

CHAPTER 5 STRATEGY FOR INSTITUTIONAL IMPROVEMENT

5.1 Principles for Institutional Improvement

The following seven principles are set to formulate countermeasures against current problems.

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

1) Definite Assignment of Operational and Regulatory Responsibilities and Configuration of Line Responsibilities

The operational area includes the followings:

- data collection, processing and dissemination
- project planning
- design
- construction and supervision
- operation and maintenance
- extension services including education and training of residents
- recording and registration

The above functions are conducted by governmental line agencies at various levels as well as by semi- or non-governmental entities especially in operation and maintenance phases with authorization invoked by the legislative bodies.

The regulatory area constitutes

- policy and strategy formulation
- overall planning
- co-ordination with other sectors
- guiding program actions
- measuring the results of actions in conformity with specified objectives (standards)
- monitoring activities and conditions and enforcement of established laws and regulations bearing on
 - * the resource use, commonly pertaining to rights to the resource
 - * real-time allocation or operation under hydrologic events, such as droughts, floods or pollution spills
 - * appropriateness of resource use
 - * quality effects of any use
 - * facilities' configuration
 - * safety of facilities and environmental impacts
- financial aspect of water service entities

- review of cost recovery schemes, the application of charges and financing operations

For the discussion below, inspection and monitoring in environmental sector, except those for assessing the performance of operational entities, are regarded as data collection, thus in the operational area.

Separation of regulatory and operational function, when enforced appropriately, is inevitable for a proper management.

Operational function, which provides public services, employs specialized staff for engineering and administration in respect to the field of its services, and their career development usually requires substantial period. The management of an operational entity needs stability, which can be hampered with involvement of political matters.

To secure appropriateness, effectiveness and efficiency in the operational function is often difficult because the operating agencies for public services tend to monopolize the services in the field. Therefore, operational function should be under proper control by regulatory function. The regulatory function is normally led by a politician and in democratic government, finally and theoretically, by the nation.

Integrated water environment management should include the following management division:

- a) water resources assessment and allocation
- b) domestic and municipal water supply
- c) industrial water supply
- d) irrigation, livestock watering, fishery and aqua-culture
- e) hydro-power
- f) navigation
- g) waste water treatment
- h) pollution control
- i) soil erosion and sedimentation control
- j) eco-system conservation
- k) excess water management
- l) drought relief
- m) multi-purpose facility management

On the other hand, the government involvement in the administration and management, directly or indirectly, contains the following six functions;

- i) data collection and dissemination
- ii) planning
- iii) design
- iv) construction
- v) operation, maintenance, monitoring and registration
- vi) regulatory

To achieve a proper water environment management all of six functions (from i to vi) of eleven management sectors (from a to m) should work harmoniously. Deficiency or duplication in administrative endeavors should be fulfilled or avoided for effective and efficient management.

2) Enhanced Enforcement of Legislation on Water Environment Management and Administration

Legislation without enforcement means nothing or even worse than nothing. When legislation is not observed and no actions follow by the government, the people might disobey the legislation and consequently ignore the whole legislation and government administration.

The standards and regulations should be established taking account of socio-economic acceptance and industrial capability to obey. Phased target setting and enforcement can be recommendable in some cases.

3) Establishment of Proper Cost Recovery System

The principle of "beneficiary to pay" shall be applied even in public services, except some of them provided to meet basic human needs.

Regarding exploitation of water of public property, the cost of the property management shall be borne by the users. When development costs occur, the cost also borne by users according to the benefit received. Cost allocation mechanism should preferably be prescribed.

Water pricing mechanisms are formulated, internationally, based on i) cost of services, ii) ability to pay, iii) opportunity cost, iv) incremental cost or v) market driven price. Water pricing should also be analyzed as means of resource allocation as well as a constraint on public expenditure.

As for pollution control, the owners or operators of plants or facilities which discharge effluent to public streams or public sewerage systems, should conform with the regulations and standards by themselves or at their cost. In case they cannot, charges or fines should be imposed to recover the cost to conform with regulations and standards, to control the pollution, or to remedy the environment.

4) Encouragement of Public Participation

Participation of non-governmental organization or individuals is one of the element for proper water environment management, especially in advice and oversight roles. It is necessary to combine public participation into water environment management.

Beneficiaries could present some useful information on management the public utility entities, while experts and public figures could serve on technical committees of policy and oversight commissions for environmental conservation and water resource allocation.

5.2 Recommended Institutional Programs under the Concept I

<Program 1 Organizational Strengthening through Implementation of the Current Re-organization>

Current re-organization of the SEMA, the SUCEAM and the IAP will achieve well-configured responsibility allocation and recover many of the current deficiencies. However, enhancement in staff allocation and training or re-training, especially for the staff who change their duties, might be necessary, following the typical re-organization procedure as described below. Budget appropriation should follow in order for all of re-organized sections and divisions to discharge the assigned responsibilities properly.

- to prepare inventories of necessary tasks
- to identify procedures for implementation of each task
- to identify procedures to secure appropriate control of the performance of each task
- to group works in the above procedures into clusters which enables effective and efficient implementation
- to allocate the works to operational and regulatory entities
- to assess the current and required resources, such as staff and finance
- to prepare staff training program
- to identify required instructions, standards or norms
- to prepare proposal for re-organization or staff transfer and subsequent office arrangement

After the re-organization, re-organizations of the relevant regional branches should be conducted. Much effort would be necessary for elaboration of instructions and manuals on data collection, monitoring and check, inspection, and for extension services, including dissemination and education activities, and explanation to the field technicians and clerks, coupled with program formulation and its implementation of orientation, training and re-training of them.

<Program 2 Strengthened Groundwater Management>

The enforcement of the State Regulation of water use granting stipulated in 1989 based on the Water Code, has not covered all water use, especially for groundwater abstraction, whose ownership has been vested in the State since the promulgation of the Federal Constitution in 1988. As water resources potential assessment, and estimation of the current and prospective water use is a basic platform upon which appropriate water allocation and development policy can be formulated and achieved, water use granting following the Regulation should be carried out thoroughly.

Currently, the water use granting seems to face the following problems, especially that of groundwater abstraction.

