JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

STATE SECRETARIAT OF PLANNING AND GENERAL COORDINATION,
PARANÁ STATE, THE FEDERATIVE REPUBLIC OF BRAZIL

THE MASTER PLAN STUDY ON
THE UTILIZATION OF WATER RESOURCES IN PARANÁ STATE
IN
THE FEDERATIVE REPUBLIC OF BRAZIL

FINAL REPORT

SECTORAL REPORT VOLUME M

INSTITUTION

December, 1995

Yachiyo Engineering Co., Ltd.
Tokyo, Japan

and

Nippon Koei Co., Ltd.
Tokyo, Japan

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Cost Estimate is Based
on The Price Level of August, 1994,
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(as of August, 1994)

COMPOSITION OF FINAL REPORT

1. EXECUTIVE SUMMARY

2. MAIN REPORT
   - I. Strategy for Paraná State
   - II. Master Plan for Iguaçu River Basin
   - III. Master Plan for Tibagi River Basin

3. SECTORAL REPORT
   - A. Socio-economy
   - B. Meteorology, Hydrology and Surface Water Resources
   - C. Hydrogeology and Groundwater Resources
   - D. Domestic and Industrial Water
   - E. Agriculture
   - F. Hydroelectric Power Generation
   - G. Water Utilization Plan
   - H. Flood Control
   - I. Water Quality and Sewerage
   - J. Soil Erosion and Forest
   - K. Ecology
   - L. Water Environment Management
   - M. Institution
   - N. Cost Estimate, and Economic and Financial Assessment

4. DATA BOOK

THE MASTER PLAN STUDY ON
THE UTILIZATION OF WATER RESOURCES IN PARANÁ STATE
IN THE FEDERATIVE REPUBLIC OF BRAZIL
SECTORAL REPORT VOL. M
INSTITUTION

TABLE OF CONTENTS

List of Tables

List of Figures

List of Abbreviation

CEPA	:	State Commission for Agricultural Planning *Comissão Estadual de Planejamento Agrícola*
COMEC	:	Coordination of the Metropolitan Area of Curitiba *Coordenação da Região Metropolitana de Curitiba*
CONAMA	:	National Council of Environment *Conselho Nacional do Meio Ambiente*
COPATI	:	Inter Municipal Concessionaire for the Environmental Protection of the Tibagi River Basin *Consórcio Intermunicipal para a Proteção Ambiental de Bacia do Rio Tibagi*
COPEL	:	Energy Company of the State of Paraná *Companhia Pananaense de Energia*
CORPRERI	:	Permanent Regional Commission Against Floods in the Iguaçu River *Comissão Regional Permanente Contra as Cheias do Rio Iguaçu*
DAGRI	:	Agricultural Operation Department *Departamento Operacional da Agricultura*
DEPEC	:	Livestock Department *Departamento de Pecuária*
DERAL	:	Economy Department *Departamento de Economia*
DNAEE	:	National Department of Water and Electric Energy *Departamento Nacional de Águas e Energia Elétrica*
ELETROBRAS	:	Brazilian Central Electric Joint-stock Company *Centrais Elétricas Brasileiras S.A.*
ELETROSUL	:	Electric Center of the South *Centrais Elétricas do Sul do Brasil S.A.*
EMATER	:	Paraná State Technical Assistance and Rural Extension Company *Empresa Paranaense de Assistência Técnica e Extensão Rural*
EMBRAPA	:	Brazilian Agriculture and Livestock Research Company *Empresa Brasileira de Pesquisa Agropecuária*

FAMEPAR	:	Institute for Municipal Assistance of Paraná State *Instituto de Assistência aos Municípios do Estado do Paraná*
FAO	:	Food and Agriculture Organization *Fundo das Nações Unidas para Alimentação e Agricultura*
IAP	:	Environmental Institute of Paraná *Instituto Ambiental do Paraná*
IAPAR	:	Agricultural Research Institute of Paraná *Instituto Agronômico do Paraná*
IBAMA	:	Brazilian Institute of Environment and Renewable Natural Resources *Instituto Brasileiro do Meio Ambiente e de Recursos Naturais Renováveis*
IBDF	:	Brazilian Forest Development Institute (current IBAMA) *Instituto Brasileiro de Desenvolvimento Florestal*
IBGE	:	Brazilian Institute of Geography and Statistic *Instituto Brasileiro de Geografia e Estatística*
IPARDES	:	Economic and Social Development Institute of the State of Paraná *Instituto Paranaense de Desenvolvimento Econômico Social*
JICA	:	Japan International Cooperation Agency *Agência de Cooperação Internacional do Japão*
MERCOSUL	:	South Common Market in Brazil, Argentina, Uruguay and Paraguay *Merca do Cone Sul*
MINEROPAR	:	Paraná State Mineral Company *Minerais do Paraná S/A*
PROSAM	:	Environmental Sanitation Program for Curitiba Metropolitan Region *Programa de Saneamento de Região Metropolitan de Curitiba*
SANEPAR	:	Sanitation Company of the State of Paraná *Companhia de Saneamento do Paraná*
SEAB	:	State Secretariat of Agriculture and Supply *Secretaria de Estado da Agricultura e do Abastecimento*
SEDU	:	State Secretariat of Urban Development *Secretaria de Estado do Desenvolvimento Urbano*

SEFA	:	State Secretariat for Treasury Secretaria de Estado da Fazenda
SEID	:	State Secretariat for Industry, Commerce and Economic Development *Secretaria de Estado da Indústria, Comércio e do Desenvolvimento Econômico*
SEMA	:	State Secretariat of Environment *Secretaria de Estado do Meio Ambiente*
SEPL	:	State Secretariat of Planning and General Coordination *Secretaria de Estado do Planejamento e Coordenação Geral*
SETR	:	State Secretariat of Transport *Secretaria de Estado dos Transportes*
SIMEPAR	:	Meteorological System of Paraná *Sistema Meteorológico do Paraná*
SETI	:	State Secretariat of Science, Technology and Higher Education *Secretaria de Estado da Ciência, Technologia e Ensino Superior*
SUCEAM	:	Superintendency of Erosion Control and Environmental Sanitation *Superintendência do Controle de Erosão e Saneamento Ambiental*
SUREHMA	:	Superintendency of Water Resources and Environment *Superintendência dos Recursos Hídricos e Méio Ambriente*
UEL	:	State University of Londrina *Universidade Estadual de Londrina*
UNDP	:	United Nation Development Program *Programa das Nações Unidas para o Desenvolvimento*

CHAPTER 1 INTRODUCTION

1.1 Scope of Institutional Study

In this report, institution means laws and regulations, customs, organizations, and all that is associated. The customs, however, vary depending on characteristics of communities. Because of the limited period of the Study and wide variety of customs even in a state, this report can not go into inside of the customs which might prevail in Paraná and much concern is paid on the official legislation and organization of the governmental authorities through an analysis of written documents, even though communities with customs play important roles in water environment management everywhere in the world.

The involvement of the governments and their legal systems in water resource management, in general, can be divided into three areas, namely 1) legislative 2) operational and 3) and regulatory actions. The legislative area includes legislation of policies, regulations and authorization and funding of basic programs and projects determined through the legislative process, hence, ultimately, the political process. The operational area includes data collection, design, construction and O&M (operation and maintenance), conducted with authorization invoked by the legislative bodies, by governmental line agencies at various levels as well as by semi- or non-governmental entities especially in O&M phases. The regulatory area constitutes the framework for guiding program actions and measuring the results of actions in conformity with specified objectives (standards) particularly in the environmental aspects. This area includes monitoring activities in the operation area and conditions and enforcement of established laws and regulations bearing on the resource use, commonly pertaining to i) water rights; ii) real-time allocation or operation under hydrologic events; iii) appropriateness of resource use; iv) quality effects of any use; v) facilities configuration; vi) safety of facilities and environmental impacts. The area also includes vii) finical aspect of water service entities and viii) review of cost recovery schemes, ix) the application of charges and financing operations.

Out of the above three areas, the regulatory area is the main field to be dealt this report, which pertains to institutional aspect. The nature of international technical assistance does not allow the involvement into the political areas. The relevant operational areas are covered in other sectoral reports, especially in that of "Water Environment and Management". The regulatory functions and their improvement required for project implementation and operation proposed in the Study are the concern of this sectoral report.

Because of the geographic coverage of the Study, the main concerns of the report lay in the regulatory involvement of the Paraná State Government. Coordinated joint operation with other levels of governments such as the Federal and Municipal authorities, however, is definitely necessary for a successful water environment management in Paraná State. Thus, some recommendations might imply some proposal to the Federal Government for successful administration and management of water environment of Paraná State.

Even though some studies are conducted regarding the organization of the COPEL and the SANEPAR, this report does not contain major recommendations on reorganization of the two public companies. Since these companies are quite well organized compared to the governmental authorities with capable staff, sufficient budget and high productivity, emphases are put on the latter.

1.2 Methodology of Institutional Study

The flow of institutional study regarding laws and regulations, organizations and their administration, and participation of non-governmental organization (NGO) is as follows. Detail methods to be applied in the Study were be determined in the progress of the Study.

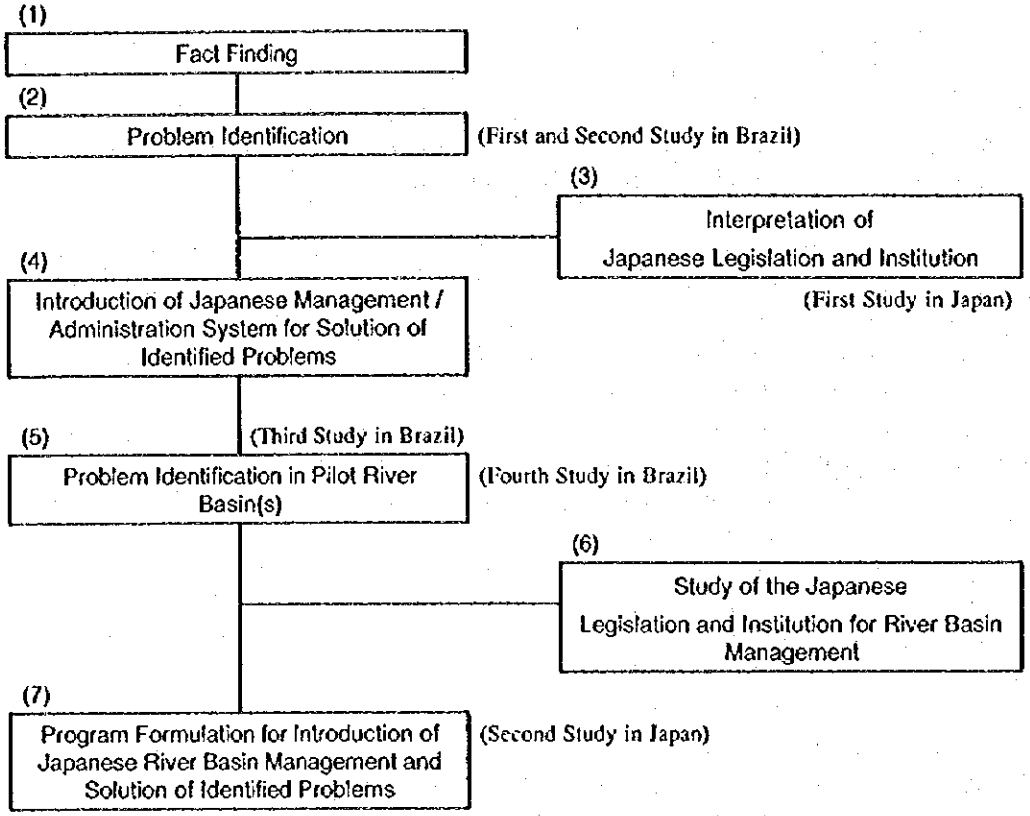

Figure-1.1 Flow of the Institutional Study

(1) Fact Finding

A survey to find the present status of water resource management was conducted on the following items.

- Legislation
  - Water Right, Use and Development
  - Environmental Conservation and Pollution Control
  - Water Supply and Sewerage Services
- Organization
  - Organization Charts and Number of Staff by Class and Type of Service
  - Establishing Laws and Decrees
  - Job Descriptions
  - Relation and Coordination among Relevant Authorities

- Budget or Finance for Relevant Organizations
  - Procedure of Budget Application and Appropriation
  - Change in Amount for the Recent 5 Years
  - Budgetary / Subsidiary Transfer (Procedure and Amount)
- Residents Participation
  - Activities of Non-Governmental Organizations
  - Cost Sharing
  - Education
- Movement of Legal Revision, Institutional Change and On-going Projects

(2) Problem Identification

Problems which hinder the maximum use of water resource, and effective management or efficient administration of "Water Environment", were identified through the analysis of the findings in the above survey.

(3) Interpretation of Japanese Legislation

Concept of Japanese legislation and their implementation, administration and management of "Water Environment" will be interpreted for a reference to resolutions of the problems identified in the above.

(4) Introduction of Japanese Management or Administration System

Strategies or principles of institutional improvement will be formulated introducing the Japanese system of "Water Environment" management.

(5) Problem Identification in Selected Pilot River Basin(s)

Problems will be detected for implementation of the strategies or principles formulated in the above in the selected pilot basin(s).

(6) Study of the Japanese Administration and Management for River Basin Management

The actual implementation of the Japanese administration and management systems of "Water Environment" introduced in the Section (4) will be further studied for solutions of the problems identified in the above.

(7) Program Formulation

Programs and/or recommendations will be formulated for the implementation of pilot river basin(s) management.

(8) Review of Methodology throughout the Study

Some reviews in methodology are made in the course of the Study as follows:

1) Reference to Models of Other Countries than Japan

Socio-economic development, hydrological characters of basins and institutional history of Paraná are often largely different from those of Japan. Thus, in some cases, introductions of successful principles, models or measures were and will be made with reference to international performances rather than Japanese ones.

2) Methods of Problem Analysis

In order to identify and clarify major problems, and to detect the core problems, meetings with the Counterpart members were held. In the counterpart meetings, problems in the water environment management are discussed following a part of "Project Cycle Management (PCM)" Method.

PCM, which is currently applied in many international technical assistance agencies, is composed of the following parts:

- participation analysis; to identify interesting and affected individuals and groups,
- problem analysis; to establish a "problem tree" which illustrate problems in "cause and effect relation", and to identify a "core problem",
- objective analysis; to establish "objective tree" based on the "problem tree", which shows favorable conditions in "means and end" relation,
- alternative analysis; to elaborate alternatives which can realize the objectives, thus solve the problems,

Because of the limited period of time, the purpose of the counterpart meetings is set for the establishment of "problem trees".

3) Future Needs

Since water resources development incurs huge cost and long period for project implementation and the resources conservation will affect future generations, water environment management should cover long term perspectives. Future needs and corresponding institutional responsibility on government administration are discussed.

CHAPTER 2 CURRENT LEGAL FRAMEWORK ON WATER ENVIRONMENT MANAGEMENT

2.1 Legislation in Force for Water Resources Management

(1) The Constitution of the Federal Republic of Brazil

The new Constitution, promulgated in October 5, 1988, gives the following as properties to the Union (the Federal Republic) (Art. 20):

- the lakes, rivers and any watercourse in land within its domain, or that wash more than one state, that serve as boundaries with other countries, or that extends into foreign territory or from there proceed, as well as bank lands and river beaches (III);
- the hydraulic energy potentials (VIII);

The constitution gives the Union the power to the following (Art. 21):

- operate, directly or through authorization, concession or permission (XII),
  a) the electric power services and facilities and the energetic exploitation of watercourses, jointly with the state wherein those hydro-energetic potential are (b);
  b) sea, river and lake ports (f);
- plan and promote permanent defense against public disasters, especially droughts and floods (XVIII);
- establish a national system for the management of water resources and define criteria for the concession of the right to their use (XIX);
- establish directives for urban development, including housing, basic sanitation and urban transportation (XX);

Further, the Union has the exclusive power to legislate on (Art. 22):

- waters, energy, --- (IV);
- regime of the ports and lake, river, ocean, air and aerospace navigation (X);

The Union, the States, the Federal District and the Municipalities, in common, have the power (Art. 23):

- to ensure --- that public property is preserved (I);
- to provide for health and public assistance, --- (II);
- to protect the environment and to fight pollution in any of its form (VI);
- to preserve the forest, fauna and flora (VII);
- to promote agriculture and cattle breeding --- (VIII);
- to promote housing construction programs and the improvement of housing and basic sanitation conditions (IX);
- to register, monitor and control the concession of rights to research and exploit water and mineral resources within their territories (XI);

In addition, the Union, the States and the Federal District have the power to legislate concurrently on (Art. 24):

- forest, hunting, fishing, fauna, preservation of nature, defense of the soil and natural resources, protection of the environment and control of pollution (VI);
- liability for damages to the environment, --- (VIII);
- the supervenience of a federal law over general rules suspends the effectiveness of the state law to the extent that the two are contrary (paragraph 4).

The property of the States includes (Art. 26):

- surface or subterranean waters, flowing, emerging or in deposit, with the exception, in this case, of those resulting from work carried out by the Union, as provided by law (I).

To Municipalities, the Constitution gives the power to (Art. 30):

- legislate upon matters of local interest (I);
- supplement federal and state legislation where pertinent (II);
- create, organize and suppress district, with due regards for state legislating (IV);
- organize and render, directly or by concession or permission, the public services of local interest, including mass-transportation, which is of essential nature (V);
- promote, wherever pertinent, adequate territorial ordaining, by means of planning and control of use, apportionment and occupation of the urban soil (VIII).

According to the above stipulation of the Constitution, the ownership of main stream river water in the State except hydraulic energy potential is as follows, while water of the tributaries and groundwater exclusively situated in the State other than the energy potential is the property of the State.

Table-2.1 Classification of the River Basins in Paraná State

No.	River Basin	Administrative Classification (main stream)	Population in 2000 *1	Catchment Area (Km^2) *2
1	Cinzas	State (Tributary of the Paranapanema River)	281,507	9,291
2	Iguaçu	Federal (International-Brazil, Argentina)	3,697,820	55,318
3	Itararé	Federal (Paraná, Saõ Paulo, Tributary of the Paranapanema River)	131,916	5,198
4	Ivai	State (Tributary of the Paraná River)	1,184,726	35,879
5	Litoranea	State	209,398	5,766
6	Paraná	Federal (International-Brazil, Paraguay)	375,336	13,156
7	Paranapanema	Federal (Paraná, Saõ Paulo)	751,314	9,797
8	Piquiri	State (Tributary of the Paraná River)	693,897	24,708
9	Pirapo	State (Tributary of the Paranapanema River)	474,693	5,006
10	Ribeira	Federal (Paraná, Saõ Paulo)	154,143	9,129
11	Tibagi	State (Tributary of the Paranapanema River)	1,376,764	24,635
		Total of the State	9,331,514	197,882

*1: Population in the State (Estimated by the Team)
*2: Area in the State

Ownership of water by Municipalities, as provided in the Water Code, Federal Decree No. 24643 of 1934, was abolished by the promulgation of the Constitution.

