlospermum regium</i> (Mart. & Schum.) Pilg.	Cochlospermaceae	3,4
	<i>Terminalia argentea</i> Mart.	Combretaceae	4
	<i>Diospyrus hispida</i> DC.	Ebenaceae	4
	<i>Gaylussacia rabdodendron</i> C. & S.	Ericaceae	3
	<i>Leucothoe chlorantha</i> (Cham.) DC.	Ericaceae	3
	<i>Leucothoe serrulata</i> (Cham.) DC.	Ericaceae	3
	<i>Erythroxylum anguifugum</i> Mart.	Erythroxylaceae	5
	<i>Erythroxylum passerinum</i> Mart.	Erythroxylaceae	5
	<i>Manihot carthagenensis</i> (Jacq.) Muell. Arg.	Euphorbiaceae	4
	<i>Savia dictyocarpa</i> Muell. Arg.	Euphorbiaceae	1,5
	<i>Aeschynomene montevidensis</i> Vog. var. <i>microphylla</i> Chod. et Hassler	Fabaceae	5
	<i>Centrolobium tomentosum</i> Guill. ex Benth.	Fabaceae	5
	<i>Crotalaria subdecurrens</i> Mart.	Fabaceae	5
	<i>Gleditsia amorphoides</i> (Griseb.) Taubert	Fabaceae	5
	<i>Lonchocarpus muehlenbergianus</i> Hassler	Fabaceae	5
	<i>Myrocarpus frondosus</i> Fr. Allem	Fabaceae	1,5
	<i>Myroxylon peruiferum</i> L.f.	Fabaceae	5
	<i>Casearia arguta</i> H.B.K.	Flacourtiaceae	5
	<i>Casearia gossypiosperma</i> Briq.	Flacourtiaceae	5
	<i>Aiouea trinervis</i> Meissn.	Lauraceae	4
	<i>Cinnamomum australe</i> Vattimo	Lauraceae	5
	<i>Nectandra angustifolia</i> Nees	Lauraceae	5
	<i>Ocotea gracilipes</i> Mez	Lauraceae	4
	<i>Ocotea laxa</i> (Nees) Mez	Lauraceae	5
	<i>Ocotea odorifera</i> (Veil.) Rohwer	Lauraceae	2,5
	<i>Buddleja oblonga</i> Benth.	Loganiaceae	3
	<i>Strychnos rubiginosa</i> DC.	Loganiaceae	4
	<i>Cuphea melvilla</i> Lindl.	Lythraceae	5
	<i>Byrsonima coccolobifolia</i> H.B.K.	Malpighiaceae	4
	<i>Hibiscus lambertianus</i> H.B.K.	Malvaceae	5
	<i>Hibiscus linearis</i> St. Hil.	Malvaceae	5
	<i>Krapodickasia urticifolia</i> (St. Hil.) Fryx.	Malvaceae	3
	<i>Monteiroa bullata</i> (Ekman) Krap.	Malvaceae	3
	<i>Monteiroa smithii</i> Krap.	Malvaceae	3
	<i>Pavonia hatschbachii</i> Krap.	Malvaceae	3
	<i>Cambessedesia hilariana</i> Kunth. DC.	Melastomataceae	3
	<i>Miconia jucunda</i> (DC.) Tr. var. <i>sellowia</i> (Cham.) Cogn.	Melastomataceae	5
	<i>Miconia langsdorfii</i> Cogn.	Melastomataceae	4