- Some of the water uses are made without grants or registrations.
- Enough consideration of the existing use is impossible mainly because of the above problem

- Potential of aquifers is not often assessed before the start of borehole drilling, which means that the information on aquifer potential is not accessible at project planning or formulation of groundwater development policy.

Water allocations and water granting in practice are generally made through the following due procedure. Strengthening the enforcement of the regulation would be achieved through the enhancement of each of the procedures of the followings:

- An application is submitted to and filed in the competent agency with due format, required attachment and fee.
- The agency examines the adequateness of the application.
- The agency refers to the resource potential of the river, the basin or the aquifer to which the application belongs.
- The agency also examines the present or future water demands along the river, the basin or the aquifer.
- The agency issues a grant with or without modification or limitation to the application or denies the application.
- The grant is registered in the file with fee charging.

Governments in many countries, as in Brazil, have asserted themselves as guardians of the groundwater resource because of its increasing role in meeting the growing water demands with the limit of the surface water potential and of its high quality as a source of supply. For an equitable management of groundwater resource, the resource assessment of the potential, current use, current conditions in quality and the projection of demands and discharge into the aquifers would be necessary at first.

(1) Potential Assessment

As currently conducted in the Study, the first step of the groundwater management is the assessment of the potential, sustainable yields of clean water from aquifers. Data collection and analysis, using data of existing wells and monitoring wells, are of immediate needs. The methodology is described in the groundwater sector of the Reports.

(2) Strengthened Inspection of Water Use and Promotion of Registration

A field survey team would be necessary for the inspection, with some legal status, such as entry to the private land or building for the inspection. The team would also be responsible for the inspection of conformity to the granting, including that of surface water use. Some measures for the encouragement of registration, such as moratorium during when the registration fee would be exempted or lowered, would be necessary coupled with after the period fines should be charged for the negligence of registration or incorrect information.

(3) Enhanced Control of Groundwater Development and Use

Typical process of the groundwater development and abstraction might be as follows:

- registration and control of professional drillers
- application of borehole drilling and well construction with project plan and attached information
- filing and examination of the plan

- issuance of a permit with or without modification or limitation to the plan or denial of the project
- design and construction of the borehole or well
- application of modification in the design of borehole, pump or other facilities, in the course of design and construction if necessary
- issue a permit with or without modification or limitation to the modified design
- application for abstraction with pumping test data and quality monitoring result
- inspection of completed borehole and other facilities, and granting the abstraction with or without the order of modification or limitation to the abstraction

A certain period should be provided for the examination, thus the application should be submitted prior to the commencement of the construction. As the conditions of the aquifers are not visible, there might some cases that the potential of the aquifers can be not known exactly, and some conflicts may occur with the existing water users and the new user. It might be necessary to include some stipulation in the regulation that the grants of borehole construction or groundwater use shall not incur any responsibility of the competent entity without any assertion of the use by the authority, while the authority should make as much effort for the assessment to manage the groundwater properly and to avoid conflicts as possible.

Even though the reporting of the result of the pumping test and quality monitoring would be the responsibility of prospective user at the own cost, cancellation of the registry of the professional driller or other penalties could be imposed when negligence or fabrication of the data occurs.

(4) Monitoring of Negative Impacts

Groundwater development might involve specific negative impact, much of that can be avoided through an equitable management of the resource after a proper assessment and adequate control of abstraction. Monitoring efforts would remain necessary for ground depression, lowering water table, salinization of groundwater and impacts on surface water run-off.

(5) Expansion of Water Source Preservation Regulation to Aquifers

In the Federal Law No. 6766, State Decree 2963, and State Law No. 8935 and No. 11055, land use control for surface water source preservation is well stipulated. These laws and a decree are recommendable for groundwater source preservation as well. Generally, solid waste disposal sites, use of agrottoxics (already stated in the State Decree) and fertilizer, and infiltration of effluent from industries are known as major sources of groundwater contamination. Even though agricultural land use is designated as preferable land use at catchment areas, some types of agricultural activities with intensive use of agrottoxics or fertilizer and with contamination of soil and groundwater could be restricted in recharging areas of aquifers, when it serves or will serve as sources of public water supply.

<Program 3 Enhancement in Enforcement of Environmental Regulations>

Although the Water Quality Standards and the Effluent Standards - CONAMA Resolution No. 20, 1986, sets limits of 66 of harmful substances to human health, such as arsenic, cadmium, lead and mercury, for water quality standards and sets 29 limits of them for effluent standards, most of these are not monitored at the water quality monitoring stations operated by the IAP. Once designated for quality standards indices, these items should be monitored and controlled, otherwise industries or farmers might ignore the water quality management, and further all of government administration and legislation.

Even though there are 144 water quality monitoring stations erected by IAP, the operation of those stations seems irregular. In 1984 major items, such as BOD, are monitored at 127 stations by the competent entity at that time, such monitoring had been decreased to only at 26 stations in 1992, and to 23 stations in 1993. Nomination of the monitoring stations for seems not to be systematic for reliable historical analysis. Frequency of the monitoring also seems to be disorganized.

Current water quality administration seems to place Environmental Impact Assessment (EIA) as the major instrument of the water quality control. The scheme would render quality control possible only at the design phase, even though it would be the most efficient measure for the water quality management. Consequent reporting system coupled with enforcement of the EIA scheme would be necessary for the effective water quality management.

(1) Establishment and Enforcement of Reporting Obligation of Operation and Accidents by Water User to the Competent Entity

Legislation in many countries requires the person or the entity who discharges effluent to the public water to meet due obligations of monitoring effluent out of the actual operation and of keeping or submitting the records for the inspection to the entity in charge of the water quality management, so that the competent entity can take necessary and effective measures after the analysis of the records. Negligence of the obligation could be fined. An adequate enforcement of this regulation would make water quality control substantially more effective.

Although industries themselves may not be able to monitor their effluent according to the effluent standards, the industries can contract with laboratories, public or private, or universities in the area. A nomination of qualified institutes would be necessary by the competent entity to encourage the contracts. Listed institutes should be responsible for fair monitoring and reporting of the results through a control of the competent entity.