(2) Water Code

The Water Code, Decree 24643, July 10, 1934 stipulates general rules on the ownership of water of rivers, lakes and those of underground, as well as river beds and their border area. Those provisions on ownership, however, have been replaced by the new constitution as mentioned in the above. The Code also gives general stipulation on the concession, authorization or permission of water use and the obligations of the title holders.

Derivation of water of the Federal or State domain requires concession, authorization or permission, provided that the water use for the first necessity of life is free in case that the access to the water is lawful (Water Code, Art. 34).

The Water Code classifies water rights into the following two types:

- Concession; destined for public utility
- Authorization; in case of use other than public utility

The Code gives the highest priority in use of any water for the first necessity of life with free. The easement for the access to this type of use is also assured when compensated for the damage cased by the passage and when no other way without much difficulty is envisaged.

The second priority is, in normal situation, given to navigation when it is commercial one. The Code also gives many provisions are prescribed for the regulation and the administration of the power sector by the federal authority.

Water use for public utility has also a priority by a concession, compared to other types of use, such as agricultural and industrial use granted by an authorization. The concession or authorization does not confer any delegation of public water nor right to third parties but only the permission to use water for purpose and amount in a fixed term prescribed in the grants.

The Code allows the grants of water uses, at longest for 30 years, and will become ineffective in case no use occurs in certain consecutive years.

The Water Code prohibits degrading or contaminating waters by discharging effluent. The Code orders the entity who causes the nuisance to take remedial activities at the polluter's expense and to compensate for the loss or damage caused by the effluent discharge.

(3) Regulation on Water Resource by Paraná State

Regulation by the SUREHMA (currently merged into the SUCEAM, Superintendency of Erosion Control and Environmental Sanitation), No. 004/89, August 1989 gives provision for the use of waters of the State domain.

The Regulation stipulates that all water use or derivation shall be made with administrative grant issued by the SUCEAM. The grants are classified into three types as follows:

1) concession; in case of use for public utility, maximum 20 years, becomes ineffective in case of no use in consecutive 3 years,

2) authorization; in case of use other than public utility, maximum 10 years, becomes ineffective in case of no use in consecutive 2 years,

3) permission; in case of use other than public utility, maximum 5 years, becomes ineffective in case of no use in consecutive 1 year, in case of insignificant use, which is neither more than 20% of the minimum discharge of recurrence in 10 years and lasting 7 consecutive days nor does not exceed 10 liter per second.

Applications for water use shall be presented with a study, content of the project and other information, following the rules established by the SUCEAM. Concessions, authorizations and permissions are renewable through written requests made 6 months before the expiry.

Authorizations or permissions may be canceled with or without compensation when the public interest does so demand. In case of cancel or ineffectiveness mentioned in the above, the user is obliged to replace all works as previous condition according to the criteria and terms established by the SUCEAM. In case of long drought or water shortage, the SUCEAM can modify the granted conditions, giving preference to the public supply.

The derivation or intake can be modified due to the public interest. The notified user is liable for the payment for the modification, granted a certain period of time to take necessary steps.

The IAP or the SUCEAM can demand of the user to control, to prevent waste of water or to protect against pollution. The authorized technicians of the IAP or the SUCEAM have free access to the public or private property in order to supervise or inspect for the time necessary to carry out their duties.

The fee for a concession, an authorization or a permission does not vary according to the amount of the water use. The fee for a concession, an authorization or a permission is US$ 121.5, U$ 81.0 or US$ 24.3 respectively as of September 1994. The fee for an examination of the application is US$ 24.3 for any type of granting.

The works necessary to derive or intake water shall be planned and constructed under the responsibility of a certified professional registered in the CREA (Regional Council of Engineers and Architects). Any alternation or any part of alternation and any change in intakes or dikes are subject to the approval of the SUCEAM.

Failing to follow the IAP's or the SUCEAM's demand concerning to the effluent discharge into water courses or aquifers will result in revocation of the authorization or permission. The revocation does not invalidate the sanctions or penalties stated in the legislation related to environmental pollution.

In case of failing to obey the regulation, the fines, from 5 to 100 VRR, simply once or daily, are charged. The unit of the VRR (value of regional reference) is set by the federal government and applied regionally, 1 VRR = R$ 8.82 (about US$ 9.9, as of September 1994) in urban areas, such as Curitiba Metropolitan Region, and 1 VRR = R$ 8.08 (about US$ 9.1) in middle and small towns or in rural areas.

(4) Law and Decrees on Urban Land Use

Federal Law No. 6766, December 19, 1979, rules land use for urban purposes. State Decree No. 2963, Dec. 19, 1980 and State Decree No. 2964, September 10, 1980 designate areas for special protection and public interest under the Federal Law No. 6766.

The Law prohibits land allotments for urban purposes in swampy lands and flood prone areas before taking precautions to water flow (Art. 3, I). The Law does not allow the allotments in areas for ecological preservation as well as polluted areas where unbearable sanitary conditions remain uncorrected (Art. 3, V).

The Law provides that in land allotment land belt of 15m shall be reserved along watercourses and their beds except other specific legislation stipulate otherwise (Art. 4, III) (Actually the Forest Code and its amendment stipulate that more than 30m of land belt according to the width of rivers shall be preserved for permanent reserve). The law requires some portion in land allotment for community facilities, such as those for education, culture, health, leisure, and urban facilities, including those for water supply, sewerage, electric power supply and storm water collection (Art. 4). The competent authority could demand, complementarily in each allotment, a reserve of no building band for urban facilities (Art. 5).

Before the projecting of land allotment, the concerned person shall request the respective Municipality to determine the place and areas of lands reserved for community and urban facilities and shall present the location of existing watercourses and community and urban facilities in application of the project (Art. 6). The respective Municipality will indicate the approximate location and areas for community and urban facilities and land areas for land belt necessary for storm water discharge in the plan with requirement, according to the aims of the State and the Municipal Planning (Art. 7). The Municipalities with less than 50,000 inhabitants are exempted the determination set in Article 6 and 7 (Art. 8).

The State will be in charge of previous examination and approval for the allotment in the areas of social interest, such as those along water source, cultural patrimony, historical landscape and archaeological protection (Sec. I, Art. 13), those situated in more than one Municipality, and those in metropolitan region (Sec. II, Art. 13), designated by the respective State, prior to the examination and approval by the relevant Municipality. In case that in metropolitan area, the previous examination and approval is discharged by the respective metropolitan authority (Single Para. of Art. 13). The State will determine, by decree, areas of special interest provided in Section I of the Article 13 (Art. 14).

Decree of the Paraná State No. 2963 of December 19, 1980 designates areas of the special interest and protection provided in Section I and II of Article 13 of Federal Law No. 6766, such as those contained among water divisions of surface run-off which contribute as sources actually or in the future destined for public supply of potable water in cities or high density urban areas, as well as areas with archeological sites, historical sections, native forest, etc., located in the Municipalities of Antonia, Guaraqueçaba, Guaratuba, Matinhos, Morretes, and Paranaguá (Art. 1).

Decree of the Paraná State No. 2964 of September 19, 1980 declares areas of the special interest and protection provided in Article 14 of Federal Law No. 6766, in the following basins of rivers that compose water sources in Curitiba Metropolitan Regions (Art. 1):

- Alto Iguaçu River Basin
- Miringuava River Basin
- Cotia River Basin
- Maurício River Basin
- Cachoeira River Basin
- Passaúna River Basin
- Verde River Basin
- Itaqui II River Basin
- Açungui River Basin
- Capivari River Basin
- Várzea River Basin

The Decree assigns the COMEC - Coordination of Metropolitan Region of Curitiba, as competent agency for previous examination and approval of the land allotment project in the areas described in the Article 1, taking into consideration technical criteria and the existing legislation for water resource protection and the SUREHMA - Superintendency of Water Resources and Environment, currently merged into SUCEAM, as consulting organs (Art. 2). The organs in charge of public works to be projected in the areas designated in the Article 1 shall submit the respective project plan to COMEC which will establish minimum requirements to be followed in the implementation of the project (Art. 3).

(5) Law on Preservation of Water Source Basins for Public Supply

The Law of Paraná State No. 8935 of March 7, 1989 provides the minimum requirement of water from water source basins for public supply and related matters. The Law requires that the water from water source basins, which is defined as the basins located at the sites of water in-take and of dams for reservoirs for public water supply or at upstream of the sites including those used currently as well as intended to be built in the future, shall meet the quality standards set as the Class 2 of the Resolution No. 20 of the CONAMA (National Council of Environment).

The Law provides that the executive branch of the State Government through its inspecting organ, assigned to the SUREHMA (Currently the IAP and the SUCEAM), and the executing organs, assigned to SANEPAR - Sanitation Company of Paraná and Municipalities, is in charge of assuring the water quality in the future, fulfilling the standards in spite of population growth (Art. 2).

The Law prohibits installation or implementation of the following facilities or activities (Art. 3):

- highly polluting industries, such as alcohol production, non-ferrous metallurgy for toxic metals, chemical industries, etc.
- hospital establishments, such as hospitals or sanatorium
- waste disposal sites
- parcels of land for high population density

The Law requires existing polluting industries and entities who manage the existing disposal site to take measures to follow the terms with the inspecting organ, and presents projects for

improvement in treatment, or transporting or pumping final residue to other areas not designated in the Law, or transferring those sites or industries to the other areas (Para. 1 of Art. 3). The parceling of lands already approved for high population density can be implemented only if it has sewage collecting works with appropriate treatment of final residue or transportation of the residue out of the basin (Para. 2 Art. 3).

The Law charges inspecting organ to present specific report on water quality in the basin where a water in-take facility for public supply is to be constructed, pointing out the existing main polluting source as well as proposing conditions for normalizing or removal of pollution, in a period of one year before the commencement of the construction (Art. 4).

Every land allotment project for urban purpose shall be subject to a previous approval by the inspecting organ, which can refuse or require changes of the project. The inspecting organ shall analyze the project in a reasonable time recommending, if necessary, the priority for implementation of executing organs of sewage collection (SANEPAR-Municipalities). The executing organs shall demand each owner of the estate to construct sewer containing anaerobic septic tank and separation from storm water, then permit to connect to the network after the requirements are met. Projects for new building to be constructed in the basin where the site is already urbanized shall be subject to the inspecting organ, which can refuse the projects in case that potential occupation endanger the limits set as the Class 2. The isolated building that cannot have connection to sewer network shall have an anaerobic septic tank or a negative well to avoid direct dispose of sewage into the river (Art. 7).

The designated activities in the water source basins for public supply are agriculture, livestock breeding and re-forestation. The only restriction in agricultural activities to be controlled by the inspecting organ will be use of pesticides and bad use of soil that can generate erosion (Art. 8)

2.2 Current Environmental Legislation

The Constitution of the Federal Republic provides a legal base for the government administration on environmental protection and conservation. Major environmental enactment related to water resources conservation is as follows:

Table-2.2 Laws and Regulations related to Water Environment

Laws and Regulation	Subject
Federal Law No. 6938, 1981 and Federal Decree 99274, 1990	National Environmental Policy
State Law No. 7109, 1979 and State Decree No. 857, 1979	State Environmental Protection System
Federal Decree No. 1413, 1975, Federal Decree No. 76389, 1975, State Law No. 6513, 1973 and State Decree No. 5316, 1973	Industrial Pollution Control
Federal Law No. 6902, 1981, State Law No. 10247, 1993 and State Decree No. 2320, 1993	Ecosystem (Fauna and Flora) Preservation
State Law No. 9491, 1990, State Complementary Law No. 59 and State Decree 974, 1991	Ecological ICMS (Tax on Circulation of Commercial Goods)
Federal Law No. 7802, 1989	Control of Agrotoxics
State Law No. 8014, 1984	Preservation of Agricultural Soil
Federal Law No. 4771, 1965, and Federal Law No. 7803, 1989	Forest Code and its partial amendment
Resolution of CONAMA No. 01, 1986	Environmental Impact Assessment
Resolution of CONAMA No. 20, 1986	Classification of Water Quality

(1) Constitution of the Federative Republic of Brazil

The Federal Constitution of 1988 has one chapter for provisions on environment (Chapter VI). The Constitution allows all nations to have the right to possess an ecological balanced environment, which is an asset of common use and essential to health and quality of life. The Government and the community shall have the duty to defend and preserve the environment for present and future generations (Art. 225). In order to ensure the effectiveness of the right, it is incumbent upon the Government to;

I preserve and restore the essential ecological processes and provide for ecological treatment of species and ecosystems (I, Para. 1);

II preserve the diversity and integrity of the genetic patrimony of the country and to control entities engaged in research and manipulation of genetic materials (II);

III define, in all units of the Federation, territorial spaces and their components which are to receive special protection, any alteration suppressions being allowed only by means of law, and any use which may harm the integrity of the attributes which justify their protection being forbidden (III);

IV demand, in the manner prescribed by law, a prior environmental impact study, which shall be made public, for the installation of works and activities which may potentially cause significant degradation of the environment (IV);

V control the production, sale and use of techniques, methods or substances which represent a risk to life, the quality of life and the environment (V);

VI promote environment education in all school levels and public awareness of the need to preserve the environment (VI);

VII protect the fauna and the flora, with prohibition, in the manner prescribed by law, of all practices which represent a risk to their ecological function, cause the extinction of species or subject animals to cruelty (VII).

The Constitution requires those who exploit mineral resources to restore the degraded environment, in accordance with technical solutions demanded by the competent public agency, as provided by law (Para. 2). Procedures and activities considered as harmful to the environment shall subject the infractors (violators), be they individuals or legal entities, to penal and administrative sanctions, without prejudice to the obligations to repair the damages caused (Para. 3).

The --- Atlantic Forest, the "Serra do Mar" --- and the coastal zone are parts of national patrimony, and they shall be used, as provided by law, under conditions which ensure the preservation of the environment, there included the use of mineral resources (Para 4). The unoccupied lands or lands seized by the States through discriminatory actions which are necessary to protect the natural ecosystems are inalienable.

The Constitution provides general principles of the economic activity in the Chapter 1. The economic order, founded on the appreciation of human work and on free enterprise, is intended to ensure everyone a life with dignity, in accordance with the dictates of social justice, with due regards to the following principles (Art. 170);

I national sovereignty

II private property

III the social function of property

IV free consumption

V consumer protection

VI environment protection

VII reduction of regional and social differences

VIII pursuit of full employment

IX preferential treatment for small Brazilian enterprises of national capital

Free exercise of any economic activity is ensured to everyone, regardless of authorization from government agencies, except in the cases set forth by law (Single Para.)

(2) National Environment Policy

Based on the Section VI and VII of Article 23, and Article 225 of the Federal Constitution, the Law No. 6938, August 31, 1981, establishes the National Environment Policy, its objectives, mechanism of formulation and application, constitutes the National Environment System, and introduces Environmental Defense Registry (Art. 1).

The National Environment Policy has established taking into account of the following principles (Art. 2):

I government actions in maintenance of ecological balance, considering the environment as a public property necessary to be assured and protected, keeping in mind collective use;

II rationalizing the use of soil, underground, water and air;

III planning and supervising use of environmental resources;

IV protection of ecosystems with preservation of representative areas;

V controlling and zoning of potentially or effectively polluting activities;

VI incentives for studies and researches of technology oriented to rational use and protection of environment resources;

VII keeping up with the conditions of environmental quality;

VIII recovery of degraded areas;

IX protection of areas threatened to be degraded;

X environmental education at all teaching level including community education, aiming at enabling active participation in environmental defense;

The objectives of the Policy shall be the followings (Art. 4):

I to make socio-economic development compatible with preservation of environmental quality and ecological balance;

II to define priority areas for government actions related to the quality and the ecological balance, corresponding to the interest of the Union (Federal Republic), the States, the Federal District and the Municipalities;

III to establish criteria and standards on environmental quality, and norms related to use and management of environmental resources;

IV to develop researches for national technology oriented to rational use of environmental resources;

V to diffuse technology for environment management, to publicize data and information on environment, and to form public conscience about the necessity of preservation of environmental quality and ecological balance;

VI to preserve and restore environmental resources, aiming at the rational use and permanent availability together with maintenance of ecological balance necessary for well being.

VII to impose on polluter and offender obligations to recover and/or to indemnify the damage caused, and on users contribution for the use of the environmental resources for economic purposes:

The National Environment System has been constituted to implement the Policy, allocating responsibilities to the Union, the States and the Municipalities as follows (Art. 6):

I Superior Organ: the Governmental Council, with the function of advisory to the President of the Republic in formulation of the national policy and governmental guidelines for the environment and environmental resources;

II Deliberative and Consultative Organ: The National Council of Environment, CONAMA, with the objectives of advisory, study and proposal to the Governmental Council guidelines of governmental policies for the environment and natural resources, deliberating to the extent of its competence, on norms and standards compatible with ecologically balanced environment and essential to the healthy quality of life;

III Central Organ: the State Secretariat of the Republic Presidency, with objectives of planning, coordinating, supervising and controlling, as a federal organ, the national policy and the direction of governmental performances for the environment;

IV Executing Organ: the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), with objectives of executing directly or indirectly, as a federal organ, the national policy and governmental guidelines set up for the environment;

V Sector Organs: the organs or integrated entities of federal administration, directly and indirectly, as well as Foundations established by the Public Power, whose activities are associated with protection of environmental quality and those for disciplining use of environmental resources;

VI Section Organs: the organs of States' entities, responsible for execution of programs, projects and control, and for inspection of activities capable to provoke environmental degradation;

V Local Organs: the organs of Municipal entities, responsible for control and inspection of these activities under their respective jurisdictions;

The States, in the spheres of their competencies and in the areas of their jurisdictions, will elaborate in supplemental norms and complements, and standards related to the

environment, observing those established by the CONAMA (Sec. 1, Art. 6). The Municipalities, observing the Federal and the State norms or standards, may also elaborate norms mentioned in the previous paragraph (Sec. 2).

The Central, Sector, Section and Local Organs mentioned in the above, are obliged to provide the results of accomplished analyses and their bases when requested by legitimately interesting person (Sec. 3).