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Miconia ramboi</i> Brade.	Melastomataceae	3
	<i>Microllicia myrtifolia</i> Cham.	Melastomataceae	4
	<i>Trembleya phlogiformis</i> DC.	Melastomataceae	3,4
	<i>Acacia parviceps</i> (Speg.) Burk.	Mimosaceae	5
	<i>Albizia hassleri</i> (Chod.) Burk.	Mimosaceae	5
	<i>Inga fagifolia</i> Willd.	Mimosaceae	5
	<i>Mimosa bathyrrhena</i> Barneby	Mimosaceae	3
	<i>Mimosa lanata</i> Benth.	Mimosaceae	3
	<i>Mimosa sanguinolenta</i> Barneby	Mimosaceae	3
	<i>Stryphnodendron adstringens</i> (Mart.) Coville	Mimosaceae	4
	<i>Calycorectes psidiiflorus</i> (Bg.) Sobral	Myrtaceae	5
	<i>Campomanesia pubescens</i> (DC.) Bg.	Myrtaceae	3
	<i>Campomanesia sessiliflora</i> (Bg.) Mattos var. <i>bullata</i> (Barb. Rodr.) Landrum	Myrtaceae	4
	<i>Eugenia aurata</i> Bg.	Myrtaceae	4
	<i>Eugenia gardneriana</i> Bg.	Myrtaceae	2,5
	<i>Hexachlamys hamiltonii</i> Mattos	Myrtaceae	3
	<i>Hexachlamys humilis</i> Bg.	Myrtaceae	3
	<i>Myrceugenia franciscensis</i> (Bg.) Landrum	Myrtaceae	1,3
	<i>Myrcia jaguaraiensis</i> Mattos	Myrtaceae	3,4
	<i>Myrcia microcarpa</i> Camb.	Myrtaceae	4,5
	<i>Myrcia microcarpa</i> Camb.	Myrtaceae	4,5
	<i>Myrcia shirleyana</i> Mattos	Myrtaceae	3
	<i>Myrcianthes reptans</i> Legr.	Myrtaceae	3
	<i>Trichostigma octandrum</i> (L.) H. Walter	Phytolaccaceae	5
	<i>Piper flavicans</i> C. DC.	Piperaceae	5
	<i>Discaria americana</i> Gill. & Hook.	Rhamnaceae	3
	<i>Genipa americana</i> L.	Rubiaceae	
	<i>Balfourodendron riedellianum</i> (Engl.) Engl.	Rutaceae	1,5,2
	<i>Pouteria salicifolia</i> (Spr.) Radlk.	Sapotaceae	5
	<i>Pradosia brevipes</i> (Pierre) Pennington	Sapotaceae	3
	<i>Escallonia chlorophylla</i> C. & S.	Saxifragaceae	5
	<i>Escallonia obtusissima</i> St. Hil.	Saxifragaceae	3
	<i>Lycianthes santonetii</i> (Carr. ex Lesc.) Bitter	Solanaceae	5
	<i>Lycium glomeratum</i> Sendtn.	Solanaceae	5
	<i>Solanum hasslerianum</i> Chod.	Solanaceae	3
	<i>Byttneria catalpeaefolia</i> Jacq. subsp. <i>sidaefolia</i> (St. Hil.) Crist.	Sterculiaceae	5
	<i>Clavija nutans</i> (Vell.) Stahl	Theophrastaceae	5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Aloysia polygalaefolia</i> Cham.	Verbenaceae	3
	<i>Lantana hassleri</i> Briq.	Verbenaceae	3
Iguaçu e Tibagi	<i>Streblacanthus dubiosus</i> (Lindau) V.M.Baum	Acanthaceae	5
	<i>Achatocarpus bicornutus</i> Schintz et Autran	Achatocarpaceae	5
	<i>Anacardium humile</i> St. Hil.	Anacardiaceae	4
	<i>Astronium graveolens</i> Jacq.	Anacardiaceae	5
	<i>Annona coriacea</i> Mart.	Annonaceae	4
	<i>Annona dioica</i> St. Hil.	Annonaceae	4
	<i>Duguetia furfuracea</i> (St. Hil.) Benth. & Hook	Annonaceae	4
	<i>Rollinia salicifolia</i> Schlecht.	Annonaceae	5
	<i>Xylopia aromatica</i> (Lam.) M.C.Dias	Annonaceae	5
	<i>Aspidosperma cylindrocarpon</i> M.Arg.	Apocynaceae	5
	<i>Aspidosperma polyneuron</i> M.Arg.	Apocynaceae	5
	<i>Oreopanax fulvum</i> E. March.	Araliaceae	2
	<i>Araucaria angustifolia</i> (Bert.) O. Ktze.	Araucariaceae	2
	<i>Angelphytum arnottii</i> (Bak.) H. Rob.	Asteraceae	3
	<i>Aspilia attenuata</i> (Gardn.) Baker	Asteraceae	5
	<i>Aspilia silphioides</i> (H. & A.) Benth.	Asteraceae	5
	<i>Baccharis elliptica</i> Gardner	Asteraceae	3
	<i>Baccharis megapotamica</i> Spr. var. weirii (Bak.) G.M.Barroso	Asteraceae	3
	<i>Baccharis paranaensis</i> Heer & Dus	Asteraceae	2
	<i>Chromolaena hatschbachii</i> K. & R.	Asteraceae	3
	<i>Chromolaena rhinanthacea</i> (DC.) K. & R.	Asteraceae	3
	<i>Chrysolaena nicolackii</i> H. Rob.	Asteraceae	3
	<i>Disynaphia variolata</i> (B.L.Rob.) K. & R.	Asteraceae	4
	<i>Gochnatia argyrea</i> Malme	Asteraceae	3
	<i>Gochnatia orbiculata</i> (Malme) Cabr.	Asteraceae	3
	<i>Gochnatia rotundifolia</i> Less.	Asteraceae	3
	<i>Vernonia westermanii</i> Ekman & Dusen ex Malme	Asteraceae	4
	<i>Viguiera grandiflora</i> Cabrera	Asteraceae	2
	<i>Zexmenia viguerioides</i> (Bak.) Hassl.	Asteraceae	4
	<i>Tabebuia heptaphylla</i> (Vell.) Toledo	Bignoniaceae	5
	<i>Zeyheria montana</i> Mart.	Bignoniaceae	4
	<i>Zeyheria tuberculosa</i> (Vell.) Bur.	Bignoniaceae	5
	<i>Hymenaea courbaril</i> L.	Caesalpinaceae	1,5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Jacaratia spinosa</i> (Aubl.) DC.	Caricaceae	1,5
	<i>Caryocar brasiliense</i> Camb.	Cariocaraceae	3,4
	<i>Maytenus ilicifolia</i> Mart. ex Reiss.	Celastraceae	2
	<i>Cochlospermum regium</i> (Mart. & Schum.) Pilg.	Cochlospermaceae	3,4
	<i>Terminalia argentea</i> Mart.	Combretaceae	4
	<i>Diospyrus hispida</i> DC.	Ebenaceae	4
	<i>Gaylussacia rabdodendron</i> C. & S.	Ericaceae	3
	<i>Leucothoe chlorantha</i> (Cham.) DC.	Ericaceae	3
	<i>Leucothoe serrulata</i> (Cham.) DC.	Ericaceae	3
	<i>Erythroxylum anguifugum</i> Mart.	Erythroxylaceae	5
	<i>Erythroxylum passerinum</i> Mart.	Erythroxylaceae	5
	<i>Croton ichthygaster</i> Smith & Downs	Euphorbiaceae	2
	<i>Manihot carthagenensis</i> (Jacq.) Muell. Arg.	Euphorbiaceae	4
	<i>Savia dictyocarpa</i> Muell. Arg.	Euphorbiaceae	1,5
	<i>Aeschynomene montevidensis</i> Vog. var <i>microphylla</i> Chod. et Hassler	Fabaceae	5
	<i>Centrolobium tomentosum</i> Guill. ex Benth.	Fabaceae	5
	<i>Crotalaria subdecurrens</i> Mart.	Fabaceae	5
	<i>Gleditsia amorphoides</i> (Griseb.) Taubert	Fabaceae	5
	<i>Lonchocarpus nuelenbergianus</i> Hassler	Fabaceae	5
	<i>Machaerium paraguariense</i> Hassler	Fabaceae	2
	<i>Myrocarpus frondosus</i> Fr. Allem	Fabaceae	1,5
	<i>Myroxylon peruiferum</i> L.f.	Fabaceae	5
	<i>Azara uruguayensis</i> (Speg.) Sleumer	Flacourtiaceae	2
	<i>Casearia arguta</i> H.B.K.	Flacourtiaceae	5
	<i>Casearia gossypiosperma</i> Briq.	Flacourtiaceae	5
	<i>Cunila incana</i> Benth.	Lamiaceae	2
	<i>Salvia uliginosa</i> Benth.	Lamiaceae	2
	<i>Alouea trinervis</i> Meissn.	Lauraceae	4
	<i>Cinnamomum australe</i> Vattimo	Lauraceae	5
	<i>Nectandra angustifolia</i> Nees	Lauraceae	5
	<i>Ocotea gracilipes</i> Mez	Lauraceae	4
	<i>Ocotea laxa</i> (Nees) Mez	Lauraceae	5
	<i>Ocotea odorifera</i> (Vell.) Rohwer	Lauraceae	2,5
	<i>Ocotea porosa</i> (Nees) L. Barroso	Lauraceae	2
	<i>Buddleja oblonga</i> Benth.	Loganiaceae	3
	<i>Strychnos rubiginosa</i> DC.	Loganiaceae	4
	<i>Cuphea melvilla</i> Lindl.	Lythraceae	5
	<i>Byrsonima coccolobifolia</i> H.B.K.	Malpighiaceae	4
	<i>Hibiscus lambertianus</i> H.B.K.	Malvaceae	5
	<i>Hibiscus linearis</i> St. Hil.	Malvaceae	5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	Krapodickasia urticifolia (St. Hil.) Fryx.	Malvaceae	3
	Monteiroa bullata (Ekman) Krap.	Malvaceae	3
	Monteiroa smithii Krap.	Malvaceae	3
	Pavonia hatschbachii Krap.	Malvaceae	3
	Cambessedesia hilariana Kunth. DC.	Melastomataceae	3
	Leandra catharinensis Cogn.	Melastomataceae	2
	Leandra parvifolia Cogn.	Melastomataceae	2
	Miconia jucunda (DC.) Tr. var. sellowia (Cham.) Cogn.	Melastomataceae	5
	Miconia langsdorfii Cogn.	Melastomataceae	4
	Miconia ramboi Brade	Melastomataceae	3
	Microlicia myrtifolia Cham.	Melastomataceae	4
	Ossaea australis Brade	Melastomataceae	2
	Tibouchina kleinii Wurdack	Melastomataceae	2
	Trembleya phlogiformis DC.	Melastomataceae	3,4
	Acacia parviceps (Speg.) Burk.	Mimosaceae	5
	Albizia hassleri (Chod.) Burk.	Mimosaceae	5
	Inga fagifolia Willd.	Mimosaceae	5
	Inga lentiscifolia Benth.	Mimosaceae	2
	Mimosa bathyrrhena Barneby	Mimosaceae	3
	Mimosa lanata Benth.	Mimosaceae	3
	Mimosa sanguinolenta Barneby	Mimosaceae	3
	Mimosa urticaria Barneby	Mimosaceae	2
	Stryphnodendron adstringens (Mart.) Coville	Mimosaceae	4
	Calycorectes psidiiflorus (Bg.) Sobral	Myrtaceae	5
	Campomanesia pubescens (DC.) Bg.	Myrtaceae	3
	Campomanesia sessiliflora (Bg.) Mattos var. bullata (Barb. Rodr.) Landrum	Myrtaceae	4
	Eugenia aurata Bg.	Myrtaceae	4
	Eugenia gardneriana Bg.	Myrtaceae	2,5
	Hexachlamys hamiltonii Mattos	Myrtaceae	3
	Hexachlamys humilis Bg.	Myrtaceae	3
	Myrceugenia franciscensis (Bg.) Landrum	Myrtaceae	1,3
	Myrceugenia gertii Landrum	Myrtaceae	1,2
	Myrceugenia scutellata Legr.	Myrtaceae	2
	Myrcia jaguariaivensis Mattos	Myrtaceae	3,4
	Myrcia microcarpa Camb.	Myrtaceae	4,5
	Myrcia microcarpa Camb.	Myrtaceae	4,5
	Myrcia shirleyana Mattos	Myrtaceae	3
	Myrcianthes reptans Legr.	Myrtaceae	3
	Trichostigma octandrum (L.) H. Walter	Phytolaccaceae	5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Piper flavicans</i> C. DC.	Piperaceae	5
	<i>Piper macedoi</i> Yuncker	Piperaceae	2
	<i>Discaria americana</i> Gill. & Hook.	Rhamnaceae	3
	<i>Genipa americana</i> L.	Rubiaceae	
	<i>Balfourodendron riedellianum</i> (Engl.) Engl.	Rutaceae	1,5,2
	<i>Pouteria salicifolia</i> (Spr.) Radlk.	Sapotaceae	5
	<i>Pradosia brevipes</i> (Pierre) Pennington	Sapotaceae	3
	<i>Escallonia chlorophylla</i> C. & S.	Saxifragaceae	5
	<i>Escallonia obtusissima</i> St. Hil.	Saxifragaceae	3
	<i>Cyphomandra pinetorum</i> Smith & Downs	Solanaceae	2
	<i>Lycianthes santonetii</i> (Carr. ex Lesc.) Bitter	Solanaceae	5
	<i>Lycium glomeratum</i> Sendtn.	Solanaceae	5
	<i>Solanum hasslerianum</i> Chod.	Solanaceae	3
	<i>Solanum reitzii</i> Smith & Downs	Solanaceae	2
	<i>Byttneria catalpeaeifolia</i> Jacq. subsp. <i>sidaefolia</i> (St. Hil.) Crist.	Sterculiaceae	5
	<i>Clavija nutans</i> (Vell.) Stahl	Theophrastaceae	5
	<i>Aegiphila australis</i> Moldenke	Verbenaceae	2
	<i>Aloysia hatschbachii</i> Moldenke	Verbenaceae	2
	<i>Aloysia polygalaeifolia</i> Cham.	Verbenaceae	3
	<i>Lantana hassleri</i> Briq.	Verbenaceae	3
Ivaí e Tibagi	<i>Streblacanthus dubiosus</i> (Lindau) V.M.Baum	Acanthaceae	5
	<i>Achatocarpus bicornutus</i> Schintz et Autran	Achatocarpaceae	5
	<i>Astronium graveolens</i> Jacq.	Anacardiaceae	5
	<i>Rollinia salicifolia</i> Schlecht.	Annonaceae	5
	<i>Xylopia aromatica</i> (Lam.) M.C.Dias	Annonaceae	5
	<i>Aspidosperma cylindrocarpon</i> M.Arg.	Apocynaceae	5
	<i>Aspidosperma polyneuron</i> M.Arg.	Apocynaceae	5
	<i>Oreopanax fulvum</i> E. March.	Araliaceae	2
	<i>Araucaria angustifolia</i> (Bert.) O. Ktze.	Araucariaceae	2
	<i>Aspilia attenuata</i> (Gardn.) Baker	Asteraceae	5
	<i>Aspilia silphiooides</i> (H. & A.) Benth.	Asteraceae	5
	<i>Baccharis paranaensis</i> Heer & Dus	Asteraceae	2
	<i>Viguiera grandiflora</i> Cabrera	Asteraceae	2
	<i>Tabebuia heptaphylla</i> (Vell.) Toledo	Bignoniaceae	5
	<i>Zeyheria tuberculosa</i> (Vell.) Bur.	Bignoniaceae	5
	<i>Hymenaea courbaril</i> L.	Caesalpiniaceae	1,5
	<i>Jacaratia spinosa</i> (Aubl.) DC.	Caricaceae	1,5
	<i>Maytenus ilicifolia</i> Mart. ex Reiss.	Celastraceae	2