(2) Effluent Standards by Scale Type of Industry

Current effluent standards in the Resolution of the CONAMA, No.20, have only one set of limits for designated harmful substances, ignoring scales and types of industries or effluent treatment capability or availability of treatment technology. Even though ultimately the standards may not necessarily consider the effluent treatment technology, and can be set only taking into account of impact caused by the discharge, strict enforcement cannot be promoted without an examination of the capability or the technological availability for the treatment by the type and scale of the industry. The effluent standards can be set by type of

industry or according to the volume of the discharge.

Construction of effluent treatment plants for small scale industries would also be recommendable, especially in the case that the factories with similar process are concentrated in an area. There could be a system where for some industries the standards would be set less strict, and the industries would pay for the discharging of differences among the standards, while industries with stricter standards are subsidized for effluent treatment to meet the standards in the case that total cost could be much cheaper.

(3) Phased Enhancement of Detecting Capability of Problems and Inconformity to the Effluent and the Water Quality Standards

Detecting capability of contaminating sources is the basis for the effective control of water quality including pollution control. Counter-measures can be planned or designed only after identification of problems and the analysis of the mechanism.

Under the current conditions, phased enhancement and management and enforcement could be recommendable. Monitoring and analysis of all designated items of water quality standards in the Resolution at all monitoring station might actually incur much more costs than those currently appropriated to the competent entity (IAP). The analyses of some harmful substances require sophisticated equipment and necessitate many technicians and much cost. Even though the analysis could be outsourced, the costs might be huge.

After strict enforcement of monitoring of effluent from factories by themselves, the analysis of their report and examination on agrototoxic use and use of chemical products in the daily life by citizens or effluent from sewerage treatment facilities, as well as some experimental monitoring covering all items designated in the Resolution at all monitoring stations and examination of harmful effect caused by the discharging of the items, phased nomination of the items could be made for the continuous and intensive monitoring activities for all of 144 stations.

(4) Effluent Standards for Infiltration to the Ground.

Although conservation of the groundwater quality may require a different approach in legislation and in practice, the current effluent standards seem not to consider waste water discharging through infiltration to the ground. Effluent discharge into the ground should be prohibited, except that would not possibly include any harmful or noxious substances because once contaminated the quality of groundwater could be more hard or impossible to be recovered. In the areas without sewerage services, the sanitary conditions around the projected borehole or well should be checked upon the examination of the application.

(5) Enhanced Control of Agrototoxic Use

The Federal Law No. 7802, 1989 well covers research, development, production, packaging and labeling, storing, marketing, advertising, utilization, import, export, final destination of residue, classification, control and inspection and surveillance of toxic agricultural chemicals and similar products. Current agrototoxic use control seems to have the following major problems.

- Degree of contamination and its impact on human health or on the environment are not sufficiently monitored to elaborate effective and efficient

countermeasures.

- Since huge numbers of agrotoxic products have emerged in the market, the examination and registry can not catch up with the market changes.
- Much of contamination seems to be caused by disordered use, storing, disposal and washing devices for spraying of agricultural toxics, including use of prohibited chemicals.

Immediate activities can be concentrated on the control of agrotoxic use by farmers through extension services of the agricultural sector of the Government, such as the EMATER, supported with environmental sectors, such as the IAP. The followings could be effective or efficient.

- notification and dissemination of information with some recommendations, such as that of prohibited products, effective products with less contamination, adequate amount and timing of use against over use, proper methods of storing, disposal and cleansing of spraying devices
- promotion of coordinated use among neighboring farmers

<Program 4 Legal Arrangement for the Control of Soil, Sand and Stone Taking in River Areas>

As proposed in Sector Report H, non-structural measures are often efficient with less cost in flood control. Although, land use control is a major component of flood plain management as properly provided in the laws, control of taking soil, sand or stones in river areas should be encouraged as well. Some granting procedures are recommendable. Typical procedure might be as follows:

- application with required information (purpose of taking, location, volume of taking, time and period, methods of taking, etc.) with fee
- investigation of the effect of the taking on river run off and water quality, including sedimentation
- issuance of a permit with or without modification or limitation with fee charging, or denial
- inspection of conformity of the taking with the granted conditions

<Program 5 Cost Recovery of Water Environment Management>

Cost recovery by users' charges and charging for water is and should be discussed in dual connotation of;

- 1) charging for the use of the raw resource, i.e., paying for the privilege of diverting, storing of the natural resources,
- 2) charging for water being supplied through public utility networks.

(1) Cost Recovery of Resources Assessment and Environmental Monitoring

As stipulated in the Constitution, water is the property of the Federal Republic or the State according to the administrative attribution. Use of water, especially its commercial use including that for hydro-electric generation, can be charged as high as the value lost by specific use actually destined or applied rather than use for other purposes, known as "opportunity cost".

The function and benefits of water and water courses cover many spheres of lives, such as those in sustaining lives of the people, agricultural, fishery and industrial production, power generation, washing away waste water, running off excess water, ecosystem conservation, recreational activities, giving amenity, etc., so that the measurement of amount of benefits generated by water use would be extremely complicated. Therefore, water pricing or adoption of "users-to-pay" principle to its direct derivation or other types of use varies coupled with complexity in affordability of users to pay, in chargability, and in governments' policy on subsidies and tax collection.

At present, government organs in charge of the property management, such as water resources assessment and water quality control, suffer from insufficient budget, while fees at water use granting seem to cover only costs of examination and filing, and some parts of the resources assessment and quality monitoring activities are discharged or financed by the public utilities such as the COPEL or the SANEPAR.

As introduced in many countries, charging for water right can be made according to the volume of the granted water use. Although ideal or ultimate charging should be conducted based on the opportunity cost, current discussion could be encouraged in the light of budgetary supplement and affordability of the users to pay. Exemption could be made in the use for public water supply as given in many countries. Further discussion with full consideration of regional conditions should be promoted.

(2) Cost Recovery of Water Supply and Sanitation

Cost Recovery of Water Supply and Sanitation is discussed below in two points of view; tariff level and cost saving by leak detection. Generally, once the tariff falls under the preferable level, often by political reasons, insufficiency in operation funds occurs, causing deterioration in quality and reliability of the services, resulting in less consumers' willingness to pay, in further scarce funds, and a vicious circle follows. To escape from the vicious circle is normally a hard and long task. The tariff level should be continuously revised to cover aggregately full cost incurred for the provision of the services, after the elaboration for more efficient services, such as reduction of leakage.