The instruments for execution the National Environmental Policy are as follow (Art. 9):

I establishment of environmental quality standards;

II environmental zoning;

III environmental impact assessment;

IV licensing and revising of effectively or potentially polluting activities;

V incentives for production and installation of equipment, and creation and absorption of technology, in view of improvement of environmental quality;

VI creation of territorial spaces, especially those to be protected by the Federal, States' or Municipal Public Power, such as areas of environmental protection, of relevance to ecological interest and (extrativistas) reserves;

VII national information system on environment

VIII Federal Technical Registry of activities and instrument of environmental defense;

IX disciplinary or compensatory penalties for disobedience and necessary measures for preservation and correction of degraded environment;

IX instituting Environmental Quality Report to be published annually by Brazilian Institute Environment and Renewable Natural Resources-IBAMA

X guaranteeing presentation of information related to environment, to be obliged for the Public Power, when not existing;

XI Federal Technical Registry on potentially polluting activities and utilization of environmental resources;

Applications for licensing, their renewals and respective concessions shall be published in official gazette of the State, as well as in a regional or local periodic of large circulation. In cases and times foreseen in the CONAMA's resolution, licensing will be depend on the approval of the IBAMA. The State organ of environment and the IBAMA, being in supplementary character, if necessary and without prejudice of appropriate pecuniary penalties, can determine reduction of activities that generate pollution in order to maintain gas emission, liquid effluent, and solid waste disposal within the conditions and limits stipulated in the conceded license. The IBAMA is competent for the licensing of activities with significant environmental impact of national or regional interest (Art. 10).

The IBAMA is also competent to propose norms and standards to the CONAMA for implementation, following and inspection of the licensing except those originated by the CONAMA. Inspection and control of application of criteria, norms and standards, including analyses of projects of public or private entity which might affect the environment aiming at preservation and recovery of environmental resources which might be affected through plundering and polluting exploitation, shall be executed by the IBAMA, in

supplemental character to implementation of State and Municipal competence (Art. 11).

Without prejudice of the penalties by the Federal, State of Municipal legislation, the violator shall subject to:

I. daily or simple fine corresponding to its importance, in case double imposition is not prohibited by a regulation

II. loss or restriction of incentives or fiscal benefits granted by the public power

III. loss or suspension of participation in official financing or credits

IV. suspension of its activities

The polluter is oblige to compensate or repair the harm or damage caused to the environment and to a third party. In case the State or Municipal authority does not exist, the Federal Secretary is due to execute the penalty (Art. 14).

A registry system shall be established under the administration of the IBAMA of activities and entities for compulsory registry of individuals or juridical persons that dedicate technical consulting, as well as compulsory registry of physical or juridical persons that will potentially involved in polluting activities, or in extraction, production, transportation and business potentially dangerous to the environment.

The Federal Decree No. 99274, June 6, 1990, gives stipulation for the execution of the National Environment Policy, assigning the responsibilities of the CONAMA and the IBAMA as given in the next chapter.

(3) Resolution of the CONAMA No. 20, on Water Quality and Effluent Standards

Resolution of the CONAMA No. 20, June 18, 1986, classifies water as follows (Art. 1):

1) Fresh Water

* Special Class - water destined for;

a) domestic water supply without previous disinfection or with simple disinfection

b) preservation of natural balance of aquatic communities

* Class 1 - water destined for;

a) domestic water supply after simple treatment

b) protection of aquatic communities

c) recreation of primary contact (swiming, water ski, and diving)

d) irrigation for vegetable consumed in raw and fruits growing in contact with soil, consumed in raw and with peel

e) natural or intensive breeding of species for human consumption (aquaculture)

* Class 2 - water destined for;

a) domestic supply after conventional treatment

b) protection of aquatic communities

c) recreation of primary contact (water ski, swiming and diving)

d) irrigation for vegetable and fruits-bearing plants

e) natural or intensive breeding of species for human consumption (aquaculture)

* Class 3 - water destined for;

a) domestic supply after conventional treatment

d) irrigation for arboreal or cereal crops for forage

e) animal breeding

* Class 4 - water destined for;

a) navigation

d) landscape harmony

e) insignificant use

2) Saline Water

* Class 5

* Class 6

2) Brackish Water

* Class 7

* Class 8

For Special Class waters, the following limits and/or conditions are established (Art. 3):

Coliforms: for sources of water supply without previous disinfection, the total coliforms must be absent in any sample taken.

For Class 1 waters, the following limits and conditions are established (Art. 4):

a) floating materials, including non-natural foam: virtually absent

b) oil and grease: virtually absent

c) substances which change 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), other considerations are given in the stipulation of the Resolution. Water utilized for irrigation of vegetable or fruit bearing plant, which grow close to the soil, and which are consumed in raw without peeling, must not be polluted by human excrement, thus being necessary for periodical sanitary inspections. For other uses, the limit of 200 fecal coliforms per 100 ml in 80% or more of at least 5 samples examined monthly. 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 ml in 80% of more of at least from 5 samples examined monthly, collected in any month;

g) BOD (5 days at 20°C): up to 3 mg/liter O_2

h) DO (in any sample): not inferior to 6 mg/liter O_2

I) Turbidity: up to 40 nefelometric turbidity units (UNT)

j) Color: natural color level of water body in mg Pt/liter

l) pH: 6,0 to 9,0

m) Potentially harmful substances (maximum proportions):

Aluminum:	0.1 mg/liter	Al
Ammonia:	0.02 mg/liter	NH_3
Arsenic:	0.05 mg/liter	As
Barium:	1.0 mg/liter	Ba
Beryllium:	0.1 mg/liter	Be
Boron:	0.75 mg/liter	B
Benzene:	0.01 mg/liter	
Benzo-a-pireno:	0.00001 mg/liter	
Cadmium:	0.001 mg/liter	Cd
Cyanide:	0.01 mg/liter	CN
Lead:	0.03 mg/liter	Pb
Chloride:	250 mg/liter	Cl
Residual Chlorine:	0.01 mg/liter	Cl
Cobalt:	0.2 mg/liter	Co
Copper:	0.02 mg/liter	Cu
Trivalent Chromium:	0.5 mg/liter	Cr
Hexavalent Chromium:	0.05 mg/liter	Cr
1,1 dichlorine ethane:	0.0003 mg/liter	
1,2 dichlorine ethane:	0.01 mg/liter	
Tin:	2.0 mg/liter	Sn
Phenol:	0.001 mg/liter	C_6H_5OH
Soluble Iron:	0.3 mg/liter	Fe
Fluoride:	1.4 mg/liter	F
Total Phosphorus:	0.025 mg/liter	P
Lithium:	2.5 mg/liter	Li
Manganese:	0.1 mg/liter	Mn
Mercury:	0.0002 mg/liter	Hg
Nickel:	0.025 mg/liter	Ni
Nitrate:	10 mg/liter	N
Nitrite:	1.0 mg/liter	N
Silver:	0.01 mg/liter	Ag
Pentachlorophenol:	0.01 mg/liter	
Selenium:	0.01 mg/liter	Se
Total Dissolved Solids:	500 mg/liter	
Tense Active Substances which react to Blue Metilen:	0.5 mg/liter	LAS
Sulfate:	250 mg/liter	SO_4
Sulfide (as H_2S not dissociated):	0.002 mg/liter	S
Tetrachlorine ethane:	0.01 mg/liter	
Trichlorine Ethane:	0.03 mg/liter	
Tetra Carbon Chloride:	0.003 mg/liter	

2,4,6 Trichlorinephenol:	0.01 mg/liter	
Total Uranium:	0.02 mg/liter	U
Vanadium:	0.1 mg/liter	V
Zinc:	0.18 mg/liter	Zn
Aldrin:	0.01 µg/liter	
Chlordane:	0.04 µg/liter	
DDT:	0.002 µg/liter	
Dieldrin:	0.005 µg/liter	
Endrin:	0.004 µg/liter	
Endossulphan:	0.056 µg/liter	
Heptachlorine Epoxide:	0.01 µg/liter	
Heptachlorine:	0.01 µg/liter	
Lindane(gamma-BHC):	0.02 µg/liter	
Metoxichlorine:	0.03 µg/liter	
Dodecachlorine+Nonachlorine:	0.001 µg/liter	
Polychlorinared Biphenyl's(PCB's):	0.001 µg/liter	
Toxaphenol:	0.01 µg/liter	
Demethon:	0.1 µg/liter	
Guthion:	0.005 µg/liter	
Malathion:	0.1 µg/liter	
Parathion:	0.04 µg/liter	
Carbonyl:	0.02 mg/liter	
Organphosphorated Composts and Total Carbamates:	10.0 µg/liter in Parathion	
2,4-D:	4.0 µg/liter	
2,2,5-TP:	10.0 µg/liter	
2,4,5-T:	2.0 µg/liter	

For Class 2 waters, the same limits and conditions for Class 1 are established, except for the following (Art. 5):

a) the presence of artificial dyers 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 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 5.000 total coliforms per 100 milliliters in 80% or more of at least 5 monthly samples examined, collected In any month;

c) Color: up to 75 mg Pt/liter

d) Turbidity: up to 100 UNT

e) BOD (5 days at 20°C): up to 5 mg/liter O_2

f) DO (in any sample) not inferior to 5 mg/liter O_2

For Class 3 waters, the following limits and conditions are established (Art. 6):

a) floatable materials, including non natural foam: virtually absent

b) oil and grease: virtually absent;

c) substances which change taste and odor : virtually absent

d) the presence of artificial dyers which can not be removed by the process of coagulation, sedimentation and conventional filtration, will not be allowed

e) substances which form objectable deposits: virtually absent

f) number of fecal coliforms up to 4,000 per 100 ml in 80% or core of at least 5 monthly samples examined, collected in any of the months. in the case of the region not being provided with available facilities for examining the fecal coliforms, the limit index will be of 20,000 total coliforms per 100 ml in 80% or more of at least from 5 monthly samples examined, collected in any month;

g) BOD (5 days at 20°C): up to 10 mg/liter of O_2;

h) DO (in any sample): not Inferior to 4 mg/liter O_2;

I) Turbidity: up to 100 UNT;

j) Color: up to 75 mg Pt/liter;

l) pH: 6.0 to 9.0

m) Potentially harmful substances (maximum proportions):

Aluminum:	0.1 mg/liter	Al
Arsenic:	0.05 mg/liter	As
Barium:	1.0 mg/liter	Ba
Beryllium:	0.1 mg/liter	Be
Boron:	0.75 mg/liter	B
Benzene:	0.01 mg/liter	
Benzo-a-pireno:	0.00001 mg/liter	
Cadmium:	0.01 mg/liter	Cd
Cyanide:	0.2 mg/liter	CN
Lead:	0.05 mg/liter	Pb
Chloride:	250 mg/liter	Cl
Cobalt:	0.2 mg/liter	Co
Copper:	0.5 mg/liter	Cu
Trivalent Chromium:	0.5 mg/liter	Cr
Hexavalent Chromium:	0.05 mg/liter	Cr
1,1 dichlorine ethane:	0.0003 mg/liter	
1,2 dichlorrine ethane:	0.01 mg/liter	
Tin:	2.0 mg/liter	Sn
Phenol:	0.3 mg/liter	C_6H_5OH
Soluble Iron:	5.0 mg/liter	Fe
Fluoride:	1.4 mg/liter	F
Total Phosphorus:	0.025 mg/liter	P
Lithium:	2.5 mg/liter	Li

Manganese:	0.5 mg/liter	Mn
Mercury:	0.002 mg/liter	Hg
Nickel:	0.025 mg/liter	Ni
Nitrate:	10 mg/liter	N
Nitrite:	1.0 mg/liter	N
Ammoniac Nitrogen:	1.0 mg/liter	N
Silver:	0.05 mg/liter	Ag
Pentachlorophenol:	0.01 mg/liter	
Selenium:	0.01 mg/liter	Se
Total Dissolved Solids:	500 mg/liter	
Tense Active Substances which react to Blue Metilen:	0.5 mg/liter	LAS
Sulfate:	250 mg/liter	SO_4
Sulfide (as H_2S not dissociated):	0.3 mg/liter	S
Tetrachlorine ethane:	0.01 mg/liter	
Trichlorine Ethane:	0.03 mg/liter	
Tetra Carbon Chloride:	0.003 mg/liter	
2,4,6 Trichlorinephenol:	0.01 mg/liter	
Total Uranium:	0.02 mg/liter	U
Vanadium:	0.1 mg/liter	V
Zinc:	5.0 mg/liter	Zn
Aldrin:	0.03 µg/liter	
Chlordane:	0.3 µg/liter	
DDT:	1.0 µg/liter	
Dieldrin:	0.03 µg/liter	
Endrin:	0.2 µg/liter	
Endossulphan:	150 µg/liter	
Heptachlorine Epoxide:	0.1 µg/liter	
Heptachlorine:	0.1 µg/liter	
Lindane (gamma-BHC):	3.0 µg/liter	
Metoxichlorine:	30.0 µg/liter	
Dodecachlorine+Nonachlorine:	0.001 µg/liter	
Polychlorinared Biphenyl's(PCB's):	0.001 µg/liter	
Toxaphenol:	5.0 µg/liter	
Demethon:	14.0 µg/liter	
Guthion:	0.005 µg/liter	
Malathion:	100.0 µg/liter	
Parathion:	35.0 µg/liter	
Carbonyl:	70.0 µg/liter	
Organophosphorated Composts and Total Carbamates:	100.0 µg/liter in Parathion	
2,4-D:	20.0 µg/liter	
2,2,5-TP:	10.0 µg/liter	
2,4,5-T:	2.0 µg/liter	

For Class 4 waters, the following limits and conditions are established (Art. 7):

a) floating materials, including non-natural foam: virtually absent

b) odor and aspect: non objectable

c) oil and grease: tolerable iridescence

d) easily sedimentable substances which contribute to accretion of navigation channels:

e) Phenol: up to 1.0 mg/liter C_6H_5OH

f) DO (in any sample): superior to 2.00 mg/liter O_2

g) pH: 6.0 to 9.0

The effluents of any polluting source, can only be discharged into the water bodies, directly or indirectly, only if under the following conditions (Art. 21) are met:

a) pH: 5 to 9

b) temperature: lower than 40°C, considering that the raising of temperature of receptive body must not exceed 3°C;

c) sedimentable materials; up to ml/liter in 1 hour test in Imhoff cone. To be discharged in lakes and ponds, with its circulation velocity being almost none (null), the sedimentables must be virtually absent;

d) discharging regime with a maximum discharge of up to 1.5 times the average discharge of the daily activity period of the pollutant agent;

e) oil and grease
   - mineral oil: up to 20 mg/liter;
   - vegetable oil and animal fat: up to 50 mg/liter;

f) absent of floating materials;

g) maximum values acceptable of the following substances

Ammonia:	5.0 mg/liter	N
Total Arsenic:	0.5 mg/liter	As
Barium:	5.0 mg/liter	Ba
Boron:	5.0 mg/liter	B
Cadmium:	0.2 mg/liter	Cd
Cyanide:	0.2 mg/liter	CN
Lead:	0.5 mg/liter	Pb
Copper	1.0 mg/liter	Cu
Hexavalent Chromium:	0.5 mg/liter	Cr
Trivalent Chromium:	2.0 mg/liter	Cr
Tin:	4.0 mg/liter	Sn
Phenol:	0.5 mg/liter	C_6H_5OH
Soluble Iron:	15.0 mg/liter	Fe
Fluoride:	10.0 mg/liter	F
Soluble Manganese:	1.0 mg/liter	Mn
Mercury:	0.01 mg/liter	Hg
Nickel:	2.0 mg/liter	Ni

Silver:	0.1 mg/liter	Ag
Selenium:	0.05 mg/liter	Se
Sulfide:	1.0 mg/liter	S
Sulfites:	1.0 mg/liter	SO_3
Zinc	5.0 mg/liter	Zn

Organophosphorated Composts and Total Carbonates: 1.0 mg/l in Parathion

Carbon Sulfide:	1.0 mg/liter
Trichlorine:	1.0 mg/liter
Chloroform:	1.0 mg/liter
Tetra Carbon Chloride:	1.0 mg/liter
Dichloride:	1.0 mg/liter
Organochlorinated composts not listed above (pesticides, extractive substances, etc.):	0.05 mg/liter

other substances in concentrations which could be harmful: according to limits to be fixed by CONAMA;

h) special treatment, if proceeding from hospitals and other establishments where waters containing infected pathogenic microorganisms are present.

The dilution of industrial effluents with non-polluted waters will not be permitted, such as in water supply, sea water and refrigerating water. In the case that a pollutant source generates different wastes or discharge, the limits within this Resolution will be applied to each of them or to the whole set after the mixture, to the criteria of each of the competent authorities (Art. 22).

The effluents could not confer to the receptive body, characteristics which do not agree with the classification of this Resolution. Under the quality standards of the receptive body, demonstrated through the environmental impact assessment carried out by the entity responsible for the waste water, the competent authority can authorize waste discharging above the limits established in the Article 21, thus fixing the type of treatment and the discharging criteria (Art. 23).

The methods of water collection and analysis must be specified in the regulations approved by the National Institute of Meteorology, Normalization and Industrial Quality - INMETRO or, in their absence, the Standard Methods for the Examination of Water and Wastewater APAHA-AWWA-WPCF, last edition. The phenol must be determined according to the method 510 B of Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985.

(4) Regulations on the Water Quality Standards of the Rivers of the State Domain

The following Orders of the SUREHMA specifies water quality of rivers under the domain of the State of Paraná, designating each of the classes of the CONAMA's Resolution.

Table-2.3 Regulations on the Water Quality Standards of the Rivers of the State Domain

River Basin	No. of the Order	Specified Class	Exception
Cinzas	006/91	Class 2	Class 1; streams and rivers such as those destined to sources of public water supply
Iguaçu	020/92	Class 2	Special Class; water courses such as those in Coastal Mountain Region, and in the Marumbi, etc. Class 1; rivers and streams such as those destined to sources of public water supply, and water courses in the Iguaçu National Park, etc. Class 3; some parts of rivers, such as the Belém River, its downstream, the Barigui River and the Cambui River
Itarare	005/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply and parts of Itarare Rive around its source
Ivaí	019/92	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply Class 3; some parts of the streams in the Municipality of Maringá
Litoranea	005/89	Special Class; within the limit of the registered area of Coastal Mountain Region, with some exceptions Class 1; out of the limit of the registered area of Coastal Mountain Region with some exceptions Class 7; brackish water	
Parana 1	011/91	Class 2	
Parana 2	012/91	Class 2	
Parana 3	013/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply
Paranapanema 1	009/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply
Paranapanema 2	007/91	Class 2	
Paranapanema 3	008/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply
Paranapanema 4	016/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply
Piquiri	017/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply
Pirapó	004/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply Class 3; some parts of the streams in the Municipality of Maringá
Ribeira	013/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply, and some parts of the streams in the Lauráceas Park
Tibagi	003/91	Class 2	Class 1; rivers and streams such as those destined to sources of public water supply, some parts of the streams in the Arthur Tomas Park and Mata do Godoy State Park, and of a stream up to a dam owned by a paper company Class 3; some parts of the streams in the Municipality of Londrina and Ponta Grossa

(5) Resolution of the CONAMA No. 001, on Report of Environment Impact Assessment

The Resolution of the CONAMA No. 001, January 23, 1986, with some alternation by the CONAMA's Resolution No. 011 and a IBAMA's Regulation, stipulates on the definitions, responsibilities, the basic criteria and general directions of the environmental impact assessment (Art. 1).