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Erythroxylum anguifugum</i> Mart.	Erythroxylaceae	5
	<i>Erythroxylum passerinum</i> Mart.	Erythroxylaceae	5
	<i>Croton ichthyogaster</i> Smith & Downs	Euphorbiaceae	2
	<i>Savia dictyocarpa</i> Muell. Arg.	Euphorbiaceae	1,5
	<i>Aeschynomene montevidensis</i> Vog. var <i>microphylla</i> Chod. et Hassler	Fabaceae	5
	<i>Centrolobium tomentosum</i> Guill. ex Benth.	Fabaceae	5
	<i>Crotalaria subdecurrens</i> Mart.	Fabaceae	5
	<i>Gleditsia amorphoides</i> (Griseb.) Taubert	Fabaceae	5
	<i>Lonchocarpus muehlenbergianus</i> Hassler	Fabaceae	5
	<i>Machaerium paraguariense</i> Hassler	Fabaceae	2
	<i>Myrocarpus frondosus</i> Fr. Allem	Fabaceae	1,5
	<i>Myroxylon peruiferum</i> L.f.	Fabaceae	5
	<i>Azara unguayensis</i> (Speg.) Sleumer	Flacourtiaceae	2
	<i>Casearia arguta</i> H.B.K.	Flacourtiaceae	5
	<i>Casearia gossypiosperma</i> Briq.	Flacourtiaceae	5
	<i>Cunila incana</i> Benth.	Lamiaceae	2
	<i>Salvia uliginosa</i> Benth.	Lamiaceae	2
	<i>Cinnamomum australe</i> Vattimo	Lauraceae	5
	<i>Nectandra angustifolia</i> Nees	Lauraceae	5
	<i>Ocotea laxa</i> (Nees) Mez	Lauraceae	5
	<i>Ocotea odorifera</i> (Vell.) Rohwer	Lauraceae	2,5
	<i>Ocotea porosa</i> (Nees) L. Barroso	Lauraceae	2
	<i>Cuphea melvilla</i> Lindl.	Lythraceae	5
	<i>Hibiscus lambertianus</i> H.B.K.	Malvaceae	5
	<i>Hibiscus linearis</i> St. Hil.	Malvaceae	5
	<i>Leandra catharinensis</i> Cogn.	Melastomataceae	2
	<i>Leandra parvifolia</i> Cogn.	Melastomataceae	2
	<i>Miconia jucunda</i> (DC.) Tr. var. <i>sellowia</i> (Cham.) Cogn.	Melastomataceae	5
	<i>Ossaea australis</i> Brade	Melastomataceae	2
	<i>Tibouchina kleinii</i> Wurdack	Melastomataceae	2
	<i>Acacia parviceps</i> (Speg.) Burk.	Mimosaceae	5
	<i>Albizia hassleri</i> (Chod.) Burk.	Mimosaceae	5
	<i>Inga fagifolia</i> Willd.	Mimosaceae	5
	<i>Inga lentiscifolia</i> Benth.	Mimosaceae	2
	<i>Mimosa urticaria</i> Barneby	Mimosaceae	2
	<i>Calycorectes psidiiflorus</i> (Bg.) Sobral	Myrtaceae	5
	<i>Eugenia gardneriana</i> Bg.	Myrtaceae	2,5
	<i>Myrceugenia gertii</i> Landrum	Myrtaceae	1,2
	<i>Myrceugenia scutellata</i> Legr.	Myrtaceae	2
	<i>Myrcia microcarpa</i> Camb.	Myrtaceae	4,5

RIVER BASIN	LATIN NAME	FAMILY	VEGETATION
	<i>Trichostigma octandrum</i> (L.) H. Walter	Phytolaccaceae	5
	<i>Piper flavicans</i> C. DC.	Piperaceae	5
	<i>Piper macedoi</i> Yuncker	Piperaceae	2
	<i>Balfourodendron riedellianum</i> (Engl.) Engl.	Rutaceae	1,5,2
	<i>Pouteria salicifolia</i> (Spr.) Radlk.	Sapotaceae	5
	<i>Escallonia chlorophylla</i> C. & S.	Saxifragaceae	5
	<i>Cyphomandra pinetorum</i> Smith & Downs	Solanaceae	2
	<i>Lycianthes santonetii</i> (Carr. ex Lesc.) Bitter	Solanaceae	5
	<i>Lycium glomeratum</i> Sendtn.	Solanaceae	5
	<i>Solanum reitzii</i> Smith & Downs	Solanaceae	2
	<i>Byttneria catalpeaefolia</i> Jacq. subsp. <i>sidaefolia</i> (St. Hil.) Crist.	Sterculiaceae	5
	<i>Clavija nutans</i> (Vell.) Stahl	Theophrastaceae	5
	<i>Aegiphila australis</i> Moldenke	Verbenaceae	2
	<i>Aloysia hatschbachii</i> Moldenke	Verbenaceae	2