(a) Continuous Revision of Tariff Tables

Currently, the service level and financial condition of the SANEPAR seem to be kept at a fair level. To meet the growing demands and to expand the services, the unit cost for the service, including investment cost, would be raised. The expansion of the services to the areas with low density, as well as the upgrading demand for the sewerage treatment level in the future will incur substantial increase in the unit cost. The tariff table should be revised continuously.

Long run marginal cost (LRMC) pricing, which charges incremental costs on the community of satisfying marginal demands, is found efficient in many counties, as currently discussed in the SANEPAR. The system contributes to equitable demand control and to optimal development plan, including investment plan, avoiding over investment corresponding to increased demands enjoyed by the community with low tariff. Since LRMC pricing is applied in many sectors of public utilities, such as electricity supply services, and the COPEL has much experience for this pricing, coordinated studies in the theories and practices as well as tariff setting policies should be promoted.

Progressive or increasing block tariff, where succeeding blocks of units of water are sold at higher and higher prices, is commonly introduced in developing countries with the following objectives:

- income re-distribution with narrow tax base (weakness in income tax collection)
- encouragement of water saving with scarce resources (water, chemicals, etc.) availability

Even though progressive block tariff structure is of less interest in developed countries, many municipalities in Japan adopt this tariff system with the two objectives:

- to reflect increased costs of the development of new water resources on the charge imposed on consumers demanding a great amount of water
- to promote the consumption reduction effect

In tariff setting based on progressive block tariff, a base line consumption and a basic charge, and progressive ratios in excess use should be examined. Both criteria vary according to the life style, income distribution structure, price elasticity of water supply services, subsidies to water supply schemes, etc.

For example, tariff tables of the Osaka City in 1965 and 1980 are shown in Table-5.1.

Table-5.1 Water Rates in Osaka

Date of Revision	1965			1980		
	m ³ /month	yen/m ³	ratio	m ³ /month	yen/m ³	ratio
Basic Charge	0 - 10	** 13 (130) *	= 1.00	0 - 10	** 34 (340)	= 1.00
Excess charge per 1 m ³	11 - 30	17	1.31	11-20	50	1.47
				21 - 30	65	1.91
	31 - 50	22	1.69	31 - 40	77	2.26
				41 - 50	117	3.44
	51 -	25	1.92	51 - 100	144	4.24
				101 - 200	182	5.35
				201 - 500	206	6.05
			501 - 1,000	225	6.62	
			1,001 -	240	7.06	

(Note) * minimum charge, ** = minimum charge / 10

(Source) Pricing of Water Service, OECD, 1987

As shown in the above table, a drastic progressive increase was introduced in 1980. However, it should be noted that the water supply in Japan is normally divided into domestic and industrial supply system, and generally in industrial supply system effect of demand control by introduction of progressive tariff table is said to be little.

In Italy, important changes in the national tariff system in 1974 and 1975. In the Water Board, responsible 65% of the country's water supply, the following had been implemented by 1979.

- tariff revenue was "adjusted to average consumptive cost"
- "political tariff" (low price) were introduced for "essential domestic consumption (6-8 m³ per month per household, 200-267 liters per household per day)
- much higher tariff in a basic and two or three excess blocks, as shown below

Table-5.2 Water Tariff in Italian Cities in 1980

Block		Rome		Turin		Naples		Trieste		Genoa	
lire per m ³	reduced rate	30	0.31	30	0.32	80	0.61	48	0.53	68	0.50
	basic rate	97	1.00	95	1.00	130	1.00	90	1.00	135	1.00
	1st excess	155	1.60	115	1.21	150	1.15	114	1.27	180	1.33
	2nd excess	310	3.20	210	2.21	280	2.15	204	2.27	315	2.33
	3rd excess	620	6.39	305	3.21	410	3.15	294	3.27	450	3.33
annual reduction in per capita consumption (1974-1978)		1.8% *		5.2%		2.8%		---		---	
* 2.5% annual reduction for domestic consumption only											

(Source) Pricing of Water Service, OECD, 1987

(b) Enhanced Leak Detection

Normally, the SANEPAR's billing system for supplied water seems to be efficient with rare errors, and tariff collection system is well facilitated, combined with proper fines for the customers with payment delay and stoppage for the customers without payment for certain months.

Ideally, all produced water is distributed to customers, and water tariff could be collected for all produced water at treatment facilities. SANEPAR's records, however, show, around 60% of the produced water is supplied to the customers, which means production cost of supplied water per cubic meter, excluding distribution cost, is as high as 1.67 times of that of produced water.

The loss throughout the distribution system might be as high as a certain equitable level, while the loss less than 25% is generally difficult to attain, requiring higher cost for recovery than the cost saved. Efforts for inspection of the leakage in distribution network should be necessary, establishing Inspection Teams for identification of leakage or stolen water and advice to the technical or administrative section for the remedial.

<Program 6 Promotion of Residents Participation through Information Publication>

Public awareness is inevitable to encourage sound residents' participation. Public awareness can be obtained through information publication, especially in the field of environmental conservation. In Japan, data collected and analyzed, and current issues, as well as government policies are published annually in the name of "White Papers" for major sectors of the government administration, such as those on environment and water resources development.

Even though the Federal Law No. 6938, 1981, titled as "National Environment Policy", provide that publication of annual "Environment Quality Report" is one of the basic instrument for environment conservation (Art. 9, X), such kind of reports are not published periodically or annually by neither of the federal nor the state institutes on water environment. Report publication should be made in order to promote sound residents' participation.

5.3 Programs under the Concept II

As the programs under the Concept II are recommended as pilot implementation in the Pilot River Basins, the programs are described in the next chapter.

CHAPTER 6 MASTER PLAN FOR WATER ENVIRONMENT MANAGEMENT IN THE PILOT RIVER BASINS

6.1 Principles to Respond Future Needs

Principles to be observed in formulation of institutional improvement programs to meet the future needs in water environment management are set as follows:

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

- 5) **Water Basin Management and Establishment of the Competent Entity**
 - **Equitable and Definite Policy Formulation on Water Allocation and Water Quality Control**
 - **Comprehensive Planning, Evaluation and Regulation**

The concept of water basin management is found efficient and effective in many countries because the form of appropriate management and administration depends heavily on the hydrological and socio-economic characteristics and mode of each basin.