A Report of Environmental Impact (RIMA-relatório de impact ambiental) shall be submitted to the approval of the responsible State organ and of the SEMA (National Secretariat) at the following establishment or commencement of activities, in addition to the relevant licenses required in other legislation (Art. 2).

.....

III. ports and mineral, petroleum, and chemical products terminal

.....

V. oil, gas or mineral pipelines, and pipelines for collection or distribution of sewage

VI. electrical energy transmission lines, above 230 KV

VII. works for exploitation of water resources, such as dams for hydroelectric aims over 10 MW, for sanitation (water supply) or irrigation, opening of navigation canal, improvement of water courses, dikes, etc.

.....

X. sanitary landfilling, treatment or final disposal of toxic or dangerous waste

XI. electricity generating plants whatever the source of primary energy, over 10 MW

XII. industrial and agro-industrial complexes or units (petrochemical, metallurgy, alcohol distillery, coal, extraction and cultivation of water resources)

XIII. industrial districts and strictly industrial zones (ZEI-zonas estritamente industriais)

XIV. economic exploitation of wood or fuel wood in the areas larger than 100 ha or smaller in case of significant portion of importance from environmental point of view

XV. urban development project over 100 ha or in designated areas with environmental interests by the competent Municipal, State or SEMA (National).

XVI. any activities that utilize charcoal or derived or similar products in quantity more than 10 ton/day

XVII. agricultural and livestock projects in areas larger than 1,000 ha or smaller in case of significant portion of importance from environmental point of view, including areas of environment protection

.....

The environmental impact study at least includes the following technical activities (Art. 6):

I. environmental diagnosis of the influenced area of the project, with a complete description and analysis of the environmental resources and their interactions to characterize the environmental situation of the area before the implementation of the project, regarding;

a) physical environment - the underground, the waters, the air, and the climate, pointing out the mineral resources, the topography, the types and aptness of the soil, the water bodies, the hydrological regime, the marine current and the atmospheric current

b) the biological environment and the natural eco-system - the fauna and flora, pointing out indicative species of the environment quality, the scientific and economic values, rare and threatened species and the areas of permanent preservation

c) social and economic environment - the use and occupation of lands, use of water and socio-economic conditions, pointing out the archeological sites, the archeological, historical, and cultural monuments of the community, the relations and dependence among local communities, the environmental resources and future potential utilization of these resources

II. analysis of environmental impacts of the projects and of alternatives, through the identification and prediction of the magnitude, and interpretation of the importance of the probable relevant impacts, listing: the positive and negative (benefiting and adverse), direct and indirect, immediate and in a medium and long term, and temporary and permanent impacts; their degree and reversibility, their cumulative and synergic properties; the distribution of the social obligation, charges and benefits

III. identification of the measures to rescue the negative impacts, equipment of control and system for waste treatment, evaluating each efficiency

IV elaboration of the program for follow-up and monitoring of the positive and negative impacts, indicating factors and parameters to be considered

By determining the execution of the environmental impact assessment study, the competent State, SEMA (National) or the Municipality will furnish additional instruction, whenever deemed necessary, according to the peculiarities of the project and environmental characteristics of the area (Single Para., Art. 6). All the costs incurred in the study shall be born by the person (physical or juridical) who proposes the project (Art. 8).

The RIMA shall contain at least (Art. 9):

I. objective and justification of the project, compatibility with the sectoral policy and governmental plans

II. description of the projects and its alternative, concerning technology and location, specifying phases of construction, areas of influence, raw material, labor, sources of energy, process and operational techniques, probable effluent, emission, energy residue, direct and indirect employment generation

III. synthesis of the result of the study and environmental diagnosis

IV. description of the probable environmental impacts of implementation and operation of the activities considering the project, its alternatives and the time limits of impacts, indicating methods, techniques and criteria adopted for their identification, quantification and interpretation

V. characteristics of future environmental quality of the influenced area comparing the differences with and without project or with alternatives

VI. description of expected effects of the mitigating measures related to the negative impacts, mentioning those cannot be avoided and degree of alteration expected

VII. follow-up and monitoring programs

VIII. recommendations concerning the most favorable alternative

The RIMA shall be presented in objective form and adequate for understanding in accessible language, illustrated with maps, charts, tables and other visual techniques for communication so that advantages and disadvantages of the project are clarified (Single Para. Art. 9)

The competent State organ, SEMA (National) or the Municipality, whenever concerns, will have a term to manifest itself in a conclusive form about the RIMA (Art. 10). The RIMA shall be accessible to the public, respecting industrial secrecy. The competent State organ, SEMA (National) or the Municipality, whenever concerns, will have a term to receive the comments made by public organs concerned or shall promote public inquiry, when deemed necessary.

(6) Law No. 7803 on Control of Toxic Agricultural Chemicals

The Federal Law No. 7803, July 11, 1989 rules on research, development, production, packaging, labeling, storing, marketing, advertising, utilization, import, export and final disposal of residues of toxic agricultural chemicals, its components and similar products (agrotoxics), as well as their registry, classification, control and surveillance (Art. 1).

The Law requires prior registry for production, export, import, selling and usage of agrotoxics, in accordance with the guidelines and requirements of the relevant federal agencies, which may grant permission of the circulation or use when the agrotoxic is proved to be equally or less harmful to human beings and to the environment than the existing ones. A temporary registry is established for research and development of agrotoxics with applicant's or permit holder's obligation to submit updated information to the Federal Government, which shall take immediate action when international organizations advise existence of risks. The registrations of the following types of agrotoxics are forbidden (Art. 3):

a) to which Brazil does not have methods for deactivating or preventing remaining residue

b) to which effective antidote or treatment cannot be attained in Brazil

c) which reveals teratogenic, cancerogenic or mutagenic characteristics according to experiments carried out by the scientific community

d) which causes hormonal disturbance, damages to reproduction system according to experiments carried out by the scientific community

e) which might reveals to be more dangerous for human beings than the laboratory tests according to technical and scientific criteria

f) whose characteristics are environmentally hazardous

Persons or companies who provide, import, export or sell agrotoxics are obliged to file for the registration to the responsible State or Municipal agencies, of which summary shall be published in the Official Daily Bulletin of the Federal Government. Regulations will establish the conditions for the process of registration, suspension or canceling, determining

the closing time of examination of regulating entity not exceeding 90 days after publication of the registration. Professional institutes, political parties representing the National Congress or legally constituted institutes to represent various interests related to the consumer, environment and natural resources are eligible to cancel or suspend the registration (Art. 5).

The packaging of agrotoxics shall be made in such ways to prevent from leakage, evaporation and altering its contents with materials not susceptible and with sufficient strength (Art. 6). The Law gives detail provision on labeling of agrotoxics for selling or display for sale, indicating manners and mandatory contents, such as identification of the products, instruction for storing and use, potential dangers, and recommendations to users to read the label, and limits for non mandatory information (Art. 7). The Law also provided obligations in advertising of agrotoxics (Art. 8)

The Federal Government will be in charge of regulation of the production, registration, interstate marketing, export, transport, classification, technological control, surveillance of producing enterprises imports and export, and analysis of international agrotoxics, while the States are responsible for ruling on the use, production, consumption, marketing, and surveillance of the use, consumption, marketing, storage and domestic transportation, and the Municipalities is compremental ily in charge of control of the use and storage (Art.9-11).

The agrotoxics shall be sold to users through a prescription issued by legally qualified professionals, who is responsible for proper and accurate prescription (Art. 14). The executive powers of the governments shall carry out instructing, divulging and clarifying actions to promote or stimulate the safe and efficient use, aiming at reducing harmful effects on human beings and on the environment and at prevention of accidents caused by the misuse (Art. 19).

(7) Forest Code

The Forest Code, law No. 4774, September 15, 1965, with major amendments by a law numbered 7803, July 18, 1989 and other amendments, provides many stipulations on forest preservation and sound forest management even in those other than designated forests for preservation. The objectives of the Code include water resources conservation, aquatic eco-system preservation and sedimentation control with detail stipulation of permanent forest reserves along water courses as follows (Art. 2).

- 30m for a water course with a width less than 10m
- 50m for water courses with a width up to 50m
- 100m for water courses with a width from 50m to 200m
- 200m for water courses with a width from 200m to 600m
- 500m for water courses with a width more than 600m

The permanent preserve shall include lands around lagoon, lakes or natural and artificial water reservoir, as well as lands within the minimum range of 50m around a spring.

The Code assigns the IBAMA as the competent federal organ in charge of the management or administration of forests (Art. 19, etc.)

(8) Federal Law No. 6902 on Ecological Stations and Environmental Protection Area

The Federal Law No. 6902, April 27, 1981 stipulates on designation, management and administration of ecological stations and environmental protection areas.

Ecological Stations are representative areas of Brazilian eco-systems, destined to basic or applied research of ecology, protection of natural environment and development of environment education, created by the Federal Republic, the States or Municipalities within their respective domain. The preservation of the biota shall share 90% or more area, and the remaining can be used for scientific research with an approval and within the limits of regulations, and without endangering the existing species in the Station (Art. 1, 2). The IBAMA shall keep the registry and promote elaboration of plans for the preservation and research in the Stations (Art. 6).

The Ecological Stations shall be not be reduced nor destined for other purposes than those for its creation. In the Station the followings are prohibited, provided that for scientific activities, use or possession from c) to c) may be allowed when authorized by the administrative entity (Art. 7).

a) presence of domestic animals of private properties
b) exploitation of natural resources except for experimental purposes which does not imply damage to preservation of native biota.
c) possession and use of guns of any kinds
d) possession and use of any kinds of instrument for felling down of flora
e) possession and use of any kinds of devices for capture of fauna

The executive power, in case of relevant public interests, may declare specific Areas for Environmental Protection, in order to assure the human welfare and preservation or improvement of local ecological conditions, establishing the rules limiting or prohibiting the following activities, including execution of private ownership (Art. 9).

a) to establish and operate potentially polluting industries
b) to construct embankment works and channels where and when these works will sensitively alter the local ecological conditions
c) to exercise activities which will potentially provoke accelerated soil erosion or sedimentation in water sources
d) to exercise activities which will threaten rare species in the regional biota

The IBAMA or the equivalent State organ, in assembly or by itself or with agreement of other entity, shall inspect and supervise in the Areas of Environment Protection.

(9) Ecological ICMS

The State of Paraná has unique legislation of the Law No. 9491, December 21 1990, the Complementary Law No. 59, October 1, 1991 and Decree of the State Governor No. 974, October 1, 1991, with some amendment by the Complementary Law No. 67, 1993.

As stipulated in the Federal Constitution, the States shall have the power to collect taxes on transactions relating to the circulation of goods and to the rendering of inter-state and inter-municipal transportation services and services of communication, even when such transactions and renderings begin abroad (Art. 155, I, b), called ICMS (tax on circulation of

commercial goods). The portion of 25% of the ICMS collected in each State shall be assigned to the Municipalities in the State (Art. 158, IV). Regarding ICMS assigned to the Municipalities, at least three fourths (3/4) in proportion to the value added shall be credited to the relevant municipalities where the circulation and the rendering of services carried out in their territories. Up to a quarter (1/4) shall be credited in accordance with the state law (Art. 158, IV).

The Constitution of the State of Paraná, 1989 stipulate that the State shall assure legally that municipalities with environmental conservation units and with catchment areas of water sources for public supply shall have a special treatment in crediting a part of its the revenue to municipalities as provided in the Article 158 of the Federal Constitution (Art. 132, Single Para.). Based on the stipulation in the State Constitution, the Law No. 9491, December 21, 1990 establishes the indices of participation of the Municipalities in ICMS distribution as follows (Art. 1):

- 75%, in proportion of the value added in each Municipality to the total value added in the State (as amended in the State Complementary Law. No. 59)
- 8%, in proportion of the agricultural and livestock production in each Municipality to the total agricultural and livestock production in the State, according to the data provided by the SEAB
- 6%, in proportion of the population of each Municipality to the total population of the State, according to the data provided by the IBGE (Brazilian Institute of Geography and Statistics)
- 2%, in proportion of the number of rural properties registered in each Municipality to the total the number of rural properties registered in the State, according to the data registered to and provided by the National Institutes of Colonization and Agrarian Reform
- 2%, in proportion of the territorial area of each Municipality to the total territorial area of the State, according to the data provided by the ITCF (Institute of Lands, Cartography and Forest, currently merged into the IAP)
- 2%, with equal distribution
- 5% to the Municipalities as stated in the Article 132 of the State Constitution

The Complementary Law No. 59, October 1, 1991, provide that a half of the 5% of ICMS collected in the State shall be distributed to the municipalities with environmental conservation units, including areas of environmental preservation, ecological stations, parks forest reserve, forest nurseries and Indian areas or reserves, when registered in the State institute, and the other half to the municipalities with water sources for public supply to neighboring municipalities.

The Decree of the State Governor, October 1, No. 974 provides criteria for the of the distribution of ecological ICMS. Formulae are given to determine the portion of the distribution to relevant municipalities, measuring contribution of each municipality to public water supply to the neighboring urban center and to environmental conservation in quantity and in quality.

CHAPTER 3 CURRENT ORGANIZATIONAL FRAMEWORK FOR WATER ENVIRONMENT MANAGEMENT

3.1 Federal Level

The major relevant authorities of the Federal level are

1) National Department of Water and Electric Energy (DNAEE) of the Ministry of Mines and Energy (MME) for water resource administration
2) Brazilian Central Electric Joint-stock Company (ELETROBRÁS), Electric Center of the South (ELETROSUL) for electric energy services and their management in the Federal and Regional level, respectively;
3) Ministry of Environment and Legal of Amazon Region, National Council of Environment (CONAMA) and Brazilian Institute of Environment (IBAMA) for administration of environmental conservation, preservation of ecosystem and pollution control, including water quality management.

1) Ministry of Mines and Energy, and National Department of Water and Electric Energy

The Ministry of Mines and Energy (MME) of the Federal Government has the following fields of competence.

- Geology and mineral and energy resources;
- Hydrological regime and hydraulic energy sources;
- Mining and metallurgy;
- Petroleum and electric energy industry, including nuclear

The organization of the Ministry consists of Sectoral Organs - administrative divisions, such as the Juridical Advisory Office, the Secretariat of General Administration and the Secretariat of Internal Control, and Specific Organs - line divisions, comprising of the National Secretariat for Mines and Metallurgy and the National Secretariat of Energy.

The Ministry has decentralized entities - statutory bodies related to its competence, including ELETROBRÁS S.A. (Centrais Elétricas Brasileiras Sociedade Anônima, Brazilian Central Electric Joint-stock Company).

The National Secretariat of Energy has three departments, namely, the National Department of Waters and Electric Energy (DNAEE, Departamento Nacional de Águas e Energia Elétrica), the National Department of Fuel and the National Department of Energy Development.

The DNAEE is responsible for the following duties.

- to enforce or to monitor enforcement of the Water Code and the specific legislation related to water and electric energy, within the scope of the department's attribution
- to concede, permit or authorize exploration of services and installation of electric energy and utilization of energy of water courses with the States where hydraulic energy potentials are located

- to concede, permit or authorize utilization of water resources, except that for irrigation
- to formulate guidelines and to coordinate the actions in the scope of the National Water Resource Management System
- to plan, coordinate and execute hydrologic studies in the entire national territory, and to supervise, control and inspect utilization of water
- to define tariff level and structure of electric energy and to submit them for approval to competent organs
- to regulate, standardize, supervise, control and inspect electric energy services in the country
- to administer necessary resources for maintenance and making viable of tariff of electric energy
- to verify, control, examine and expedite criteria and to maintain up-dated calculus of the operation and investment costs of conceded, permitted or authorized electric energy services
- to promote sustenance of decisions and practices of conceded, permitted or authorized electricity services, when side effect of the decisions or practices can damage consumers in any way, adequate services rendered, or economic or financial stability of the same or other conceded, permitted or authorized electric energy services
- to approve technical projects of conceded, permitted or authorized electric energy services, to authorize at the beginning of works, to ratify their termination and to affirm their economic and financial costs for tariff means
- to examine technical, economic, accountable and financial capability of conceded, permitted or authorized electric energy services for supplemental means of decentralization to hire public or private entity
- to promote, in cases foresighted in law, biding at auction for granting of concession and permission for exploration of public electricity services and commercialization of electric energy
- to exercise examination and to control, together with conceded, permitted or authorized entities for electric energy services, levying and distributing financial compensation in utilization of water resources
- to propose intervention of concessionaire of electric energy services, in cases of negligence of legal obligation, regulatory norms, decision of conceding power or unchangeable conditions of concession contracts
- to propose, when it is the case, cancellation, reversion, transference, or declaration of forfeit of concession and the contracts related to utilization of water resources or thermoelectric, establishment of transmission lines and distribution networks

2) ELETROBRÁS and ELETROSUL

Law No. 3890, Apr. 25, 1961 authorized the Federal Government to constitute the ELETROBRÁS, which is established Jun. 11, 1962.

The ELETROBRÁS, subordinated to the Ministry of Mines, is responsible for execution of

national policy on electric energy, planning, financing, coordinating and supervising programs of construction, expansion of operation of generation, transmission and distribution system and conservation of electric energy. The ELETROBRÁS is the principal agency for financing the sector both for federal and state undertakings through internal and external resources.

ELETROBRÁS performs its role of coordination in inter-connected electric system among managing organizations, and of technical assistance for Brazilian electric sector. The ELETROBRÁS discharges its responsibility, through the CEPEL (Centro de Pesquisas de Energia Elétrica, Research Center of Electric Energy), for research and development of techniques and methods related to the sector.

The ELETROBRÁS also works as stock holding company, having four regional companies under its control, participating in 27 state companies throughout the country, and investing approximately 31 public or private entities, and holding 50% of the capital for Itaipu Binational.

The ELETROBRÁS actuates its duties through the following four regional companies, whose principal functions are generation and transmission of electricity:

- ELETRONORTE (Centrais Elétricas do Norte do Brasil S.A.): operating in Northern and Central-Eastern regions
- CHESF (Companhia Hidro Elétrica do São Francisco): in North-Eastern region
- FURNAS (Centrais Elétricas S.A.): in South-East and Central-Eastern regions
- ELETROSUL (Centrais Elétricas do Sul S.A.): Southern region and the State of Mato Grosso do Sul

Distribution of electricity is carried out by the States' companies, in many of whose capitals ELETROBRÁS participates in share holding. For example, electricity distribution system in Paraná State is managed by COPEL, Companhia Paranaense de Energia, 10.6% of whose stock is shared by ELETROBRÁS.