Source: HARTSBACH & ZILLER. IAP/GTZ, 1995

VEGETATION:

- 1 - Atlantic Forest up to 800 m altitude
- 2 - Mixed Ombrofilous Forest with *Araucaria angustifolia*
- 3 - Dry grassland
- 4 - Scrubby grassland (Savannah)
- 5 - Semidecidual Seasonal Forest
- 6 - Atlantic Forest over 800 m altitude
- 7 - Wet grassland

Appendix-3

APPENDIX 3 - LIST OF ENDANGERED RARE AND EXTINCT SPECIES OF MAMMALS, BIRDS AND REPTILES REPORTED IN PARANÁ STATE

CLASS MAMMALIA				
RIVER BASIN	LATIN NAME	POPULAR NAME	CATEGORY	ENVIRONMENT
COASTAL AND RIBEIRA	<i>Chironectes minimus</i> (Zimmerman,1870)	culca-d'água	e	FA, FC, FES..
	<i>Cebus apella</i> (Linnaeus,1758)	macaco-prego	a	FA, FC, FES.
	<i>Alouatta fusca</i> (E.Geoffroy,1812)	bugio/guariba	a	FA, FC, FES.
	<i>Leontopithecus caissara</i> (Lorini & Persson,1990)	mico-leão-de-cara-preta	b	FA.
	<i>Agouti paca</i> (Linnaeus,1766)	paca	a	FA, FC, FES.
	<i>Speothos venaticus</i> (Lund,1842)	cachorro-vinagre	d	FA, FC, FES, CE
	<i>Lutra longicaudis</i> (Olfers,1818)	lontra	a	FA, FC, FES, AA
	<i>Pteronura brasiliensis</i> (Gmelin,1788)	ariranha	d	FA, FC, FES, AA
	<i>Felis concolor</i> Linnaeus,1771	puma	a	FA, FC, FES, C,CE
	<i>Felis pardalis</i> Linnaeus,1758	jaguaritica	a	FA, FC, FES, C,CE
	<i>Panthera onca</i> (Linnaeus,1758)	onça-pintada	b	FA, FC, FES.
	<i>Tapirus terrestris</i> (Linnaeus,1758)	anta/tapir	b	FA, FC, FES.
	<i>Tayassu pecari</i> (Link,1795)	queixada	c	FA, FC, FES, C,CE
	<i>Blastocerus dichotomus</i> (Illiger,1815)	cervo-do-pantanal	d	FA, FC, FES.
	<i>Sylvilagus brasiliensis</i> (Linnaeus,1758)	tapiti	c	FA, FC, FES.
Iguaçu, Itararé, Tibagi e Cinzas	<i>Chrysocyon brachyurus</i> (Illiger,1815)	lobo-guará	b	C, CE.
	<i>Ozotocercus bezoarticus</i> (Linnaeus,1758)	veado-campeiro	b	C, CE.
	<i>Myrmecophaga tridactyla</i> Linnaeus,1758	tamanduá-bandeira	b	C, CE.
	<i>Priodontes maximus</i> Kerr,1792	tatu-canastra	d	C, CE.
	<i>Chironectes minimus</i> (Zimmerman,1870)	culca-d'água	e	FA, FC, FES..
	<i>Cebus apella</i> (Linnaeus,1758)	macaco-prego	a	FA, FC, FES.
	<i>Alouatta fusca</i> (E.Geoffroy,1812)	bugio/guariba	a	FA, FC, FES.
	<i>Agouti paca</i> (Linnaeus,1766)	paca	a	FA, FC, FES.
	<i>Speothos venaticus</i> (Lund,1842)	cachorro-vinagre	d	FA, FC, FES, CE
	<i>Lutra longicaudis</i> (Olfers,1818)	lontra	a	FA, FC, FES, AA
	<i>Pteronura brasiliensis</i> (Gmelin,1788)	ariranha	d	FA, FC, FES, AA
	<i>Felis concolor</i> Linnaeus,1771	puma	a	FA, FC, FES, C,CE
	<i>Felis pardalis</i> Linnaeus,1758	jaguaritica	a	FA, FC, FES, C,CE
	<i>Panthera onca</i> (Linnaeus,1758)	onça-pintada	b	FA, FC, FES.
	<i>Tapirus terrestris</i> (Linnaeus,1758)	anta/tapir	b	FA, FC, FES.
	<i>Tayassu pecari</i> (Link,1795)	queixada	c	FA, FC, FES, C,CE
	<i>Blastocerus dichotomus</i> (Illiger,1815)	cervo-do-pantanal	d	FA, FC, FES.
	<i>Sylvilagus brasiliensis</i> (Linnaeus,1758)	tapiti	c	FA, FC, FES.

CLASS MAMMALIA

RIVER BASIN	LATIN NAME	POPULAR NAME	CATEGORY	ENVIRONMENT
Paraná 1, 2 e 3	<i>Chironectes minimus</i> (Zimmerman, 1870)	culca-d'água	e	FA, FC, FES.
Paranapanema 1- 4	<i>Cebus apella</i> (Linnaeus, 1758)	macaco-prego	a	FA, FC, FES.
Pirapó	<i>Alouatta fusca</i> (E. Geoffroy, 1812)	bugio/guariba	a	FA, FC, FES.
	<i>Agouti paca</i> (Linnaeus, 1766)	paca	a	FA, FC, FES.
	<i>Speothos venaticus</i> (Lund, 1842)	cachorro-vinagre	d	FA, FC, FES, CE
	<i>Lutra longicaudis</i> (Olfers, 1818)	lontra	a	FA, FC, FES, AA.
	<i>Pteronura brasiliensis</i> (Gmelin, 1788)	ariranha	d	FA, FC, FES, AA.
	<i>Felis concolor</i> Linnaeus, 1771	puma	a	FA, FC, FES, C, CE
	<i>Felis pardalis</i> Linnaeus, 1758	jaguaritica	a	FA, FC, FES, C, CE
	<i>Panthera onca</i> (Linnaeus, 1758)	onça-pintada	b	FA, FC, FES.
	<i>Tapirus terrestris</i> (Linnaeus, 1758)	anta/tapir	b	FA, FC, FES.
	<i>Tayassu pecari</i> (Link, 1795)	queixada	c	FA, FC, FES, C, CE
	<i>Blastocerus dichotomus</i> (Illiger, 1815)	cervo-do-pantanal	d	FA, FC, FES.
	<i>Sylvilagus brasiliensis</i> (Linnaeus, 1758)	tapiti	c	FA, FC, FES.
Piquiri e Ival	<i>Chironectes minimus</i> (Zimmerman, 1870)	culca-d'água	e	FA, FC, FES.
	<i>Cebus apella</i> (Linnaeus, 1758)	macaco-prego	a	FA, FC, FES.
	<i>Alouatta fusca</i> (E. Geoffroy, 1812)	bugio/guariba	a	FA, FC, FES.
	<i>Agouti paca</i> (Linnaeus, 1766)	paca	a	FA, FC, FES.
	<i>Speothos venaticus</i> (Lund, 1842)	cachorro-vinagre	d	FA, FC, FES, CE
	<i>Lutra longicaudis</i> (Olfers, 1818)	lontra	a	FA, FC, FES, AA.
	<i>Pteronura brasiliensis</i> (Gmelin, 1788)	ariranha	d	FA, FC, FES, AA.
	<i>Felis concolor</i> Linnaeus, 1771	puma	a	FA, FC, FES, C, CE
	<i>Felis pardalis</i> Linnaeus, 1758	jaguaritica	a	FA, FC, FES, C, CE
	<i>Panthera onca</i> (Linnaeus, 1758)	onça-pintada	b	FA, FC, FES.
	<i>Tapirus terrestris</i> (Linnaeus, 1758)	anta/tapir	b	FA, FC, FES.
	<i>Tayassu pecari</i> (Link, 1795)	queixada	c	FA, FC, FES, C, CE
	<i>Blastocerus dichotomus</i> (Illiger, 1815)	cervo-do-pantanal	d	FA, FC, FES.
	<i>Sylvilagus brasiliensis</i> (Linnaeus, 1758)	tapiti	c	FA, FC, FES.