In spite of highly successful experience of Tennessee Valley Authority (TVA, 1932), the jurisdictional conflicts with state governments and established state and federal line agencies have prevented the creation of other authorities in the United States. Successful experience can be summarized into two types: Strong but narrowly focused such as that operates main-stream facilities to maximize power generation or water supply; the other is a commission or committee to coordinate basin planning, operating and regulatory activities made by the political jurisdiction involved.

Water allocation policies may vary depending on the water availability and the development phase of society and economy of the county or the region where water serves as an essential element of its development. Ideally, the water resource development plan should be formulated in accordance with the long- or mid-term socio-economic development plan of the region. Human resources as well as financial resources for water development can optimally be allotted to support the achievement of socio-economic development plan of the region.

As water is essential for various sectors of the society and economy, many entities are involved for the administration and management of water environment. Projects or programs for the exploitation and the conservation are planned, executed, operated, maintained, registered and monitored by various entities. Concurrent operations will be attained under comprehensive planning or programming with the consequent synchronized implementation of the program and projects.

Consistent planning requires, first of all, appropriate information networks. The networks should include data of all relevant sector, including a database on the followings by river basin and groundwater aquifer. Assignments of the responsibilities for the collection and processing should also be clearly prescribed.

The networks should not necessarily computer based but be compatible among sub-systems and accessible to all relevant administrators, and most of them shall be open to the public. Real time retrieval will be required for the contingency management in case of droughts, floods or pollution spills.

To secure enough water for social and economic activity, both surface water and groundwater must be exploited where water demands grow near to the potential to the source of supply. Trade-off in water use of both sources will be inevitable in case of hydrological event, such as drought, or pollution spill.

6) Coordinated Administration and Management among Relevant Administrative Sectors

- Linkage of Water- and Land-use Management
- Linkage of Quantity and Quality Management
- Linkage of Surface Water and Groundwater Management

Generally a specific use of water determines the quality of return flow, hence, the potential of downstream use. There are cost trade-offs between pollution control or prevention and water supply treatment. Linkage between quantity and quality management will grow more important in the congested resource use.

7) Equitable Water Pricing

Water pricing mechanisms are formulated, internationally, based on i) cost of services, ii) ability to pay, iii) opportunity cost, iv) incremental cost or v) market driven price. Water pricing should also be analyzed as means of resource allocation as well as a constraint on public expenditure.

6.2 Master Plan for the Pilot River Basin

(1) Recommended Institutional Programs under the Concept I

The following programs, are recommendable to solve the current problems. These programs are proposed to be implemented to covering the whole State, including pilot river basins. Detail contents are given in the previous chapter.

- <Program 1 Organizational Strengthening through Implementation of the Current Re-organization>
- <Program 2 Strengthened Groundwater Management>
- <Program 3 Enhancement in the Enforcement of Environmental Regulations>
- <Program 4 Legal Arrangement for the Control of Soil, Sand and Stone Taking in River Areas>
- <Program 5 Cost Recovery of Water Environment Management>
- <Program 6 Promotion of Residents Participation through Information Publication>

(2) Recommended Institutional Programs under the Concept II

<Program 7 Introducing River Basin Management and Establishment of Competent Entities>

River basin management, a management of river basin as a unit of water resources management, has been found as an equitable and efficient approach for comprehensive water resources management in many countries including in Japan. Besides, the current constitution has the clear definition of ownership of water by river and hydraulic energy potential in all rivers, which might not accord to river basin management. Currently, a law project to establish the National Policy of Water Resources Management is argued on inter-ministerial and inter-jurisdictional base. Even though the discussion is not settled and no enactment has been in force so far, the institutional study refers, examines or evaluates as far as the information is obtained.

As situated in the Constitution, 1988, the Federal Republic has the exclusive power to legislate on waters, energy and the regime of lake or river navigation. The policy, the instruments to achieve the policy, the system and the organization of river basin management must be discussed, enacted and enforced within the legal frame of the federal administration. The participation of the State to the river basin management for preservation of its property, environmental protection, registry and control of concession of exploitation of water in its domain shall be carried out within the policy frame of the federal administration.

(1) Establishment of the Competent Entity

(a) Hydrologic Regime of the Pilot River Basins

Hydrographic characteristics of the Pilot River Basins, to be noted for organizing river basin management, can be summarized as described below:

- 1) All rivers in the Pilot River Basins, as well as most of the rivers in the State except those in the Litoranea Basin belong finally to the Paraná River Basin, and form complicated hierarchy of flow system.
- 2) Rivers in the Iguazu River Basin comprise of federal rivers, and state rivers whose water is the property of the Federal Republic and the State, respectively, while all rivers in the Tibagi River Basin belong to the State domain.

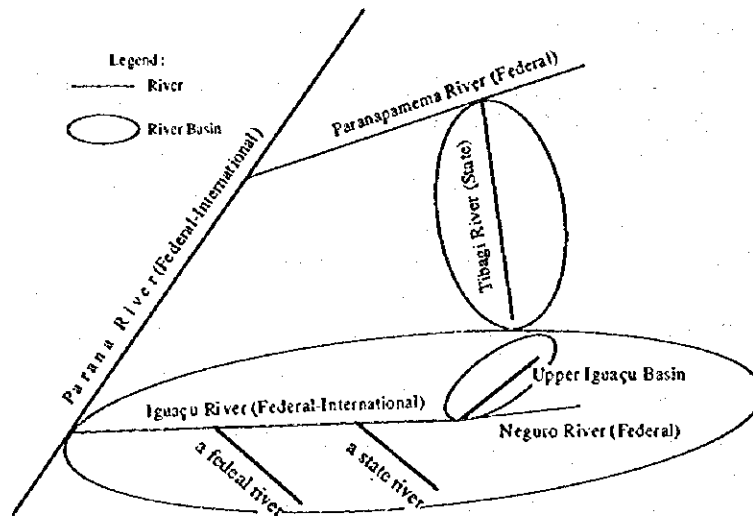


Figure-6.1 Hydrographic Regime of the Pilot River Basins

(b) Composition of the River Basin Management

With reference to and analysis of the current the discussions of river basin management, the structure shown in Table-9.1 can be recommended. The outline of the recommendation seems to be similar to the proposals expressed in the current discussion with some minor additional proposals and revisions. In the discussion at the Federal level, the Iguaçu River Basin can be classified as “Sub-basin” of the Paraná River Basin and the Tibagi River Basin can be classified sub-basin of the Paranapanema River Basin, which is a “Sub-basin” of the Paraná River Basin.