ELETROSUL was established in 1968 in order to convey the capacity to sustain economic development of the region. Its principal attributions are to supply electric energy in high or extra-high voltage, entitled to plan, construct and operate hydro-electric and thermal-electric plant, substations and transmission lines including some part of electricity generated by Itaipu Binational.

The service coverage of ELETROSUL extends to the States of Rio Grande do Sul, Paraná, Santa Catarina and Mato Grosso. Through expansion during 25 years, its participation has reached up to 58% of electric energy in the regional market, which corresponds to 9.7% of the total Brazilian market.

3) Ministry of Environment and Legal Amazon, National Environmental Council and Brazilian Institute of Environment and Renewable Natural Resources

The Ministry of Environment and Legal Amazon (Ministério do Meio Ambiente e da Amazónia Legal) was established by the Law No. 8490 of Nov. 19, 1992, altered by the Law No. 8746 of December 9, 1993 and by the Provisional Measure No. 545 of July 4, 1994. The Ministry has its purposes of planning, coordinating, supervising and controlling

activities related to the National Environmental Policy, preservation, conservation and rational use of renewable natural resources, and articulating and coordinating the actions regarding integrated policy for Legal Amazon aiming at improvement of quality of life of Amazon population.

The functions of the Ministry are as follows:

- to formulate and develop the national environmental policy
- to articulate and coordinate the actions regarding integrated policy for the Legal Amazon
- to collaborate with ministries, organs and entities of related Federal Administration of international and national range regarding the national environmental policy and integrated policy for the Legal Amazon
- to participate in decision procedure in international and national jurisdiction by means of agreements and negotiations turned to environmental management and integrated policy for the Legal Amazon
- to implement technical, scientific and financial cooperation as a support to the national environmental policy
- to give incentives and to promote researches, and technical and scientific studies at all levels related to its competent areas, and to disclose the obtained results to the public
- to promote environmental education and formation of social consciousness on conservation and appreciation of nature, aiming at improvement of quality of life
- to promote integration of programs and actions under the responsibilities of organs and entities of the Federal Administration, the States, the Federal District and Municipalities, related to environment and natural renewable resources and to integrated policy of the Legal Amazon
- to formulate, orient and discipline the policies of forest, fauna, fishing and rubber
- to implement programs for management of hydro-graphic basins and for protection and maintenance, including pollution control of rivers

The Ministry has the following organizational structure.

1) Administrative Organs
   - Office of Legal Advice
   - Secretariat of General Administration
   - Secretariat of Internal Control
2) Line Organs
   - Secretariat of Coordination of Environmental Affairs
     * Department of Formulation of Policy and Programs
     * Department of Environmental Management
     * Department of International Cooperation
   - Secretariat of Coordination of the Legal Amazon Affairs
     * Department of Articulation with Federal Organs and of International Affairs
     * Department of Articulation with States' and Social Organs

- Secretariat of Coordination of Integrated Development Affairs
  * Department of Plan and Programs
  * Department of Study on Sustainable Development

The Ministry has the following collegiate organs and an entailed entity

- Collegiate Organs
  * National Council of Environment
  * National Council of Legal Amazon
  * National Council of Rubber
  * National Committee of Environmental Fund
- Entailed Entity
  * Brazilian Institute of Environment and Renewable Natural Resource (IBAMA)

The National Council of Environment, Conselho Nacional do Meio Ambiente - CONAMA, has the following competence, mainly establishing administrative regulations for environmental conservation and rational use of natural resources, and preparation of environmental legislation.

- to establish norms and criteria, upon proposals from the Ministry, for licensing of potentially or actually polluting activities to be conceded by the States or Federal District
- to determine, when judged necessary, accomplishment of alternative studies and possible environmental consequence of public or private projects, requiring the Federal, States or Municipal organs as well as private entities to provide indispensable information for appreciation of environmental impact studies and respective reports, in cases that the works or activities will significantly degrade the environment, especially in areas considered as national heritage
- to decide, as the ultimate administrative jurisdiction as a means of appeal, meantime previous deposit concerning fines and other penalties imposed by IBAMA
- to ratify agreement aiming at transformation of fines to obligation to execute measures of interest for environmental protection
- to determine, by means of representation of the Ministry, when referring especially a matter of environment, the loss or restriction of fiscal benefit conceded by the Public Power, in general or conditional character, and the loss or suspension of participation in financing line of official crediting establishment
- to establish norms and national standards for control of pollution caused by automobiles, aircraft and ships through discussion with competent Ministries
- to establish norms, criteria and standards related to control and maintenance of environmental quality aiming at rational use of environmental resources, principally water resources

The Brazilian Institute of Environment and Renewable Natural Resources (IBAMA, Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováis), established by the Law No. 7735 of Feb. 22, 1989, amended by the Law No. 7804 of Jul. 18, 1989 and Law No. 7957 of Dec. 20, 1989, linked to the Environmental Secretary to the President of the Republic (Secretariat do Meio Ambiente da Presidência da República, SEMAM-PR).

Although the IBAMA is bounded to the Ministry, it has a certain independence, endowed special legal characteristics and administrative and financial autonomy.

The purpose of the establishment of the IBAMA is to give advice for formation and coordination, so as to execute and supervise the execution of national environmental policy and of preservation, conservation, rational use, monitor, control and promotion of natural resources. The functions of the IBAMA are as follows:

- to act as executive and secretarial organ to the National Council of Environment, CONAMA
- to propose to CONAMA, through the SEMAM-PR, establishment of norms and general standards related to preservation and conservation of environment, aiming at assuring well-being of the population and compatibility to socio-economic development with rational use of natural resources
- to propose and operate defined policy for environment and renewable natural resources
- to coordinate and execute actions related to recovery of degraded areas
- to give incentives, promote and execute research, as well as technical and scientific studies at all level of the sphere and to diffuse the obtained results
- to propose creation, extinction and modification of the limits and purposes of Conservation Units for public forests of the property of the Union (Federal Republic), as well as to promote their installation and administration
- to provide orientation and discipline of activities for protection of flora, fauna, and rubber
- to enforce legislation, directives and norms in order to fulfill the objectives established in the National Policy of Environment and Renewable Natural Resources, and to provide technical assistance to the Federal, States and Municipal organs and entities, acting supplementarily when the effective legislation is not accomplished
- to register, license, inspect and discipline productive sector which utilize primary materials derived from exploration of natural resources and rubber
- to enforce Federal legislation on environment and to promote monitoring of activities for exploration of flora, forest flora and water resources aiming at their conservation and development as well as protection and improvement of environment
- to guarantee application of resources collected by IBAMA in any title for the execution of the National Policy of Environment, Renewable Natural Resources and Rubber
- to apply penalties defined in laws to violators of environmental legislation on flora and fauna in cases which exceed authorized competence of States and Municipalities
- to promote and discipline the utilization, transformation and commercialization of renewable resources and products and sub-products resulting from their exploration

- to promote development of environmental education activities for formation of social consciousness on conservation and appreciation of nature and life quality
- to stimulate and promote human resource development
- to establish scientific and technical cooperation with national, foreign and international institutes
- to maintain data banks of the sector, essential to the execution of its competence

3.2 State Level

Generally, the State Secretariats themselves have regulatory functions, while statutory bodies attached to each secretariat discharge operational functions as executing agencies, as shown in Figure-3.1. State Councils with deliberative functions are established for major sectors of the Government administration.

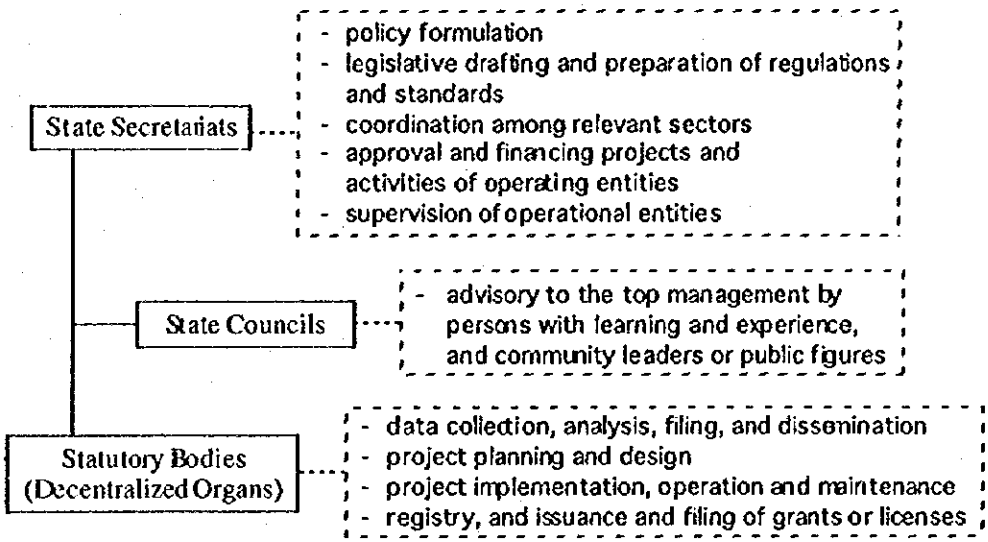

Figure-3.1 General Organizational Structure of the State Secretariats

Competent entities by relevant sector of water environment administration and management are listed in Table-3.1.

The prime institute of water environment administration at the State level is the State Secretariat of Environment (SEMA), subordinating Superintendency of Erosion Control and Environmental Sanitation (SUCEAM) and Environmental Institute of Paraná (IAP). These organs have been in the course of re-organization and strengthening since January, 1995. The initial plan of the organizational structure proposed in the current re-organization of the SEMA, the SUCEAM and the IAP are illustrated in Figure-3.2, 3.3 and 3.4, respectively. The detail of the structure or the composition has been modified in the course of re-organization. The competence of the relevant authorities or agencies in the initial plan is described below:

According to the proposed organization and job descriptions for relevant sectors, most of all responsibilities for the sector are assigned appropriately. With the current re-organization the following two improvements would be attained if re-organization will be implemented as planned.

- to cover the previous weakness in regulatory functions of water environment management
- to enhance technical or engineering capabilities of the relevant entities

Table-3.1 Relevant Entities of Water Environment Administration and Management

Sector	Operational Functions	Regulatory Functions	Deliberative Functions
Water Resources Assessment and Allocation	(IAP) ↦ SUCEAM	SEMA	{State Environment Council}
Domestic and Municipal Water Supply	SANEPAR	(SEDU) ↦ Governor	****
Industrial Water Supply	SANEPAR, industries	(SEDU) ↦ Governor	****
Irrigation, Livestock Watering, Fishing and Aqua-culture	EMATER, CODAPAR, farmers	SEAB/DAGRI, DEPEC	State Council of Irrigation and Drainage, State Council of Fishing
Hydropower	COPEL, (ELETROSUL)	(Federal), Governor	----
Navigation	navigation companies	SETR	Commercial Transportation Council
Waste Water Treatment	SANEPAR, industries	(SEDU) ↦ Governor	State Environment Council
Pollution Control	IAP, industries	SEMA	State Environment Council
Soil Erosion and Sedimentation Control	SUCEAM, EMATER	SEMA, SEAB	State Environment Council
Eco-system Conservation	IAP	SEMA	State Environment Council
Water Excess Management	SUCEAM	SEMA, (Federal)	----
Drought Relief	SUCEAM	SEMA, (Federal)	----
Multi-purpose Facility Management	****	****	****

****; not clearly assigned, { }; not active for the sector, ( ) ↦ ; being transfered in 1995,
---- ; not assignned to the State, Governor; the Governor of the State, ( ); not for the State

Since quantitative and qualitative management on water environment, previously both are the responsibilities of the IAP, are being separated, there might some fear of fragmented management. The solution would be attained if the strengthened SEMA will integrate activities of subordinating organs. Responsibilities of the Government for multi-purpose facility development could be discharged by the new SUCEAM, if the Directorate of Engineering and the Directorate of Water Resources will grow properly with some support or collaboration with the COPEL, which has some interest in multi-purposed facility development as shown below.

(1) State Secretariat of Environment - SEMA

Before the current re-organization, the SEMA itself had a small number of staff. With the current re-organization the capability of the SEMA has been in the course of substantial enhancement, newly subordinating the SUCEAM under it. The SEMA is composed of the following four components under the leadership of the Secretary.

- Advisory Level, such as the State Environment Council, which discharges advisory functions to the top management and in policy formulations.
- Decentralized Entities, such as the SUCEAM and the IAP, for the implementation of duties assigned by the Secretary.
- Instrumental Groups for the general administration of the Secretariat.

- Advisory Offices and Coordination Offices for programmatic activities. Advisory Offices discharge supervisions, inspections and inter-sectoral coordination, while the Coordination Offices carry out studies for policy formulation, educational activities and duties not assigned to the decentralized entities.

Responsibilities of major offices with strong relation to the water environment management are described below.

(a) State Council of Environment

- participation in formulation of global and integrated environmental policy of the State, and of plans and projects of respective sector, in order to ensure the prevention and control of pollution and various forms of erosion, rational use and administration of the soil and natural resources, as well as conservation of their capacity of renewal, and ecological stability, in cooperation with the organs of direct and indirect administration of the State

(b) Advisory Office of Integration of Programs, Project and Activities

1) Division of Programs, Projects and Activities

- to integrate and to formulate compatible program and projects with budgetary arrangements
- to assist for collaboration of special projects combining public and private resources
- to make SEMA's activities compatible to those of linked organs
- to coordinate in such project as financed with external funds whose scope extends to various sections of the SEMA and to related organs

2) Division of Control of Results

- to provide statistical information of actions of SEMA and linked organs
- to elaborate activity report on the SEMA and linked organs
- to coordinate, execute and supervise result evaluation programs
- to register and monitor agreements and accords related to on the SEMA and linked organs
- to coordinate in the supervision of the Regional Offices

3) Division of Information

- to manage environmental information systems of the SEMA
- to assist the Secretary to formulate and monitor data processing policy
- to define and follow-up the policy on procurement and maintenance of information equipment and software for the SEMA and the linked organs
- to promote integration related to the information system of the SEMA and relevant organs
- to elaborate and follow-up directives for data processing
- to define, implement and follow-up training for data processing
- to implement, administer and manage the network of computers in the SEMA and linked organs

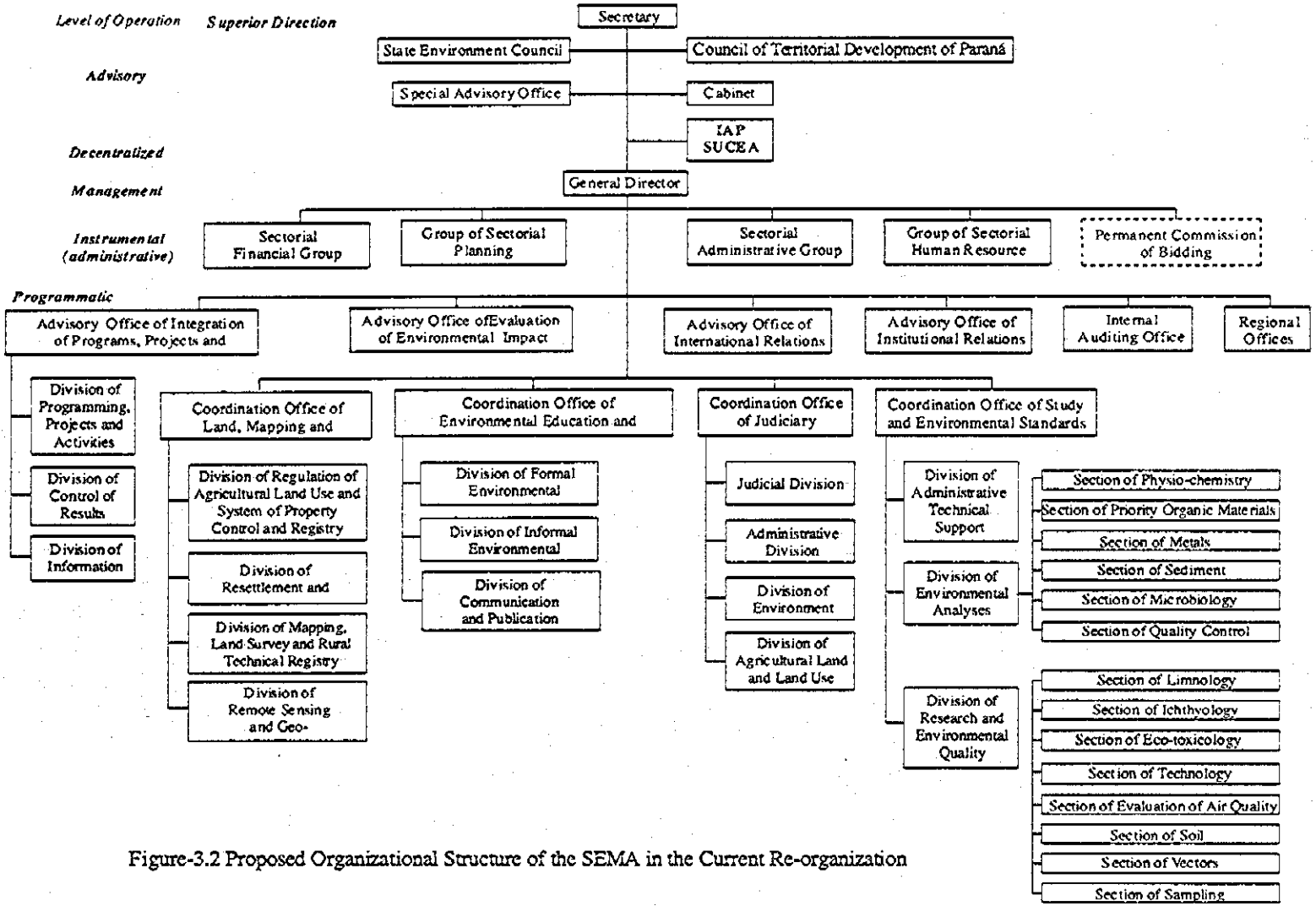

Figure-3.2 Proposed Organizational Structure of the SEMA in the Current Re-organization

(c) Advisory Office of Evaluation of Environmental Impact

- to assess the necessity of environmental impact assessment
- to orient the evaluation of the following studies
  * Terms of Reference
  * Scoping
  * Environmental Impact Assessment (EIA) and its Reports (RIMA)
  * Environmental Control Plan (PCA)
  * Basic Environmental Projects (PBA)
  * Risk Analysis
  * Environmental Auditing
- to follow-up and monitor the implementation of mitigating and compensatory measures proposed in the RIMA
- to coordinate the whole environmental analysis, to call for meeting and discussion including public inquiry
- to elaborate final or partial reports
- to follow-up and to guide affected population
- to analyze resettlement projects and to monitor resettlers
- to analyze the relationship between dam development and territorial shrinkage
- to provide norms for EIA