CLASS AVIAN	AQUATIC BIRDS			
RIVER BASIN	LATIN NAME	POPULAR NAME	CATEGORY	ENVIRONMENT
COASTAL, RIBEIRA	<i>Tigrisoma fasciatum</i> (Such, 1825)	socó-boi-escuro	c	FA, FES.
	<i>Chloroceryle aenea</i> (Pallas, 1764)	martinhoa	c	FA, FES.
	<i>Chloroceryle inda</i> (Linnaeus, 1766)	martim-pescador-da-mata	c	FA.
	<i>Tachuris rubrigastra</i> (Vieillot, 1817)	papa-piri	c	FA.
	<i>Eudocimus ruber</i> (Linnaeus, 1758)	guará	b	AA.
	<i>Ixobrychus involucris</i> (Vieillot, 1823)	socol-amarelo	e	AA.
	<i>Ptilerodius pileatus</i> (Boddaert, 1783)	garça-real	c	AA.
	<i>Botaurus pinnatus</i> (Wagler, 1829)	socó-boi-baio	e	AA.
	<i>Cochlearius cochlearius</i> (Linnaeus, 1766)	arapapá	e	AA.
	<i>Anhima cornuta</i> (Linnaeus, 1766)	anhuma	d	AA.
	<i>Anas bahamensis</i> Linnaeus, 1758	marreca-toicinho	e	AA.
	<i>Sarkidiornis melanotos</i> (Pennant, 1769)	pato-de-crista	e	AA.
	<i>Buteogallus aequinoctialis</i> (Gmelin, 1788)	caranguejeiro	c	AA.
	<i>Circus buffoni</i> (Gmelin, 1788)	gavião-do-banhado	c	AA.
	<i>Rallus longirostris</i> (Boddaert, 1789)	saracura-matraca	e	AA.
	<i>Aramides mangle</i> (Spix, 1825)	saracura-do-mangue	e	AA.
	<i>Laterallus leucopyrrhus</i> (Vieillot, 1819)	monjolinho	e	AA.
<i>Heliornis fulica</i> (Boddaert, 1783)	picaparra	e	AA.	
<i>Phleocryptes melanops</i> (Vieillot, 1817)	bate-bico	e	AA.	
Paraná 1, 2 e 3	<i>Mergus octosetaceus</i> Vieillot, 1817	pato-mergulhador	d	FES.
Paranapanema 1-4	<i>Tigrisoma fasciatum</i> (Such, 1825)	socó-boi-escuro	c	FA, FES.
Piquiri, Ivaí, Iguaçu	<i>Chloroceryle aenea</i> (Pallas, 1764)	martinhoa	c	FA, FES.
Pirapó, Cinzas	<i>Eudocimus ruber</i> (Linnaeus, 1758)	guará	b	AA.
Tibagi, Itararé	<i>Ixobrychus involucris</i> (Vieillot, 1823)	socol-amarelo	e	AA.
	<i>Ptilerodius pileatus</i> (Boddaert, 1783)	garça-real	c	AA.
	<i>Botaurus pinnatus</i> (Wagler, 1829)	socó-boi-baio	e	AA.
	<i>Cochlearius cochlearius</i> (Linnaeus, 1766)	arapapá	e	AA.
	<i>Anhima cornuta</i> (Linnaeus, 1766)	anhuma	d	AA.
	<i>Anas bahamensis</i> Linnaeus, 1758	marreca-toicinho	e	AA.
	<i>Sarkidiornis melanotos</i> (Pennant, 1769)	pato-de-crista	e	AA.
	<i>Buteogallus aequinoctialis</i> (Gmelin, 1788)	caranguejeiro	c	AA.
	<i>Circus buffoni</i> (Gmelin, 1788)	gavião-do-banhado	c	AA.
	<i>Rallus longirostris</i> (Boddaert, 1789)	saracura-matraca	e	AA.
	<i>Aramides mangle</i> (Spix, 1825)	saracura-do-mangue	e	AA.
	<i>Laterallus leucopyrrhus</i> (Vieillot, 1819)	monjolinho	e	AA.
	<i>Heliornis fulica</i> (Boddaert, 1783)	picaparra	e	AA.
	<i>Phleocryptes melanops</i> (Vieillot, 1817)	bate-bico	e	AA.

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RIVER BASIN	LATIN NAME	POPULAR NAME	CATEGORY	ENVIRONMENT
torânea e Ribeira	<i>Caiman latirostris</i> (Daudin, 1802)	jacaré-de-papo-amarelo	b	FA, FES.
	<i>Chelonia mydas</i> (Linnaeus, 1758)	tartaruga-verde	b	AA.
	<i>Caretta caretta</i> (Linnaeus, 1758)	tartaruga-cabeçuda	b	AA.
	<i>Lepidochelys olivacea</i> (Eschscholtz, 1829)	xibirro	b	AA.
	<i>Eretmochelys imbricata</i> (Linnaeus, 1766)	tartaruga-de-pente	b	AA.
	<i>Dermochelys coriacea</i> (Linnaeus, 1766)	tartaruga-de-couro	b	AA.
	<i>Atractus trihedrus</i> Amaral, 1926		e	FA.
	<i>Sordellina punctata</i> (Peters, 1880)		e	FA.
	<i>Liophis amarali</i> Wettstein, 1930		c	FA.
	<i>Rhadinæa persimilis</i> (Cope, 1868)		c	FA.
	<i>Dipsas incerta</i> (Jan, 1863)	dormideirinha	e	FA.
	<i>Dipsas neivai</i> Amaral, 1926	dormideirinha	e	FA.
	<i>Uromacerina ricardinii</i> (Peracca, 1897)	cobra-bicuda	e	FA.
	<i>Clelia clelia</i> (Daudin, 1803)	muçurana	e	FA, FES
	<i>Siphlophis longicaudatus</i> (Andersson, 1907)		c	FA.
	<i>Siphlophis pulcher</i> (Raddi, 1820)		c	FA.
	<i>Colobodactylus taunayi</i> Amaral, 1933	pequena lagartixa	e	FA.
	<i>Placosoma glabellum</i> (Peters, 1870)	pequena lagartixa	e	FA.
uraná 1 - 4	<i>Clelia clelia</i> (Daudin, 1803)	muçurana	e	FA, FES
uranapanema 1-3 rapô	<i>Caiman latirostris</i> (Daudin, 1802)	jacaré-de-papo-amarelo	b	FA, FES.
	<i>Chelonia mydas</i> (Linnaeus, 1758)	tartaruga-verde	b	AA.
	<i>Caretta caretta</i> (Linnaeus, 1758)	tartaruga-cabeçuda	b	AA.
	<i>Lepidochelys olivacea</i> (Eschscholtz, 1829)	xibirro	b	AA.
	<i>Eretmochelys imbricata</i> (Linnaeus, 1766)	tartaruga-de-pente	b	AA.
	<i>Dermochelys coriacea</i> (Linnaeus, 1766)	tartaruga-de-couro	b	AA.
uaçu, Plquiri af e Tibagi	<i>Xenodon guentheri</i> Boulenger, 1894	boipevinha	e	FC
	<i>Philodryas araldoi</i> Amaral, 1932		c	FC.
	<i>Calamodontophis paucidentis</i> (Amaral, 1935)		c	FC.
	<i>Bothrops cotiara</i> (Gomes, 1913)	cotiara	e	FC.
	<i>Bothrops itapetiningae</i> (Boulenger, 1907)		e	C.
	<i>Ditaxodon taeniatus</i> (Hensel, 1868)		c	C.
	<i>Chelonia mydas</i> (Linnaeus, 1758)	tartaruga-verde	b	AA.
	<i>Caretta caretta</i> (Linnaeus, 1758)	tartaruga-cabeçuda	b	AA.
	<i>Lepidochelys olivacea</i> (Eschscholtz, 1829)	xibirro	b	AA.
	<i>Eretmochelys imbricata</i> (Linnaeus, 1766)	tartaruga-de-pente	b	AA.
	<i>Dermochelys coriacea</i> (Linnaeus, 1766)	tartaruga-de-couro	b	AA.
	<i>Bothrops itapetiningae</i> (Boulenger, 1907)		e	C.
	<i>Ditaxodon taeniatus</i> (Hensel, 1868)		c	C.
	<i>Chelonia mydas</i> (Linnaeus, 1758)	tartaruga-verde	b	AA.
	<i>Caretta caretta</i> (Linnaeus, 1758)	tartaruga-cabeçuda	b	AA.
	<i>Lepidochelys olivacea</i> (Eschscholtz, 1829)	xibirro	b	AA.
	<i>Eretmochelys imbricata</i> (Linnaeus, 1766)	tartaruga-de-pente	b	AA.