Table-6.1 Organizational Structure of the River Basin Management and Jurisdictional Management

Jurisdiction	Assessment, Allocation, Excess Water, Sedimentation	Hydro-Power	Water Quality	Overall Management	River Basin Management
Federal Level	MME DNAEE [DNOS]	ELETROBRÁS	MELA CONAMA IBAMA	Secretariat of Water Resources National Council of Water Resources Inter-sectoral Committee	Regional Committee
(Regional Level)		ELETROSUL			Basin Committee
State Level	SUCEAM	COPEL	IAP	SEMA State Environment Council Inter-sectoral Committee	Basin Agency Sub-basin Committee Sub-basin Agency

(c) Competency of the River Basin Management Entities

The competency of the river management entity, such as a Basin Committee and a Basin Agency, could be proposed as the following two options in the federative system.

<Option A>

The most common type of inter-jurisdictional basin entities, in the federative system, is a committee with functions to coordinate basin planning, operating and regulatory activities of the political jurisdictions involved, or to issue some guidelines or recommendation to be approved and followed by the jurisdictions of the Basin. These committees are governed by high officials from the affected jurisdictions in the form of board of directors, with some participation of users and other shareholders, while staff assigned by the jurisdictions conduct day-to-day work.

In this option, basin agencies are not necessary to be established. In the case that a multi-purpose facility development is found efficient for water use, conservation or flood control, some joint venture agency can be organized for planning, design, construction, operation and maintenance of the facility, with shareholdings by jurisdictions, public agencies or utility companies under the supervision of competent entities assigned by jurisdictions.

<Option B>

A Basin Committee is entitled to formulate water allocation plan, development plan, including hydro-power exploitation development plan, conservation plan, and flood control or drought relief plan comprehensively suitable for the hydrological and socio-economic conditions of the respective basin. The Basin Committee is competent to determine the fees for water use granting and exemption of the fees for some purposes of use, and cost allocation for construction operation and maintenance of water facilities. The Basin Committee is also empowered with some juridical competency to arbitrate the conflict among users or prospective users, or other tribunal affairs.

A Basin Agencies in this option provides technical support to its subordinating the Basin Committee. The Basin Agency is in charge of establishing, operating and maintaining an integrated information system, and plan, design, construct, operate multi-purpose of the Basin.

(d) Basin management in the Iguacu River Basin

Under the current legal frame, water allocation and granting of use are attributed to each level of the jurisdictions. Jurisdictional conflicts among the State governments and with the Federal Republic, which have river water or hydraulic energy potential as their properties, and among established State and Federal line divisions or agencies might prevent the creation of the river authorities or Basin Committees of Option B to undertake most government responsibilities and services. Option A can be recommendable.

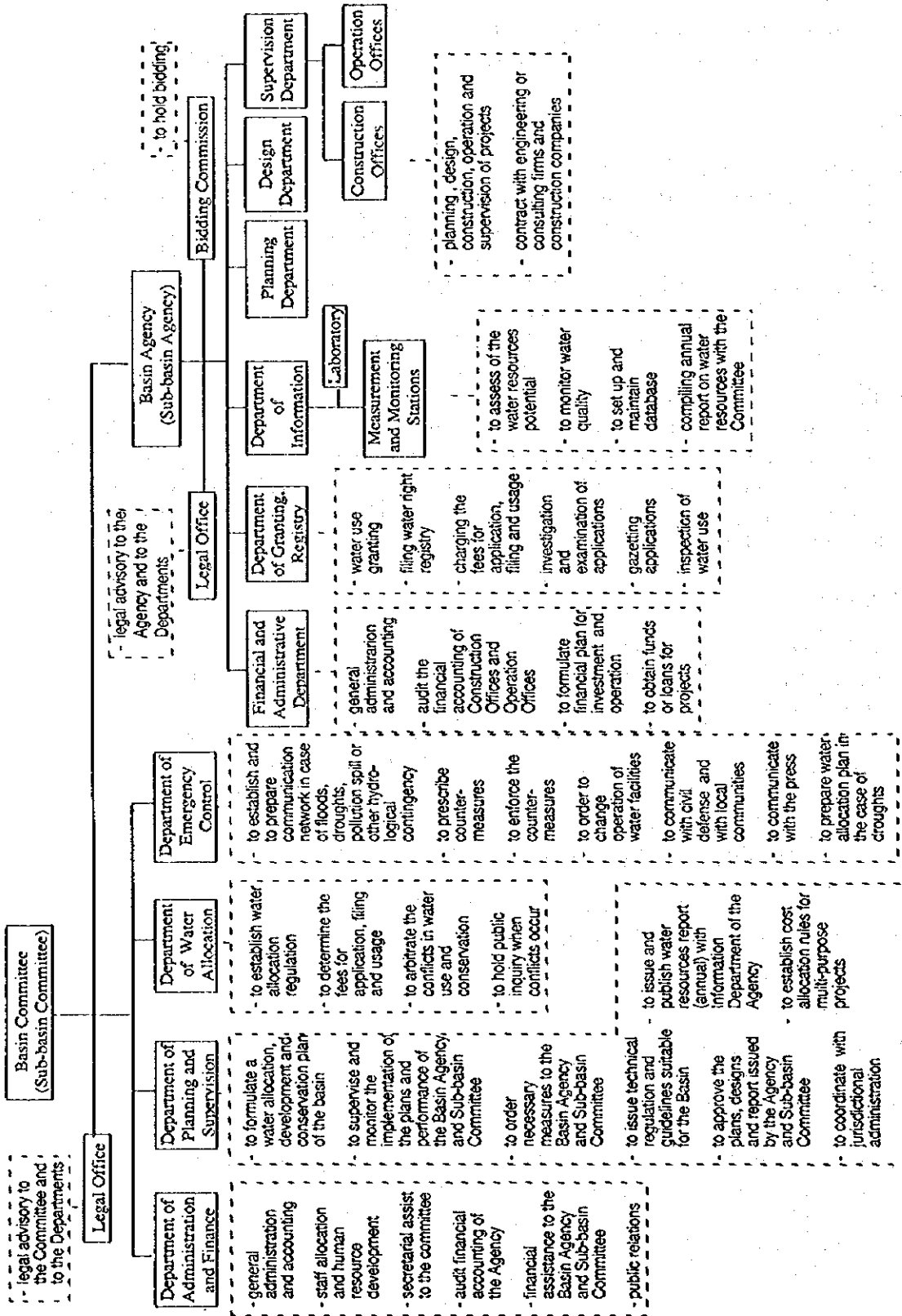


Figure-6.2 Recommended Organization Structure and Competency of Basin Management Entities (Option B)