(d) Advisory Office of International Relations

- to assist the Cabinet directly for international correspondence
- to receive foreign delegations with elaboration of schedules and other arrangement for technical visits
- to follow-up technical cooperation agreements signed with other countries
- to organize technical and scientific information exchange
- to promote and organize international events and interchange of technical staff
- to assist for technical and scientific trip to abroad

(e) Advisory Office of Institutional Relations

- to participate actively to strategy formulation and institutional decision making related to environmental issues
- to promote contact with other State Secretariats for unified environment management and socio-economic development
- to intermediate establishment of agreement or pacts for technical cooperation with other institutes, seeking for efficiency or strategic actions
- to keep continuous contact with advisory committees, or other institutes to encourage information flow and discussions on projects
- to contribute to diffusion of technical or scientific information to the Regional Offices and other institutes
- to participate in eco-tourism activities

(f) Coordination Office of Land, Mapping and Registry

- to propose coordinate and execute and monitor the State's mapping policy

- to promote coordinated mapping services with Municipal, State, the Federal and private entities
- to propose and conclude agreements, accords and contracts with public and private, national or foreign entities for research and execution of mapping projects

< Division of Resettlement and Agrarian Conflicts >

- to mediate social conflicts at State level
- to follow-up the agreement between the IAP and the ANCA
- inspect with the INCRA (National Institutes of Colonization and Agrarian Reform) areas that are prone to be dispossessed for rural resettlement
- to carry out socio-economic evaluation of areas occupied by landless farmers
- to keep the registry of occupying families up-dated
- to act with other State agencies in the analysis of projects, distribution and inspection of PROCERA's and the State's resources for the landless rural workers, together with the INCRA

(g) Coordination Office of Environmental Education and Communication

- to plan, elaborate, institute, coordinate and execute plans, programs and projects for environmental education, through global, regional, local, multi-, inter- and trans-diciplinary approach
- to coordinate and develop actions for environmental education network with the State and Municipal Secretariats of Education, integrating other institutes
- to research and develop contents, techniques, methods for integrated environmental curriculum in different school subjects
- to cooperate with civil society through exchange of information for acquiring ideas and leaders and encouraging population to prevent environmental problems
- to integrate sections of the SEMA, related institutes and the Regional Offices for decentralized environmental education
- to organize and carry out human resources development and qualification in environmental education
- to support and promote the production of educative and informative materials and the diffusion through multimedia
- to develop means to organize and maintain SEMA's bibliographical patrimony
- to support, promote, and carry out campaigns, activities to encourage public awareness for protection and improvement of environmental quality
- to establish guidelines and to create and develop environmental education programs and projects in Conservation Units and surrounding communities, and for eco-tourism
- to exchange information on environmental education with the Federal, States, Municipal, public, private, national and international institutes.
- to support and act with national and international non-governmental organizations
- to establish norms and standards, and to control the production quality of technical publication and educational materials

(h) Coordination Office of Studies and Environmental Standards

- to promote integrated environmental study
- to develop methods and standards for evaluation of environmental quality
- to evaluate technologies of treatment and disposal of polluting effluent and waste
- to study and propose norms and standards related to environmental protection
- to carry out environmental analyses and investigations
- to elaborate technical comments and reports related to environmental protection
- to feed data to the information system
- to promote coordinated human resource development, technical development, and technical transfer with other technical centers

Each division or section has the same or similar responsibilities as generalized above for the field of science or technology development as the name of the division or section shows

(2) SUCEAM

Before the current re-organization, the SUCEAM was subordinated under the SEDU (State Secretariat of Urban Development) and its main duties are technical field on soil erosion control and drainage in urban areas, as the name still shows. The major difference from the previous assignment is the addition or shift from the IAP of the responsibility for water resources assessment and allocation. Some enhancement is expected in technical development for pollution control, as well. In the initial plan, the SUCEAM has been proposed to have one administrative directorate and three technical directorates, namely Engineering, Water Resources and Environmental Sanitation. The responsibilities of the Directorates of Water Resources and of Environmental Sanitation, are given below, while the Directorate of Engineering is responsible to the implementation and control of the projects, mainly in the field of environmental sanitation.

(a) Directorate of Water Resources

- to promote surface and underground water resources management of the State
- to monitor amount and quality of water resources
- to generate, configure, store, and communicate data and information related to amount and quality of water resources
- to plan and manage rational and multiple use of water resources, such as those for public supply, energy generation, industry, irrigation, fish culture, navigation, recreation, mining, dilution and removal of industrial and domestic effluent, adopting the river basin as a unit
- to project and construct works for groundwater abstraction
- to coordinate elaboration and to execute of the State Plan on Water Resources
- to establish norms and criteria for charging on the use of water resources
- to develop studies to control and minimize flood damages in the State
- to develop studies on the potential of surface and underground water in critical regions of the availability.
- to monitor sediment transportation in rivers, identifying critical areas concerning soil loss and aggravation on rivers and reservoirs

- to prepare an inventory on availability, demands and quality of surface and underground water resources
- to classify water courses in the State based in limnological criteria of water quality
- to inform the procedures and to issue granting documents for the use of water resources
- to provide technical supports for Environment Impact Assessment
- to analyze alternatives for use of surface and underground water sources from hydrological, economic and environmental aspect.
- to monitor water sources contained in the Law on Ecological ICMS and to determine financial and environmental indices for relevant Municipalities
- to promote and execute studies and researches for identification and development of methodology and technology on water resources
- to propose programs for staff development

(b) Directorate of Environmental Sanitation

- to promote studies, projects, programs, and technical researches related to environmental sanitation works and services
- to elaborate technical projects and feasibility studies to obtain necessary resources for environmental sanitation works
- to promote accomplishment and diffusion of norms, guidelines, technical publications and procedure of subsidizing the development of environmental protection policy and execution of the works
- to promote development of new technology, technical transfer and assistance to other institutes related to environmental sanitation
- to coordinate inspections and follow-up of specific works
- to promote organizing and maintaining of systems with unified prices of materials, services and labors
- to adopt and promote development of data processing system for better indices of productivity and to diffuse the information
- to promote technological improvement and development of technical staff
- to subsidize integration programs with other institutes for promotion of correlated activities
- to subsidize programs for optimal and improved activities of the SUCEAM

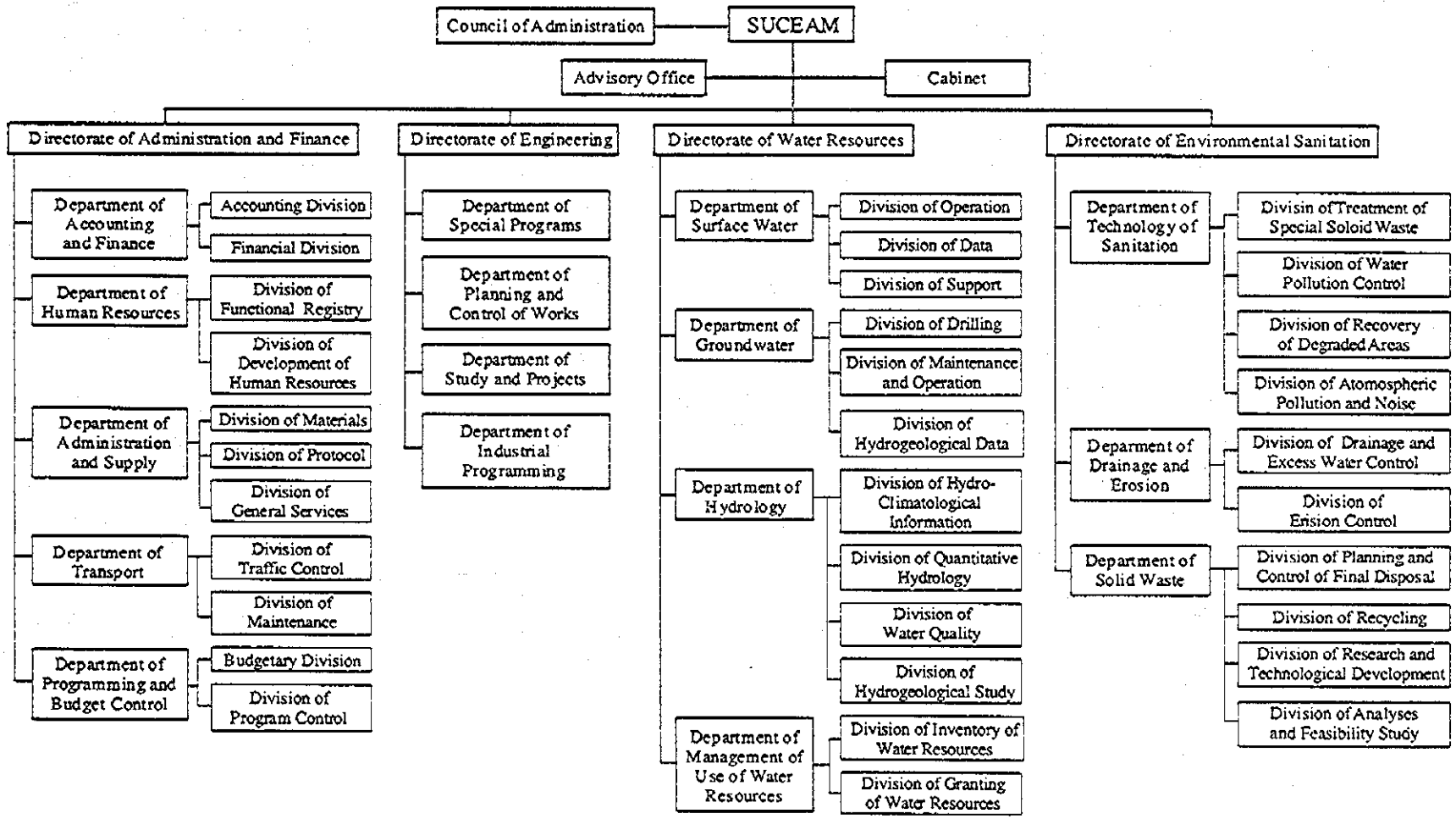

Figure-3.3 Proposed Organizational Structure of SUCEAM in the Current Re-organization

(3) IAP

In the previous administration, the IAP has wide variety of responsibilities, assigned almost all necessary functions of the government with insufficient funds. In the initial plan of re-organization, while hydrological and hydrogeological sections were replaced to the SUCEAM, line directorates, departments and divisions are strengthened for the three fields, namely, bio-diversity protection, forest preservation and pollution control.

(a) Directorate of Bio-diversity and Protected Areas

- to search adequate preservation of various biota and the existing eco-system, considering Conservation Units as common properties and instruments of sustainable development
- to propose and coordinate policies, programs and projects for implementation, maintenance, recovery, protection, diffusion and the development of environmental education and ecological tourism in the Conservation Units
- to propose creation of new Conservation Units as well as complementary areas, being adequate representation of various biota and the existing eco-system
- to organize and maintain registry referring to the Conservation Units in the State
- to establish technical norms and instructions regarding the Conservation Units in the State
- to diagnose the current situation of the existing eco-systems and to proceed its permanent monitoring through the maintenance of a database, maps and land use surveys, among others
- to diagnose the situation of the flora in the State and to guarantee its bio-diversity and to take actions for conservation, recomposition and recovery of forest coverage in the State
- to protect the fauna in the State through the conservation and control of species of the native wild fauna in a population imbalance, through the research and management, through the assessment of environmental impact on terrestrial eco-systems cased by industrial activities, through the breeding of native species and through the establishment of juridical norms oriented at the State level.

(b) Directorate of Forest Development

- to formulate and execute the State Forest Policy, proposing programs annually or in plural years for forest development, stimulating afforestation and reforestation for economic and conservation purposes
- to plan, organize, coordinate and control of activities for studies and researches.
- to define, implement and follow-up programs, projects or studies related to the forest development
- to collaborate diagnoses of the environmental situation of the State
- to advise in elaboration of proposals on technical and scientific development of the IAP

- to inspect and license activities related to afforestation and reforestation
- to propose guidelines for utilization of forest biomass
- to propose norms and guidelines for the execution of programs, projects and studies for forest development
- to participate in forest protection plans of the State
- to collaborate action plans for conservation, preservation and sustainable development
- to plan and coordinate production process
- to promote programs for technical staff development and training, emphasizing technical transfers
- to promote and execute studies and researches for identification and development of methodology and technology
- to establish technical and administrative norms and procedures for licensing forestry activities
- to propose norms and parameters for management of native forest products
- to organize, coordinate and control of laboratory and research activities related to flora
- to organize, coordinate, execute and control forest information system of the State and basic statistics on forest
- to conduct, organize, coordinate and control operational process of inspection and licensing in decentralized units of the IAP and forestry activities
- to subsidize and orient inspecting activities concerning to the forestry, in accordance with the legislation in force
- to define and enforce criteria for the elaboration of EIA-RIMA in the field related to the Directorate

(c) Directorate of Control of Environmental Resources

The Directorate of Control of Environmental Resources is competent to coordinate, execute and control of activities, concerning the observation and enforcement of the legislation applicable related to the fields of activities of the Directorate and the Departments under it, as well as concession of environmental licensing in the State. Major responsibilities of the Departments are summarized below.

1) Department of Control of Pollution
   - to accomplish the environmental legislation concerning pollution control through inspections and licensing
   - to propose agreement and accords with Federal, State and Municipal organs and international institutes to obtain technical and financial supports
   - to plan and control programs for prevention and corrective inspection of pollution
   - to plan inspecting actions concerning transportation and final destination of agronomic and harmful products used in the State
   - to plan and control inspections concerning to installation of facilities which are potentially harmful or risky.

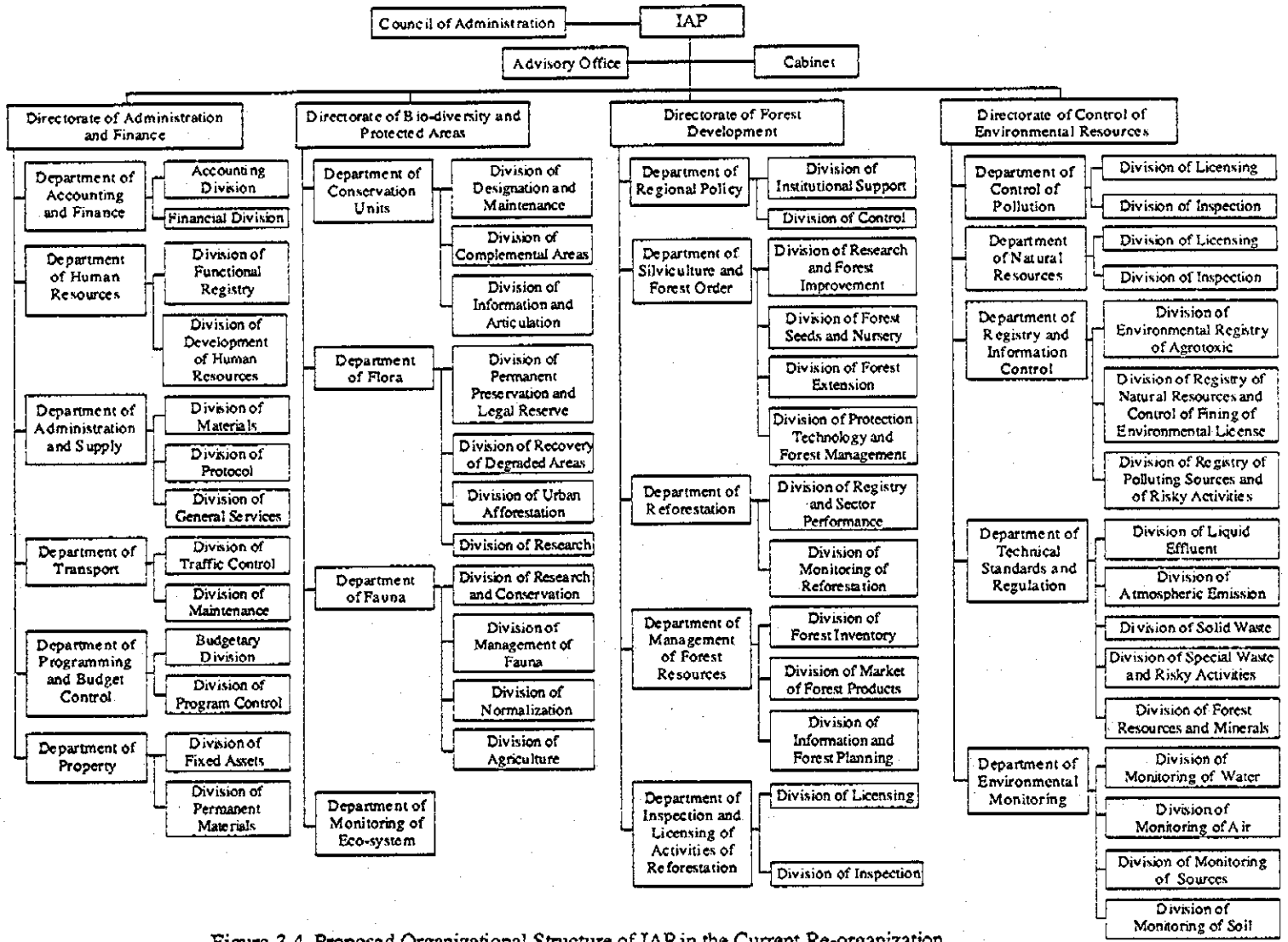

Figure-3.4 Proposed Organizational Structure of IAP in the Current Re-organization

2) Department of Natural Resources

- to accomplish the environmental legislation concerning forest and mineral resources and protection and recovery of the environment through inspections and licensing
- to plan and control inspections concerning forest and mineral resources
- to propose agreement and accords with Federal, State and Municipal organs and international institutes to obtain technical and financial supports

3) Department of Registry and Information Control

- to organize and maintain the registry of activities which potentially modify the environment, of polluting sources and agrotoxics concerning environmental aspect, of environmental licensing of potentially harmful or risky sources, and of users of the natural resources in the State

4) Department of Technical Standards and Regulation

- to elaborate norms, maximum and minimum standards and technical specifications for control, treatment and final disposal of effluent discharge and solid waste, in all forms, as well as for those related exploitation of forest and mineral resources and installation of facilities which are potentially harmful or risky, aiming at subsidizing to inspections and licensing of the institutes

5) Department of Environmental Monitoring

- to assess actions and monitoring of water quality (rivers, reservoirs and the sea), forest, minerals and the air, as well as pollution sources, aiming at elaboration of plans for improvement, protection and rational uses of these resources with obtained data and classification in accordance with the legislation in force

(4) State Secretariat of Planning and General Coordination (SEPL)

The SEPL is in charge of general planning of government administration including budget appropriation, and the inter-sectoral coordination. Under the SEPL, the Coordination of the Metropolitan Region of Curitiba (COMEC) is organized, shifted from the SEDU, whose major responsibilities in water environment management are as follows.