RIVER BASIN	LATIN NAME	POPULAR NAME	CATEGORY	ENVIRONME
Cinzas e Itararé	<i>Clelia clelia</i> (Daudin, 1803)	muçorana	c	FA, FES
	<i>Caiman latirostris</i> (Daudin, 1802)	jacaré-de-papo-amarelo	b	FA, FES.
	<i>Dermodochelys coriacea</i> (Linnaeus, 1766)	tartaruga-de-couro	b	AA.

SOURCE: ZILLER, R. Silvia. 1994, IAP (32)

Environment:

FA - Atlantic Forest or Ombrofilous Dense Forest

FC - Ombrofilous Mixed Forest with *Araucaria angustifolia*

FES - Semidecidual Seasonal Forest

C - Dry Grassland

CE - Savannah

AA - Aquatic environment

Categories:

a - Vulnerable

b - Endangered

c - Rare

d - Probably extinct

e - Indeterminate

Appendix-4

APPENDIX 4

LIST OF AQUATIC BIRD SPECIES REPORTED FOR PARANÁ STATE

ORDER	FAMILY	SPECIES	COMMON NAME
SPHENISCIFORMES	SPHENISCIDAE	<i>Spheniscus magellanicus</i>	pinguim
PODICIPEDIFORMES	PODICIPEDIDAE	<i>Tachybaptus dominicus</i>	mergulhão
		<i>Podilymbus podiceps</i>	mergulhão
		<i>Rollandia rolland</i>	mergulhão-de-cara-branca
		<i>Podiceps major</i>	mergulhão-grande
		<i>Podiceps occipitalis</i>	mergulhão-grande
PROCELLARIIFORMES	DIOMEDEIDAE	<i>Diomedea exulans</i>	albatroz - errante
		<i>Diomedea epomophora</i>	albatroz-real
		<i>Diomedea melanophris</i>	albatroz-de-sobrancelha
		<i>Diomedea chlororhynchos</i>	albatroz-de-bico-amarelo
		<i>Diomedea chrysostoma</i>	albatroz-de-cabeça-cinzenta
		<i>Phoebetria fusca</i>	albatroz-escuro
		<i>Phoebetria palpebrata</i>	albatroz-marron
	PROCELLARIIDAE	<i>Macronectes giganteus</i>	petrel-gigante
		<i>Fulmarus glacialis</i>	petrel-prateado
		<i>Daption capense</i>	pomba-do-cabo
		<i>Pterodroma incerta</i>	fura-buxo-de-boné
		<i>Pterodroma mollis</i>	fura-buxo-de-coroa
		<i>Pterodroma brevirostris</i>	fura-buxo-de-bico-curto
		<i>Pachyptila vittata</i>	faiga
		<i>Pachyptila turtur</i>	faigão
		<i>Pachyptila belcheri</i>	faigão
		<i>Procellaria aequinoctialis</i>	procelária, pardela-preta
		<i>Callonectris diomedea</i>	bobo-grande
		<i>Puffinus gravis</i>	bobo-grande
<i>Puffinus griseus</i>	bobo		
<i>Puffinus puffinus</i>	bobo-pequeno		

	OCEANITIDAE	<i>Oceanites oceanicus</i>	alma-de-mestre	
		<i>Fregatta tropica</i>	petrel-de-barriga-preta	
		<i>Fregatta grallaria</i>	petrel-de-barriga-branca	
PELECANIFORMES	SULIDAE	<i>Sula leucogaster</i>	atobá, mergulhão	
		<i>Sula dactylatra</i>	atobá-branco	
	PHALACROCORACIDAE	<i>Phalacrocorax brasilianus</i>	biguá	
	ANHINGIDAE	<i>Anhinga anhinga</i>	biguatinga	
	FREGATIDAE	<i>Fregata magnificens</i>	fregata, tesourão	
CICONIIFORMES	ARDEIDAE	<i>Syrigma sibilatrix</i>	maria-faceira	
		<i>Ptilerodius pileatus</i>	garça-real	
		<i>Ardea cocoi</i>	garça-real	
		<i>Egretta alba</i>	garça-branca	
		<i>Egretta caerulea</i>	garça-azul	
		<i>Egretta thula</i>	garcinha-branca	
		<i>Bubulcus ibis</i>	garça-vaqueira	
		<i>Butorides striatus</i>	socozinho	
		<i>Nycticorax violaceus</i>	socó-do-mangue, savacu-de-coroa	
		<i>Nycticorax nycticorax</i>	socó-dominhoco	
		<i>Cochlearius cochlearius</i>	arapapá	
		<i>Tigrisoma fasciatum</i>	socó-jararaca	
		<i>Tigrisoma lineatum</i>	socó-boi	
		<i>Ixobrychus involucris</i>	socó-amarelo	
		<i>Ixobrychus exilis</i>	socó-escuro	
		<i>Botaurus pinnatus</i>	socó-boi-baio	
		CICONIIDAE	<i>Mycteria americana</i>	cabeça-seca
			<i>Ciconia maguari</i>	cegonha, maguari
	<i>Jabiru mycteria</i>		jaburu, tuiuiu, tabuiaia	
	THRESKIORNITHIDAE	<i>Theristicus caerulescens</i>	curicaca-cinzenta	
		<i>Theristicus caudatus</i>	curucaca	
		<i>Mesembrinibis cayennensis</i>	tapicuru	
		<i>Phimosus infuscatus</i>	maçaricão	
		<i>Eudocimus ruber</i>	guará	
		<i>Plegadis chihi</i>	maçarico-	

		<i>Platalea ajaja</i>	colhereiro		
PHOENICOPTERIGIFORMES	PHOENICOPTERIGIDAE	<i>Phoenicopterus ruber</i>	flamingo		
		<i>Phoenicoparrus andinus</i>	flamingo-pequeno		
ANSERIFORMES	ANHIMIDAE	<i>Anhima cornuta</i>	anhuma		
		<i>Chauna torquata</i>	tachã		
	ANATIDAE	<i>Dendrocygna bicolor</i>	marreca-caneleira		
		<i>Dendrocygna viduata</i>	irerê, ariri		
		<i>Dendrocygna autumnalis</i>	marreca-cabocla		
		<i>Cygnus melancoryphus</i>	cisne-de-pescoço-preto		
		<i>Sarkidiornis sylvicola</i>	pato-de-crista		
		<i>Cairina moschata</i>	pato-do-mato		
		<i>Anas flavirostris</i>	marreca-parda		
		<i>Anas georgica</i>	marreca-parda		
		<i>Anas bahamensis</i>	marreca-toicinho		
		<i>Anas versicolor</i>	marreca-cri-cri		
		<i>Anas cyanoptera</i>	marreca-colorada		
		<i>Anas platalea</i>	marreca-colhereira		
		<i>Calonetta leucophris</i>	marreca-de-coleira		
		<i>Amazonetta brasiliensis</i>	ananaí, paturi		
		<i>Netta erythrophthalma</i>	marrecão		
		<i>Netta peposaca</i>	marrecão		
		<i>Mergus octosetaceus</i>	pato-mergulhador		
		<i>Heteronetta atricapilla</i>	marreca-de-cabeça-preta		
		<i>Nomonyx dominica</i>	marreca-de-bico-roxo		
		<i>Oxyura vittata</i>	marreca-de-bico-roxo		
		GRUIFORMES	ARAMIDAE	<i>Aramus guarauna</i>	carão
			RALLIDAE	<i>Rallus sanguinolentus</i>	saracura-preta
				<i>Rallus nigricans</i>	saracura-sana
				<i>Rallus longirostris</i>	saracura-do-mangue
<i>Rallus maculatus</i>	saracura-carijó				
<i>Aramides mangle</i>	saracura-do-mangue				
<i>Aramides cajanea</i>	saracura-três-potes				