Integrated operation of water environment management such as resource assessment, water quality monitoring, water use granting and registry, can be discharged with the State Regional Water Environment Management Center, supervised and integrated by the State Water Environment Management Center, obtaining some agreements with Federal administration and agencies, as described in Sector Report L. Some operational agency in charge of planning, design, construction, operation and maintenance of multi-purpose water facilities can be established when multi-purpose facility development is envisaged, under the regulatory activities of the jurisdictions. Operation of the facilities could be carried out by the entities assigned by the jurisdictions for each sector management, such as ELETROSUL, COPEL, SANEPAR and SUCEAM or joint-venture entities, under the control of the sector management.

However, in order to achieve the principles to respond to the future needs, or to attain optimal management of the Iguaçú River Basin, water allocation and development as well as the resources conservation should be comprehensively planned, appraised, implemented and monitored. Scope of the competency of the basin management entities should be wider and stronger than those described as Option B, especially in the Upper Iguaçú River Basin, where further urbanization, congested water use and increased pollution loads are estimated to occur. As the PROSAM is working out, consolidated river basin management in the Upper Iguaçú Basin, which could be defined as a part of the Iguaçú River Basin down to the junction with the Negro River, with strong competency would be necessary. Encouragement of agreement with the Federal Government would be highly necessary, if river basin management of Option B is not adopted in the current law project.

(e) Basin Management in the Tibagi River Basin

The Tibagi River Basin is favored rather simple jurisdictional involvement, compared to the Iguaçú River Basin. In the case that hydro-power management is combined into the river basin management, Option B could be legally feasible. Participatory management could be attained so that equitable river basin management could be achieved, supported by sufficient awareness of the riparian Municipalities on water environment management. Even though hydro-power management is attributed to the Federal Republic, the ELETROSUL and the COPEL have increased concern on environmental protection, coupled with intensive research and studies conducted by the ELETROBRÁS. Some form of river basin management emphasizing the natural resources conservation could be established, where preventive conservation can be achieved, by following the programs.

<Program 8 Promotion of Coordination for Comprehensive Management>

(1) Establishment of an "Inter-sectoral Committee"

Water resources should be used and conserved optimally to serve for the achievement of the objectives of the socio-economic development plan. Water resources allocation, development and conservation should be conducted harmoniously as measures to attain the objectives of sector development plans. Before the formulation of water environment management policy, information exchange on each sectoral development plan is necessary, so that the policy can serve an instrument of optimal socio-economic development.

An "State Inter-sectoral Committee" attended by high officials, chaired by the General Director of the State Secretariat of Planning and General Coordination (SEPL) and attended by high officials of the following State Secretariats, Public Agencies and other relevant entities, and a few "Sub-committees", such as on development policy formulation, water pricing and tariff revision, which subjects would be designated by the Committee, attended by the officials of Director level of the relevant sector, might be recommendable in the case of Option A. "Working-group" activities by middle management level or group studies might also be encouraged.

- State Secretariat of Environment
- State Secretariat of Urban Development
- State Secretariat of Industry and Commerce
- State Secretariat of Agriculture and Supply
- State Secretariat of Transport
- State Secretariat of Health
- State Secretariat of Works
- DNAEE
- SANEPAR
- COPEL
- EMATER/PR
- Mayors of the Relevant Areas
- Associations or Chambers of Industry
- Agricultural Associations or Cooperatives
- Other NGO's or Interest Groups

(2) Further Close Coordination with Land Use Management

Water environment administration and management have linkages with regional development and consequent changes in land uses. Water supply and sanitation programs should cover the municipal expansion. Development of flood prone areas would necessitate flood plain management and flood control. Water quality conservation at the sources for public supply would require land use restriction or control, as currently enforced. Hydrological potential would be a tight constraint for city planning. More close coordination with the SEDU should be promoted.

<Program 9 Establishment of Public Hearing System into the Water Use Granting Procedure>

Currently before the water use granting, gazetting procedure is due, lacking consequent procedure for notifications of objection objections to the application by prospectively affected parties and public inquiry system upon which the discretion of the public entity or the river basin committee mentioned above can be worked out. Preliminary adjustment before the granting through this procedure would prevent conflict among individuals. A typical model of the procedure would be as follows:

- gazetting an application submitted to the competent entity in the official periodical and/or regional circulation (as stipulated)

- notification to the existing water right holders who may be affected by the grant of water use
- notification to the relevant authorities which may be affected
- receiving objection with the reason and required information attached, if any, from existing water right holder or persons who may be affected, as well as from relevant authorities after a certain period prescribed
- arbitration and adjustment of the conflict
- holding public inquiry, if necessary, where any person may appear to object or to support the application, after notification to the relevant parties and gazetting of the date and place of the inquiry.
- survey or investigation, if necessary
- granting, refusing, with or without compensation payable to the existing right holder or the applicant, or revoking, varying or amending registered water right
- appealing to juridical court or to upper Committee or Council (in the case of Option B), if not agreed by the parties

<Program 10 Comprehensive Water Quality Management by River Basin>

(1) Effluent Standards by River Basin

The objective of the effluent control can be regarded as the achievement of the water quality standards of the basin to meet the environmental needs of the society along the Basin. In this sense, the effluent standards can be set by each basin, examining the total volume of effluent along the river and the estimated prospective volume of effluent, as well as the diluting and self-cleaning capacity of the basin. Some stricter effluent standards may be necessary to be drafted by the SEMA and discussed in the State Environmental Council and established through legislative process, especially for the Upper Iguaçú River Basin, following the procedure described below:

- to designate basins, parts of basins taking into account of the current and prospective concentration of population and industries, where the obedience of the current effluent standards, regulating the density of polluting substances, may not be enough to attain the water quality standards
- to set up the target of the total volume of polluting loads by sources, such as effluent from industries, sewage or sewerage treatment plants, and agricultural activities, including phased targets with target years
- to formulate plans to attain the above target by polluting source
- to implement the plans

The capability of the SUCEAM, or the Basin Agencies, for research and development of effluent treatment technology and guiding and supervising industries should be much strengthened for the implementation of the plans for the reduction of total pollution loads.