(a) COMEC

- promotion, elaboration, approving, obedience and control of the integrated planning of the Metropolitan Region of Curitiba
- execution together with the Sanitation Company of Paraná - SANEPAR - and the City of Curitiba, of the Program of Environmental Sanitation of the Metropolitan Region of Curitiba - PROSAM

(b) Managing Unity of the Program of Environmental Sanitation of Curitiba Metropolitan Region - PROSAM - UGP

- promotion of environmental recovery of the region and preservation of its source for public supply

- promotion of improvement of physical, chemical and biological characteristics of water resources in Upper Iguaçu Basin
- promotion of enhancement of potable water supply services, with regulation of discharge and quality control of the resources
- minimization of the impacts of urbanization over water resources of the region, with suitable land use
- promotion of flood control
- development and implementation of institutional mechanisms and instruments necessary for suitable administration of the environmental resources of the Upper Iguaçu River Basin

  <Actions of the Sectoral Projects of PROSAM>
- structure of basis for the administration of the environmental resources involving:
  * technical capacity of non-governmental organs of environmental information
  * development and improvement of administration system of the Upper Iguaçu River Basin
  * development and implementation of systems, whether governmental or not, of information about the environmental resources of the Metropolitan Region of Curitiba
  * elaboration and implementation of plans of land use ordination, of alternatives of economical development, of drainage, and of water sources for future utilization
  * environmental Supervision and monitoring
  * environmental education
- protection and advantaged utilization of supply source involving:
  * expansion of potable water supply
  * land re-ordination in urban and rural areas
  * re-composition of the forest coverage
  * protecting infra-structure for the water quality in the sources
- Environmental recovery of the Upper Iguaçu River involving
  * flood control and urbanization of the flood-prone areas
  * collection and treatment of sewage
  * collection and final disposal of urban solid waste

(5) State Secretariat of the Urban Development - SEDU

The SEDU is in charge of urban and regional development planning, land use planning and their implementation though assisting Municipalities.

(a) Council of Regional Development of the Coastal Area of Paraná

- assistance to the state administration in development of Paraná Coastal Area, as well as in obedience to the legal principles referring:
  * to the division, use and occupation of lands
  * to control, prevention of pollution
  * to management of the natural resources

* to preservation of the areas and places of interest and special protection, of the historical, landscape, archeological or historical heritage and of others of regional interest defined in Federal, State or Municipal legislation

(6) State Secretariat of the Agriculture and the Supply - SEAB

(a) State Council of Fishing - COESPE

- formulation of the State policy of fishing, according to the National Plan of Fishing Development
- elaboration of State plans and programs related to fishing activities

(b) State Council of Irrigation and Drainage - CEID

- analysis and announcements on the Annual Operation Plans related to irrigation

(c) Department of Supervision - DEFIS

< Division of Pest Control of the DEFIS >

< Section of Supervision of Agricultural Land Use >

- Supervision of agricultural land use and the other complementing items, aiming preservation, recovery and improvement of the quality of agricultural soil in Paraná State

(d) Operational Department of the Agriculture and the Supply - DAGRI

- institution, technical coordination and administration of programs and projects of agricultural area, handling soil and water, rural engineering, food supply and their appropriations, developed in regional level and in entities connected to SEAB

  < Division of Administration of the Programs of Irrigation, Drainage and Supply of DAGRI >

- management and coordination, in the State level, of the activities developed through the programs and covenants with entities connected to SEAB and with other entities external to the State System of Agriculture, related to renewable natural resources

(e) Agronomic Institute of Paraná - IAPAR

- development of the environmental research, especially of the ecology and of the natural resources of the State, through systematic research, aiming its rational utilization and the identification of new economical alternatives of production

(g) Paraná State Company of Technical Assistance and Rural Extension - EMATER

The EMATER is a decentralized entity under the SEAB. Among its scope of services, the EMATER renders services for small holding farmers including irrigation and water supply for livestock breeding projects. In agricultural water supply, the EMATER discharges of the followings:

- to identify potential areas and to develop actions for demand generation
- to identify the priority order for implementation, together with the SEAB's leadership

- to elaborate project engineering
- to provide assistance to the farmers

The EMATER also has operational functions in soil erosion and sedimentation control. Soil erosion control in rural area is discharged by the EMATER, while that in urban areas is undertaken by the SUCEAM.

(f) Company of Agricultural and Livestock Breeding Development of Paraná - CODAPAR

- supports to agricultural and livestock breeding development in Paraná, promoting production of agriculture, livestock breeding and agro-industry, and environmental preservation and recovery
- services for mechanization, aiming promotion of irrigation and drainage, recovery of the lowland and the areas of half-slope, erosion control, recovery and preservation of soil and water, measurement, survey and exploitation of water

(7) Sanitation Company of Paraná - SANEPAR

- accomplishment of studies and elaboration of projects and budgets, construction of works and facilities and expansion of water supply and sewerage facilities
- supervision of exploitation carried out by regional or local subsidiaries, of water supply and sewerage services
- execution, together with the Coordination of the Metropolitan Region of Curitiba - COMEC and City of Curitiba, of the Program of Environmental Sanitation of the Metropolitan Region of Curitiba - PROSAM

  < Division of Development of Quality and Environment - DUDO (of the Management of Operational Development) >
- planning, development, coordination, control and evaluation of programs related to the systems of water supply and sewerage, water quality and the environment, recovery and preservation of the environment
- development of measures which allow implementation of activities referring to development and control of water and sewer quality in order to decrease harmful effect on public health and the environment
- development of operational methods aiming the efficiency of control of water and sewer quality and of recovery and preservation of the environment
- standardization of specifications, equipment, materials and chemicals used in the water and sewer treatment and in the control of its quality
- definition of adoption of new standards on water and sewer quality and on environmental preservation, aiming protection of public health
- coordination, in the SANEPAR spectrum of the procedures necessary to the Integrated Program of Monitoring of Potability of Water for the Public Supply, developed by SEDU/IAP and SESA (State Secretariat of Health)/ISEP (Institute of Health of Paraná)

  < Division of Hydrogeology - DVHG (of the Management of Projects) >
- participation in the planning, control and adjustment of programming of projects and well drilling for the System of Water Supply

- development and maintenance of program to control, to operate, to maintain and to optimize deep wells together with the Regional Superintendencies of SANEPAR
- elaboration of feasibility studies for utilization of groundwater
- elaboration, following and analysis of projects of locations and dimensioning of the deep wells
- elaboration and analysis of technical and quantitative specifications of the services for construction of wells
- supervision, monitoring and analysis of drillings of deep driven wells

(8) Energy Company of Paraná - COPEL

- research and study, from technical and economic viewpoints, on any source of energy
- research, study, planning, construction and exploitation of production, generation, transportation, storing, distribution and commerce related to energy, in any of its forms, mainly electrical energy, of combustibles and energetic raw-materials
- study, planning, project, construction and operation of dams and their reservoirs, as well as other undertakings, aiming multiple utilization of the waters

(9) Minerals of Paraná Corporation - MINEROPAR

The activities of the MINEROPAR include:

- research of mineral resources, groundwater and mining of the respective layers, as well as refining and industrialization of minerals
- stimulus for discovery and intensification of utilization of the mineral resources in the state, through its own schemes and assistance and cooperation with private corporations

  < Management of Development and Mineral Economy of MINEROPAR >
- promotion of coherence of mining activities and groundwater exploitation with other activities of use and occupation of the physical environment, specially in what concerns dialogues with State organs responsible for the environment

3.3 Municipality Level

Participation in water environment administration by the Municipalities varies according to the level of their establishment and capabilities. Some Municipalities, such as the City of Curitiba, discharge major responsibilities in water environment management, while many of Municipalities have been raised very recently and are still in the courses of their consolidation.

COPATI, Consórcio Intermunicipal para a Proteção Ambiental da Bacia do Rio Tibagi - Inter-municipal Consortium for Environmental Protection of the Tibagi River Basin, was established in 1989 and composed of around 40 municipalities represented by the mayors. It represents, nationally and internationally, common interests of the member municipalities, with regard to the following objectives:

- to elaborate and execute together plans, programs and projects, aiming at improvement of environmental conditions and the life in the Tibagi River

Basin, reinforcing development programs in the region, when necessary

- to promote afforestation, reforestation and other programs and measures for preservation of fauna and flora in the region included in the territories of the member municipalities
- to develop services and activities of the interest of the member municipalities in accordance with the working programs approved by the Deliberative Council

3.4 Activities of NGO

The Regional Permanent Commission for Flood Prevention of the Iguaçu River (CORPRERI) has been organized without economic or political purposes, whose missions are as follows:

- to study and identify the causes of floods
- to give suggestions to the governments in order to gather the efforts of the governments for minimizing the effects of floods
- to promote understanding of issues on floods which involve resettlement of inhabitants
- to help the governments which seek to protect the population and to promote development
- to spread conclusions in order to create a collective conscience
- to suggest alternatives and address solutions in order to make actions and works feasible and concrete

The Commission is composed of the representatives for the entities as follows:

- Retailers' Club
- Association of Engineers, Architects, and Agronomist of the Iguaçu Valley
- Industry Associations
- Labor Unions
- Municipal Councils of União da Vitoria and Porto União
- Municipal Council of Development of União da Vitoria
- Association of Commerce and Industry of União da Vitoria
- Environmental Institute of Paraná (IAP)
- Association of Municipalities of Paraná (AMSULPAR)
- Municipality of Porto União
- Women's Power of the Iguaçu Valley
- Neighborhood Association
- Service Clubs
- Other constituted entity

CHAPTER 4 INSTITUTIONAL ISSUES

4.1 Concepts and Approach for Institutional Improvement

The following two concepts are employed to formulate institutional improvement programs:

Concept I: *Promotion of Appropriateness, Effectiveness and Efficiency through Remedial Measure against Current Problems*

Concept II: *Responding to Future Needs for Integrated Water Environment Management*

The first concept should be applied everywhere in the world for the improvement every sector of management and government administration. Considering the Concept I, current institutional problems are identified and analyzed for compiling remedial measures to solve the problems.

Since water resources development incurs huge costs and long period for project implementation and the resources conservation will affect future generations, water environment management should cover long term perspectives. Future needs and corresponding institutional responsibilities of government administration are discussed under the Concept II.

Introduction of successful models practiced in other countries, including those in Japan, which might be suitable to Paraná State, is applied as a basic approach in programming institutional improvement measures under both of the two concepts, especially those under the Concept II.

4.2 Identified Problems

(1) Problems Identified through Institutional Study

The following problems are observed throughout the institutional study. Problems described in 4), 5) and 6) are discussed in the counterpart meetings.

1) Policy Matters

- The policy on the allocation system among other sectors in each region or basin does not seem to be set up clearly.
- No long- or mid- term socio-economic development plan is published in the State or in the Federal Republic.
- It is difficult to find regional or land use plans that can be a premise for water resources development plan.

2) Responsibility Assignment

- Projects or programs for the exploitation and the conservation are planned, executed, operated, maintained, registered and monitored by various entities.
- Currently, even though many efforts are made for data collection and their processing, problems are taking place in their reliability and compatibility

mainly because of lack of written detailed regulations or manuals for the collection and processing or lack of enforcement of the regulations.

- Operational and regulatory functions of demand side are scattered in many secretariats or entities.
- Inefficiency or ineffectiveness often occurs because of doubled efforts and partial delays in related projects.
- It is often the case that operational organization, such as SANEPAR, is involved in regulatory functions, such as fundamental strategy establishment on regional priority of its services, which is finally determined by legislative, hence, political process. The management of an operational entity needs stability, which can be hampered with involvement of political matters.
- There are some complexities in legal status of water and land. Under the regime of the Water Code, there may exist some river or lake beds of private property. The new constitution stipulates that the ownership of all water vests in the Federal Republic or in the State, while the ownership of river or lake beds was not changed. Even though easements are given for public administration and compensation schemes are prescribed in relevant legislation, there might be some complications for the implementation of water environment management.
- Effective or latest version of the competent regulation is hardly known except experts.
- Once, many river basin commissions or committees were established in Brazil. Only two of them work now. The reasons of the abolishment were allegedly lack of authorization by legislative power, having had no permanent staff.
- Currently, deficiencies are found in management of the rivers of the Federal domain, except hydro-power generation and inland navigation.
- Although the constitution provided that the flood control is the Federal matter, DNOS (National Department of Sanitation Works under the Ministry of Agriculture), which was the competent organization, was abolished.
- Another deficiency is found in operational functions in the State Government for water resources assessment and allocation, groundwater use control, ecosystem conservation, soil erosion control, flood plain management.

3) Residents' Participation

- Beneficiaries could present some useful on management the public utility entities, such as those of SANEPAR, or COPEL, while experts and public figures could serve on technical committees of policy and oversight commissions for environmental conservation and water resource allocation. There appears no example of paths for exchange of opinion or commissions.

4) Water Resource Use and Allocation

- Disorganized intakes of river water occur.

- Unintegrated actions occur between relevant sectors.
- Many people waste water even during the drought.
- Conflicts in water use sometimes occur in some region in drought season.
- People in rural areas do not have access to potable water.
- Many domestic water supply systems have great extensions of old pipes.
- Discontinuity occurs often in governmental administration historically.
- Irrigation schemes do not receive sufficient attentions.
- There are many cases that extension technicians do not consider elaborated use of river water with irrigation and aqua-culture sectors.
- Only the State of São Paulo was conceded to generate hydropower in the Paranapanema River.
- Many areas of fertile lands along the Paranapanema River are under reservoir developed by the State of São Paulo without enough compensations.
- Growing use of surface water leads to conflicts.

5) Problem Identification in Water Resource Conservation
   - Factories sometimes do not follow the effluent standards.
   - Technical information is not provided sufficiently to inspectors and extension technicians who carry out environmental monitoring.
   - Industrial and domestic waste is discharged into rivers.
   - River banks are sometimes destroyed.
   - Riverside vegetation is not preserved well.
   - Many people do not pay attention to water resource protection.
   - Illegal occupiers along rivers deteriorate water quality.
   - Governmental agencies have to pay cost of pollution control instead of the polluters.
   - Drainage of irrigated water from farms and grazing fields causes pollution.
   - Soil erosion controls measures are not properly prepared.
   - Sedimentation occurs in dam reservoir, river and Paranagua bay.
   - Date and information on sedimentation are not properly collected and processed.
   - Dam planning and sedimentation control cannot be formulated appropriately.
   - Use and storage of agro-chemicals are disordered.
   - Farmers do not pay enough attention for use and storage of agro-chemicals.

6) Problem Identification in Excess Water Management
   - The secondary river beds are frequently flooded.
   - Sufficient access cannot be obtained to the information which shows flood forecast with flood hazard map.
   - Storm water often flow into sewer system.
   - Overflows often occur in sewer system.
   - Many people live in flood prone areas illegally.
   - Rain water drainage system is not maintained well.

- Flood control and storm water drainage programs and projects are not carried out.

(2) Problem Identified throughout Studies Other than Institutional Study

The following problems were and are described in the reports of the Study. Some of the statements do not directly mean problems but describe facts which possibly cause problems.

1) Data on industrial water use are not collected or kept in files.
   - There are 25,600 factories listed in the file of the SEIC in the State of Paraná.
   - Around 7,900 factories are listed in the file in the SANEPAR with data on consumed water.
   - Granted volume of water rights for 521 factories is filed in the IAP.
   - Consumed water and effluent water of 932 factories are listed in file of the IAP.

2) Data on agricultural water use are not analyzed effectively.
   - The EMATER (20 regions) and the SEAB (18~19 regions) use different division as unit of the analysis.
   - Total water consumption for irrigation is not available.
   - no data on irrigation, such as location, type of irrigation system, crop, water consumption and frequency of practices.
   - There are no authorized irrigation plans in Paraná.
   - The IAP conducts mapping for the land use using satellite imagery, while the SANEPAR completed the area calculation based on the map (disordered computer system in the IAP).
   - There is only an unauthorized information of fish pond expansion, which seems to be too large.
   - The estimation of food consumption is quite old and has not been revised for a long period (since 1976).

3) Three different hydrological databases are used by the different public agencies.
   - MSDHD; DNAEE, SISTEMA DAD; COPEL, CADASTRO-PLU-FLU; IAP.
   - Hydrological stations (217) in Paraná are operated by the DNAEE, the COPEL and the IAP.
   - Eleven observation teams of the IAP are financed by the COPEL and the DNAEE for some portion.

4) Information and data on water use are scattered among relevant organs and types of registration forms are also different.
   - IAP; water use registration (1,680) and application of factory construction (1,299)

     SANEPAR; water use in the systems (1,820)

     COPEL; hydroelectric water use (113)

     EMATER; agricultural water use (1,484)

     DNAEE ; Federal domain and hydroelectric water use

5) Methods of assessment of permissible or safe yields of groundwater are not established.

6) Groundwater quality is deteriorated beyond maximum permissible value in some areas according to the data collected by the test conducted by the Team.
   - Maximum permissible value stipulated in the Decree No. 12.486 of 10/02/78 of São Paulo is refereed in the study.
   - samples over the limit (N-NH3;1/50, N-NO3;1/50, N-NO2; 5/50)

7) The National Department of Sanitation Works (DNOS), which was in charge of flood control was abolished in 1990, although the responsibility of flood control is imposed on the Federal Government.
   - The records collected and filed in the DNOS seems to be scattered.

8) Water quality monitoring is not sufficient.

9) Only 43.2% (57.3 in Curitiba Metropolitan Area) of urban dwellers are served with sewerage service and only 15.4% (15.6% in CMA) are served with sewerage treatment service.
   - Most of the sources (more than 75%) of water quality deterioration are attributed to untreated sewage.

10. Only 492 industries are listed as discharging factories of organic pollutants in the IAP file.

11) Natural forest cover has decreased from 83.4% in 1890 to 11.9% in 1980, to 9.05% in 1990. Reforestation covers 3.24% in 1990.
   - Loans to afforestation scheme from the Federal Government have ceased since 1987.

12) The coordination and altitude of existing well sites are not well filed in the IAP at present.

13) There is no monitoring system to measure groundwater table and its fluctuation at present.

14) The Civil Defense reported about 45,000 persons were affected in the Curitiba Metropolitan Area by the inundation in January, 1995.

15) Records of structural and economic flood damages are scarce.

16) The contamination of water quality by organic substances is heavily present in the main stream and tributaries near the upstream Curitiba.

17) River flow in Ponta Grossa and Londrina seems to be contaminated by sewage.

18) Many of the industries are located in the urban areas and the effluent from these factories significantly degrades the water quality of rivers.

19) The water quality data for 1993 and 1994 is not available in March, 1995.