		<i>Aramides saracura</i>	saracura-do-mato
		<i>Aramides ypecaha</i>	saracuruçu
		<i>Porzana albicollis</i>	sanã-carijó
		<i>Porzana flaviventer</i>	saracura-pintada
		<i>Laterallus melanophaius</i>	monjolinho-cinzento
		<i>Laterallus leucopyrrhus</i>	monjolinho-castanho
		<i>Coturnicops notata</i>	pinto-d'água-carijó
		<i>Porphyriops melanops</i>	frango-d'água-carijó
		<i>Galinula chloropus</i>	frango-d'água
		<i>Porphyryla martinica</i>	frango-d'água-azul
		<i>Porphyryla flavirostris</i>	frango-d'água-pequeno
		<i>Fulica armilata</i>	carqueja
		<i>Fulica leucoptera</i>	carqueja-de-asa-branca
		<i>Fulica rufifrons</i>	carqueja-de-bico-roxo
	HELIORNITHIDAE	<i>Heliornis fulica</i>	peca-pará
CHARADRIIFORMES	JACANIDAE	<i>Jacana jacana</i>	jaçanã, cafezinho
	ROSTRATULIDAE	<i>Nycticryphes semicollaris</i>	narceja-de-bico-torto
	HAEMATOPODIDAE	<i>Haematopus ostralegus</i>	piru-piru
	RECURVIROSTRIDAE	<i>Himantopus himantopus</i>	pernilongo
	CHIONIDIDAE	<i>Chionis alba</i>	pomba-do-mar
	CHARADRIIDAE	<i>Vanellus chilensis</i>	quero-quero
		<i>Pluvialis dominica</i>	maçarico
		<i>Pluvialis squatarola</i>	maçarico-de-perna-amarela
		<i>Charadrius semipalmatus</i>	batufra-da-praia
		<i>Charadrius collaris</i>	batufra-da-praia
		<i>Zonibyx modestus</i>	batufra
		<i>Hoploxypterus cayanus</i>	mexeriqueira
	SCOLOPACIDAE	<i>Arenaria interpres</i>	vira-pedra
		<i>Tringa solitaria</i>	maçarico
		<i>Tringa flavipes</i>	maçarico-de-perna-amarela
		<i>Tringa melanoleuca</i>	maçarico-grande-de-perna-amarela

		<i>Tringa macularia</i>	maçarico
		<i>Catoptrophorus semipalmatus</i>	maçarico-de-asa-branca
		<i>Calidris canutus</i>	maçarico-de-papo-vermelho
		<i>Calidris bairdii</i>	maçarico-de-bico-fino
		<i>Calidris fuscicollis</i>	maçarico-de-sobre-branco
		<i>Calidris melanotos</i>	maçarico-de-colete
		<i>Calidris alba</i>	maçarico-branco
		<i>Micropalama himantopus</i>	
		<i>Bartramia longicauda</i>	maçarico-do-campo
		<i>Limosa haemastica</i>	maçarico-de-bico-virado
		<i>Numenius phaeopus</i>	
		<i>Gallinago gallinago</i>	narceja, bicudo
		<i>Gallinago undulata</i>	narcejão
	PHALAROPODIDAE	<i>Phalaropus fulicarius</i>	falaropo-castanho
		<i>Phalaropus lobatus</i>	falaropo-do-norte
		<i>Phalaropus tricolor</i>	pisa-n'água
	STERCORARIIDAE	<i>Catharacta maccormicki</i>	gaivota-rapineira
		<i>Catharacta antarctica</i>	gaivota-rapineira
		<i>Stercorarius parasiticus</i>	gaivota-rapineira
		<i>Stercorarius longicaudus</i>	rabo-de-junco-preto
	LARIDAE	<i>Larus dominicanus</i>	gaivotão
		<i>Larus cirrocephalus</i>	gaivota-de-cabeça-cinza
		<i>Larus maculipennis</i>	gaivota-maria-velha
	STERNIDAE	<i>Phaetusa simplex</i>	gaivota-do-rio
		<i>Sterna nilotica</i>	trinta-réis-de-bico-preto
		<i>Sterna hirundinacea</i>	trinta-réis-de-bico-vermelho
		<i>Sterna hirundo</i>	trinta-réis-boreal
		<i>Sterna vittata</i>	trinta-réis-antártico

		<i>Sterna trudeaui</i>	trinta-réis-de-coroa-branca
		<i>Sterna superciliaris</i>	trinta-réis-anão
		<i>Sterna maxima</i>	trinta-réis-real
		<i>Sterna sandvicensis</i>	trinta-réis-de-bico-amarelo
	RYNCHOPIDAE	<i>Rynchops nigra</i>	talha-mar
CORACIIFORMES	ALCEDINIDAE	<i>Ceryle torquata</i>	martim-pescador-grande
		<i>Chloroceryle amazona</i>	martim-pescador-médio
		<i>Chloroceryle americana</i>	martim-pescador-pequeno
		<i>Chloroceryle inda</i>	martim-pescador-da-mata
		<i>Chloroceryle aenea</i>	martinho, martim-pescador-anão

SOURCE: STRAUBE, F. Museum of Natural History. Curitiba, Parana. 1994

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APPENDIX 5

Water Quality Criteria for Aquatic Community Preservation
 CONAMA, Resolution n° 20
 Potentially harmful substances (maximum proportions)

Aluminium	0,1 mg/l	Al
Ammonia	0,02 mg/l	NH ₃
Arsenic	0,05 mg/l	As
Barium	0,1 mg/l	Ba
Beryllium	0,1 mg/l	Be
Boron	0,75 mg/l	B
Benzene	0,01 mg/l	
Benzo-a-pireno	0,00001 mg/l	
Cadmium	0,001 mg/l	Cd
Cyanide	0,01 mg/l	CN
Lead	0,03 mg/l	Pb
Chloride	250 mg/l	Cl
Residual Chlorine	0,01 mg/l	Cl
Cobalt	0,2 mg/l	Co
Copper	0,02 mg/l	Cu
Trivalent Chromium	0,5 mg/l	Cr ₃
Hexavalent Chromium	0,05 mg/l	Cr ₆
1,1 dichlorine ethene	0,0003 mg/l	
1,2 dichlorine ethane	0,01 mg/l	
Tin	2,0 mg/l	Sn
Phenol	0,001 mg/l	C ₆ H ₅ OH
Soluble Iron	0,3 mg/l	Fec
Fluoride	1,4 mg/l	F
Total Phosphorus	0,025 mg/l	P
Lithium	2,5 mg/l	Li
Manganese	0,1 mg/l	Mn
Mercury	0,0002 mg/l	Hg
Nickel	0,025 mg/l	Ni
Nitrate	10 mg/l	N
Nitrite	10 mg/l	N
Silver	0,01 mg/l	Ag
Pentachlorophenol	0,01 mg/l	
Selenium	0,01 mg/l	Se
Total Dissolved Solids	500 mg/l	
Tense Active which react to Blue Metilen	0,5 mg/l	LAS
Sulfate	250 mg/l	SO ₄
Sulfide (as H ₂ S not dissociated)	0,002 mg/l	S
Tetrachlorine ethane	0,01 mg/l	
Trichlorine ethane	0,03 mg/l	
Tetra Carbon Chloride	0,003 mg/l	