20) The Atuba and Palmital rivers as tributaries of the Iguaçu River are not covered by a protection or sanitation program, and this condition will probably affect the water quality of the Iguaçu River and hamper the PROSAM's sanitation objectives in the Upper Iguaçu Basin.

21) There is still a sector of the Iguaçu River resembling the landscape traits of the original river conditions, this sector is not under any kind of conservation strategy.

22) Concept of cost allocation in prospective multi-purpose dam projects has not been defined in the State.

23) Water losses in water supply are estimated as high as 40%.

24) Because of topographic constraints and increasing occupancy of low income population in the flood prone areas, the existing urban drainage systems became not enough for handling the urban flood runoff of large magnitude. Besides, some of the fast growing areas in the peripheries of the metropolitan region are not provided with the basic infrastructures required for urban storm management.

25) In all eight regions of the State, the most significant flood inundation damages occur in urban flood prone areas. In many cases, the urban flood prone areas along river regimes are occupied by low income families. In few cases such as Uniaõ da Vitoria-Porto Uniaõ and Rio Negro-Mafra areas, the urban flood prone areas are occupied with relatively high cost infrastructures, important industries, commercial establishment and houses of high value.

26) Most of sewage and industrial waste water are discharged into small rivers. Therefore, tributaries are much more contaminated than main rivers.
    - It is anticipated that the water quality will deteriorate and will not be able to meet the standards for sources of potable water.
    - The water contaminated by chemicals such as pesticides and synthetic harmful chemicals may not be recovered by normal water treatment.
    - Water is contaminated by solid waste leach and industrial waste.
    - Suspension of the operation of treatment plants occurs due to inflow of harmful materials.
    - Destruction of river ecosystem occurs.

27) Rapid industrial development is expected, following increase in urban population. Numbers of new industries will add the pollution loads, even if newly developed industries keep the same levels of effluent quality as the existing ones.
    - Some industries do not follow the effluent standards.
    - Effluent from industrial and agricultural facilities is not monitored or checked.
    - Lack of information on more efficient treatment methods.

28) Effluent with significant organic materials due to the low treatment level of sewage is discharged into rivers.
    - Sludge digestion Method has a low efficiency in the range of 30-50% of BOD.

- Untreated sewage causes groundwater contamination.
- Bacteriological contamination by sewage causes diseases.

29) There are many species of extinct, rare, endangered and vulnerable fauna and flora in Paraná. (Listed in the Red List)

30) Problems due to deforestation are pointed out in cause-effect relations as follows:

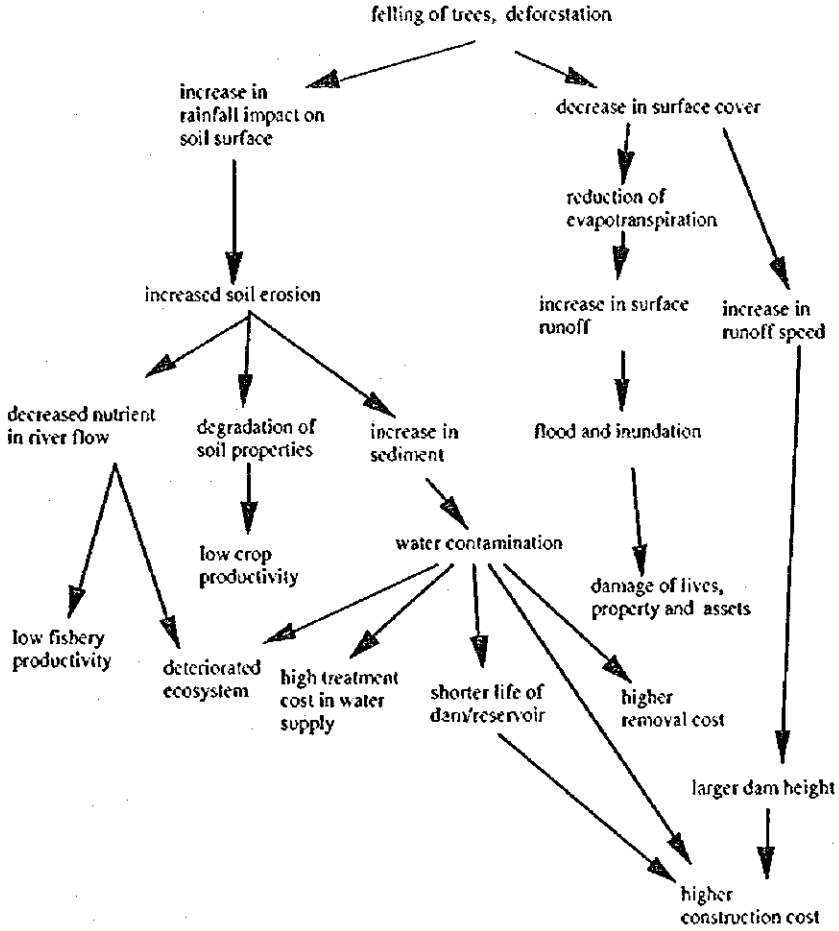

Figure-4.1 Problems on Deforestation

31) Ecological study shows the following two inter-relations of problems in eco-system of the State.

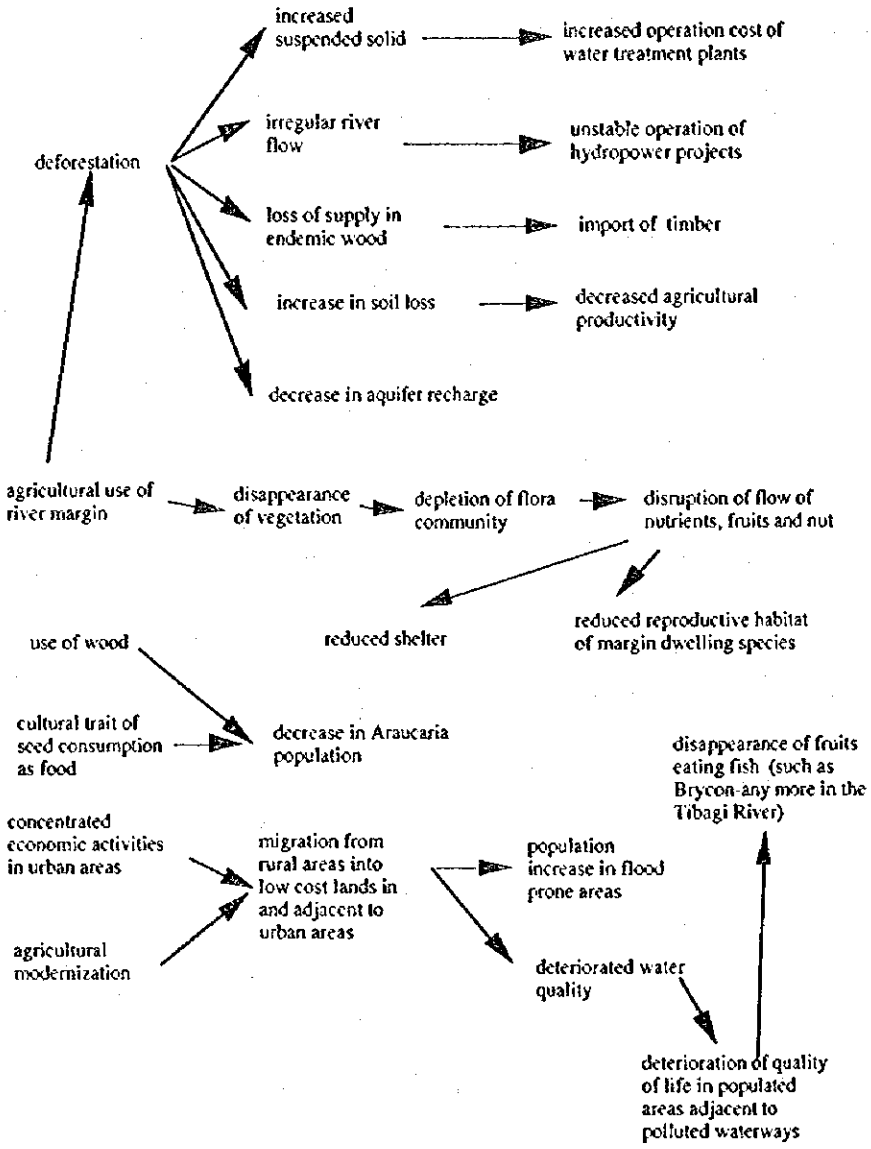

Figure-4.2 Ecological Problems (1)

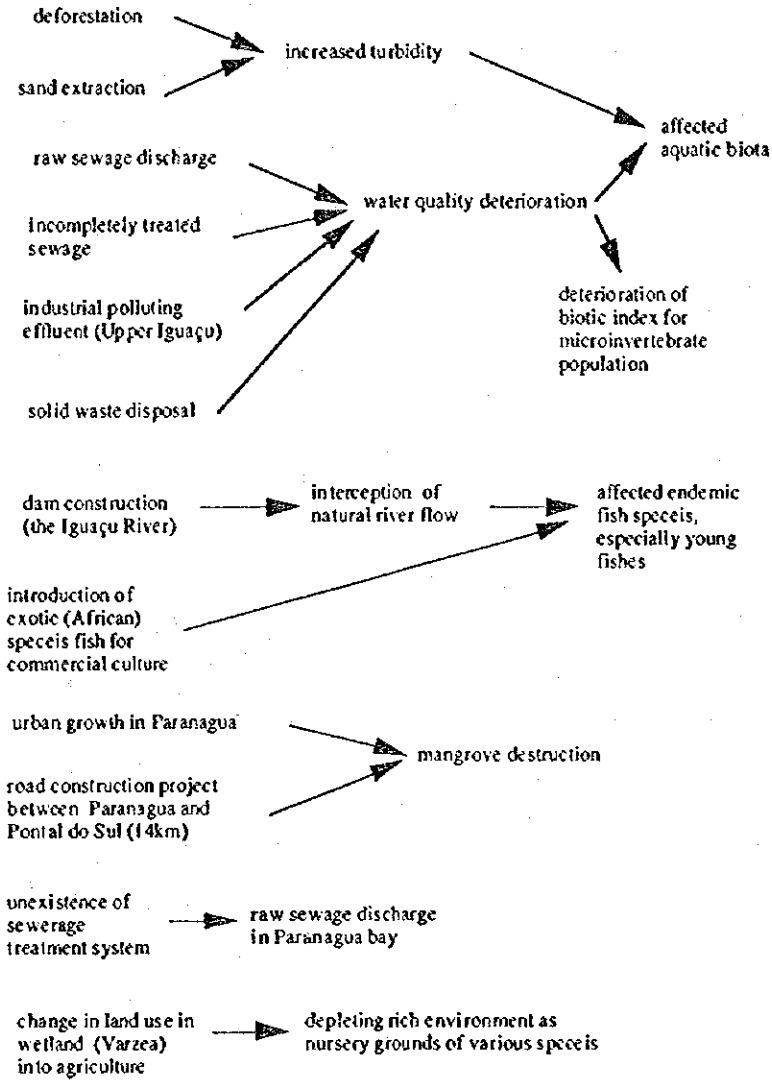

Figure-4.3 Ecological Problems (2)

The following problems are also pointed out throughout the Study.

* Lowered surface water level occurs in some places near Curitiba caused by excessive groundwater abstraction along small streams.
* Location of solid waste dumping site affects quality of groundwater because of leachate therefrom.
* Countermeasures against soil erosion seem not to be planned based on the data and analysis of conditions

4.3 Identified Institutional Problems

Problems identified throughout the Study, are followed-up by detail studies in chapters of relevant sectors. Major institutional problems and their cause-effect relations can be summarized as follows:

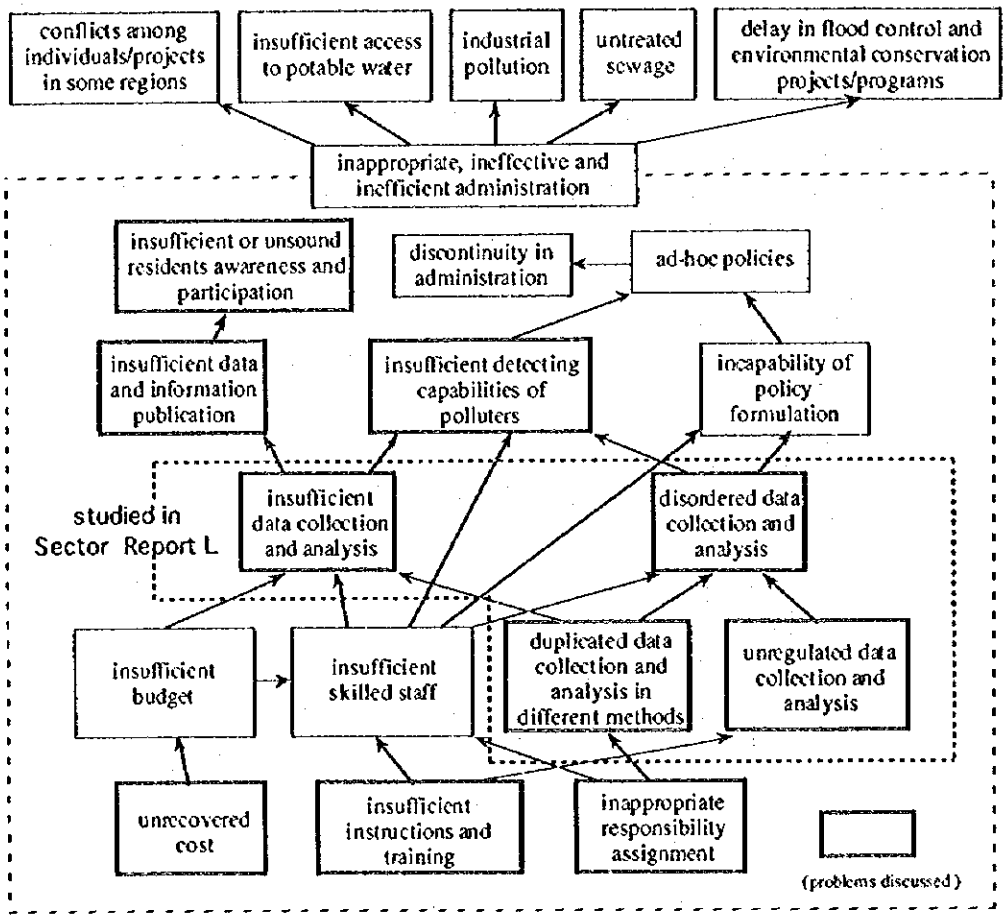

Figure-4.4 Institutional Problems and their Cause-Effect Relations

Out of the problems listed in Figure-4.4, those related to monitoring and database systems are mainly discussed in Sector Report L. Other institutional problems are discussed to formulate remedial programs, *except* those where reference to principles or models obtained or extracted from experiences and practices of other countries might not contribute to the solution.

4.4 Institutional Responsibility corresponding to the Future Needs

If water is abundant enough to meet all demands of every user, and to dilute polluting effluent or to wash away polluting substances, water environment management is not necessary to be integrated. The management is just require appropriateness, effectiveness and efficiency for development and conservation of water resources in each management sector.

Population growth, accompanied by agricultural and industrial development, boosts water demands for the production. Agricultural and industrial expansion will lead to increase in polluting loads from their production process as well, reducing available quality water. Raised living standards increase recreational and environmental demands. The water environment management will incur more costs. In order to meet those demands with limited budget, water environment management requires much more efficiency. The water environment management at this stage should be integrated in inter-related modern society, in order to achieve optimal use of limited water resources and efficient resources conservation. Responsibilities for water environment administration will largely grow corresponding to socio-economic development.

Generally, the State of Paraná has affluent water resource to be exploited. Study on socio-economic framework and consequent studies on water demands in each sector, however, reveal that in some area water demands will be congested. Allocation among relevant sectors of the limited resource will be more important in the future in some region. Development and use of the limited resource might be multifarious. Sub-management system of water environment management would be inter-connected and linkage with relevant sector will be necessary.

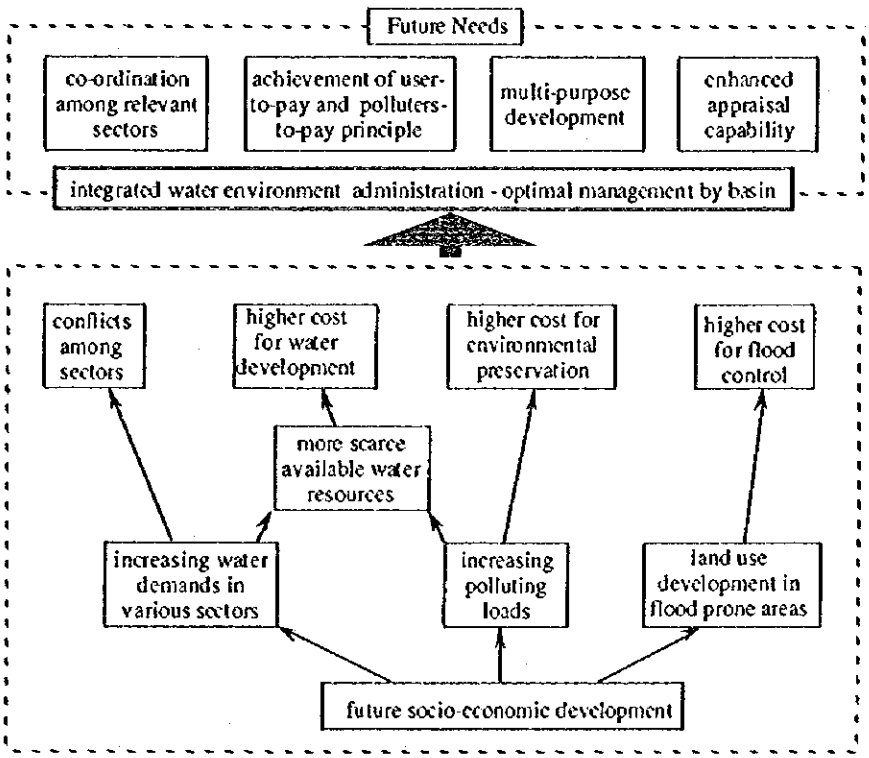

Figure-4.5 Future Needs for Integrated Water Environment Management

4.5 Phased Development of Institutional Programs

(1) Geographic Coverage

The programs under the Concept I are recommended as institutional ***strategy*** to cover the whole state, while the programs under the Concept II are proposed for the management mainly in Pilot River Basins as institutional ***master plan*** in general, where complexity of water environment management will grow to satisfy all society's demands.

(2) Time Frame

The programs under the Concept I are recommended for ***immediate*** implementation, while the programs under the Concept II are generally proposed for longer term implementation ***after*** the completion of the programs under the Concept I. Generally, he programs under the Concept I would be a prerequisite for the implementation of programs under the Concept II. Continuous upgrade of water environment management could be achieved through the introduction and implementation programs under the Concept II.