2,4,6 trichlorinephenol	0,01 mg/l	
Total Uranium	0,02 mg/l	U
Vanadium	0,1 mg/l	V
Zinc	0,18 mg/l	Zn
Aldrin	0,01 ug/l	
Chlordane	0,04 ug/l	
DDT	0,002 ug/l	
Dieldrin	0,005 ug/l	
Endrin	0,004 ug/l	
Endossulphan	0,056 ug/l	
Heptachlorine Epoxide	0,01 ug/l	
Heptachlorine	0,01 ug/l	
Lindane (gama - BHC)	0,02 ug/l	
Metoxichlorine	0,03 ug/l	
Dodecachlorine + Nonachlorine	0,001 ug/l	
Polychlorinated Biphenyl's (PCB's)	0,001 ug/l	
Toxaphenol	0,01 ug/l	
Demethon	0,1 ug/l	
Guthion	0,005 ug/l	
Malathion	0,1 ug/l	
Parathion	0,04 ug/l	
Carbonyl	0,02 ug/l	
Organophosphorated Composts and Total Carbamates	10,0 ug/l	in Parathion
2,4 - D	4,0 ug/l	
2,4,5 - TP	10,0ug/l	
2,4,5 - T	2,0 ug/l	

For the above mentioned Class 1 waters, the following limits and/or conditions are established:

- a) floating material, including non-natural foam: virtually absent;
- b) oil and grease: virtually absent;
- c) substances which transmit taste or odor: virtually absent;
- d) artificial dyers: virtually absent;
- e) substances which form objectable deposits: virtually absent;
- f) coliforms: as water for primary recreation (leisure) the Article 26 from this Resolution must be taken into consideration. Water utilized for vegetable or frutiferous plant's irrigation, which grow close to the soil, and which are consumed (eaten) raw, without removing its skin or pellicule, must not be polluted by human excrement, thus being necessary the accomplishment of periodically sanitary inspections. For other uses, the limit of 200 fecal coliforms per 100 milliliters in 80% or more of at least 5 monthly samples examined, collected in any of the months, must not be exceeded. In the case of the region not being provided with available facilities for examining the fecal coliforms, the limit index will be of 1.000 total coliforms per 100 milliliters in 80% or more of at least from 5 monthly samples examined, collected in any month;

- g) BOD5 days at 20^o C up to 3 mg/l O₂;
- h) DO in any sample, not inferior to 6 mg/l O₂;
- i) Turbidity: up to 40 nefelometric turbidity units (UNT);
- j) color: natural color level of water body in mg Pt/l;
- l) pH: 6,0 to 9,0.

For Class 2 waters, the same limits and conditions for Class 1 are established, except for the following:

- a) the presence of artificial dyes that can not be removed through coagulation, sedimentation and conventional filtration, will not be allowed;
- b) Coliforms: for the use of primary contact recreation (leisure), the Article 26 of this Resolution must be obeyed. For other uses, the limit of 1,000 fecal coliforms per 100 millimeters in 80% or more of at least 5 monthly samples examined, collected in any with available facilities for examining the fecal coliforms, the limit index will be of 5,000 total coliforms per 100 millimeters in 80% or more of at least 5 monthly samples examined, collected in any month;
- c) Color: up to 75 mg Pt/l;
- d) Turbidity: up to 100 UNT;
- e) BOD 5 days at 20^oC up to 5 mg/l O₂.

Appendix-6

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APPENDIX 6

Water quality criteria proposed by the US - EPA
 Federal Register 45(231), 79318 - 79379 (1980), 49 (23), 4551-4554 (1984)

Fresh Water Aquatic Life
 (All the values in µg/l)

Chemical substance	Water Toxicity	Note	Chronic Toxicity	Note
Acenaphthene	1700	*	n/a	*
Acrolein	68	*	21	*
Acrylonitrile	7550	*	2600	**
Aldrin	3	*	n/a	
Dieldrin	2,5		0,0019	***
Ammonia	See note 1			
Antimony	9000	*	1600	*
Arsenic (III)	140	+	72	+
Benzene	5300	*	n/a	
Benzidine	2500	*	n/a	
Beryllium	130	*	5,3	*
Carbon Tetra ...	35.200	*	n/a	
Chlordane	2,4		0,0043	***
Chlorinated Benzenes	250	*	n/a	
Chlorinated Ethanes				
1,2 - dichloridethane	118.000	*	20.000	*
1,1,1-trichloroethane	18.000	*	n/a	
1,1,2-trichloroethane	18.000	*	9400	*
1,1,2,2-tetrachloride ethane	9320	*	2400	*
Ethane Pentachloro	7240	*	390	*
Ethane Hexachloro	980	*	540	*
Chlorinated Naphthalene	1000	*	n/a	
Chlorinated Phenols				
4-chlorine-3-methylphenol	30	*		
2-chlorophenol	4380	*	n/a	
2,4-dichlorophenol	2020	*	365	*
2,4,6-trichlorophenol			970	*
Pentachlorophenol	50	*	3,2	*
Chlorinated Ethers	238.000	*	n/a	
DDT and Metabolites				
DDT	1,1 (max) 0,001 (24h average)			
TDE	0,6	*	n/a	
DDE	1050	*	n/a	
Dichlorobenzenes	1120	*	763	*
Dichloroethylenes	11.600	*	n/a	

Fresh Water Aquatic Life (continuation)

Dichloropropanes	23.000	*	5700	*
Dichloropropenes	6060	*	244	*
2,4-dimethylphenol	2120	*	n/a	
2,4-dinitrotoluene	330	*	230	*
1,2-diphenylhydrazine	270	*	n/a	
Endosulphine	0,22 (max) 0,056			
	(average of 24 h)			
Endrin	0,18 (max) 0,0023 (24h average)			
Ethylbenzene	32.000	*	n/a	
Fluorantene	3980	*	n/a	
Halomethane	11.000	*	n/a	
Chloroform	28.900	*	1240	
Heptachlorine	0,52 (max) 0,0038 (24h average)			
Hexachlorine ...	90	*	9,3	*
Hexachlorocyclohexane				
Lindane	2,0 (max) 0,06 (24 h average)			
BHC	100	*	n/a	
Hexachlorocyclopentadine	7	*	5,2	*
Isophorone	117000	*	n/a	
Naphthalene	2300	*	620	*
Nickel		++		++
Nitrobenzene	27.000	*	n/a	
Nitrophenols	230	*	n/a	
Nitro ...	5850	*	n/a	
Phenol	10.200	*	2560	*
Phthalic Esters	940	*	3	*
Polichlorobiphenyls	>2,0		0,014 (24 h. average)	
Selenium				
Selenite	260 (max) (average 24 h)			
Selenate	760	*	n/a	
Silver	+++		0,12	*
Tetrachloroethylene	5280	*	840	*
Thallium	1400	*	40	*
Toluene	17.500	*	n/a	
Toxaphenol	1,6 (max) 0,013			
	(average 24 h)			
Trichloroethylene	45.000	*	n/a	
...	n/a		n/a	
Zinc	47	(average 24 h)		

- * Perceivable effects in these concentrations, and can occur in lower concentrations with more sensible species.
- ** Death occurs by exposition to this concentration for 30 days.
- *** Average of 24 hours
- + Probable no protection of "gastrophylene carolinenses".
- ++ Numerical valor given by $(0,76 [\ln (\text{hardness})] + 1,06)$ as an average of 24 hours and the concentration shall not exceed the numerical valor given by $(0,76 [\ln (\text{hardness})] + 4,02)$ at any time.
- +++ The numerical valor given by $(1,76 [\ln (\text{hardness})] - 6,52)$ shall not be exceeded at any time.

Note: In the protection of the fresh water aquatic life, the criterion for ammonia is based in the water ambiental temperature and the pH with maximum concentration and with average valors of 30 days. The reference proportionates the valors of the criteria for the pH rates of 6,5 to 9 and the temperature rate from 0° to 30° C.

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