(2) Sewerage Scheme and Management by a River Basin

Conventionally, sewerage systems are constructed and managed for the improvement of sanitary conditions of municipal areas. With the expansion of the municipal areas and growing pollution load from the treatment facilities to rivers, sewerage schemes have been programmed in the viewpoint of the water quality conservation of the river. The developments of sewerage systems under a scheme by a river basin are programmed as a whole taking into account of the followings conditions. It is often the case that large scale treatment plants are more efficient for high level of treatment in order to meet the raised environmental requirements.

- hydrological characteristics of the basin
- water quality and water quality standards of the basin
- projected volume of sewage
- volume and pattern of the water use and their projection
- volume and quality of other effluent and their projection
- water facility construction plans
- treatment level and incurred cost

The program could be worked out with technical section the SUCEAM with a collaboration of the IAP under the control of the SEMA, while implementation would be discharged by the SANEPAR.

<Program 11 Enhanced Administration of Water Resources Development>

(1) Strengthened Management of Water Resources Development

Currently, major works and facilities are constructed for hydro-power generation throughout the State and for municipal water supply in the Curitiba Metropolitan Area. Management for existing facilities seems to be well conducted with intensive efforts by the sector entities including those for regulatory functions.

In the future, however, major construction would be required to meet the increasing demands, and especially multi-purpose facilities would be necessary and recommendable for efficient investment and optimal use of the resources.

(a) Strengthening of Capability of Technical Appraisal and Control by the Competent Entity

Current control of water resources development by the competent regulatory entities is considerably weak, despite that the safety of large scale water works is extremely important and their development will potentially cause huge negative impacts on society. Application, appraisal, permission and control procedure should be established. Forms for the application and guidelines for the appraisal would be necessary to be prepared. Procedures and guidelines for adequate and optimal operation of the facilities and reporting of the operation to the regulatory entities, as well as command lines and warning system in accidental conditions and in hydrological events, such as extraordinary flood or severe drought, should also be elaborated. Hydro-power sector, which regulatory functions are assumed by the ELETROBRÁS, could be modeled for the preparation.

(b) Environmental Impact Assessment and Measures to be taken for Resettlement

Great deal of impacts could occur by water facility development, especially by those with reservoir development, while environmental requirements are escalating. "Plano Diretor de Meio Ambiente do Setor Elétrico, 1991/1993" could also be a good model for other sectoral water resources development and multi-purpose facility projects.

Resettlement might often damage, sometimes seriously, the living conditions of resettlers, and in some cases, of those of inhabitants who accept the resettlers near their living areas. Preparation for defining the procedure of implementation of lands acquisition and subsequent resettlement would be necessary prior to the planning of major water resource development involving the agricultural sector. Planning a resettlement scheme should be combined into the project planning. The cost of resettlement should also be included in the cost of the project.

In the programming of resettlement scheme, to assure not only proper compensation but also to guarantee future incomes (equal to or more than those of enjoyed previously by resettlers), might be the most important features. Other important issues include minimization of the social and cultural impact and encouraging resettlers to adopt the change. Socio-economic analysis of their income generation structure and the social and cultural modes of the community should precede the planning. In principle, the less distance the settlers move, the less negative social and cultural effect occurs. Resettlers' participation in the planning phase of the project could promote a smooth implementation of resettlement. The best approach for sustainable resettlement might be early participation of residents, coupled with some measure for prevention from unfair land price escalation by the involvement of land-jobber, such as price freeze at a certain time or equitable price evaluation not taking account of benefits to be developed.

(c) Examination of Compensation Discharge

A reservoir development affects on run off in down stream, which might damage the some functions of the river, such as navigability or eco-system preservation. Full use of reservoir storage and assuring compensation discharge for normal functioning of the stream would be a controversial trade off with the demand increase in quantity and quality. Compensation discharge should be tightly determined by basin by basin, taking into account of the needs and the priority among them.

(2) Cost Allocation for Construction, Operation and Maintenance

Construction of multi-purpose water facilities including flood control functions is found efficient investment corresponding to socio-economic development when and where natural flow cannot meet the demands and cost of supply increases, and valuable properties and assets located in flood prone areas. Multi-purpose facilities should be promoted to meet the requirement for increasing investment with limited financial resources.

A method of cost allocation might be necessary to be elaborated. The Japanese cost allocation, as described below, could be examined as a model for introduction. The following two are the basic principles for construction cost allocation in Japan:

- Cost of common facilities used for multiple purposes is shared by the relevant sectors.
- Facilities for a specific purpose shall be constructed at the cost of the sector (separable cost).

Cost sharing for the construction of the common facilities is calculated as follows:

- Incremental cost caused by the participation of a sector shall be born by the sector.

The remaining costs for construction of the common facilities are shared with the following calculation:

- Every sector shall never bear the cost more than the cost which is incurred for the construction of its own facilities (alternative cost) with the same benefits, nor than the value of the benefits resulted from the participation (justifiable expenditure).

The above principle shows that the participation with the cost more than the one of the two is not feasible for the sector. If the total of the less cost between the alternative cost and justifiable expenditure would be less than the total of the construction costs of common facilities, although this would rarely happen, the multi-purpose project is not feasible.

The remaining cost is shared by the following portion:

- Alternative cost and justifiable expenditure shall be calculated for each sector.
- The less cost between the two shall be selected
- The cost, the less cost minus the separable cost, shall be calculated (applied cost) for each sector.
- The remaining cost shall be borne by the portion of the applied cost of the sector to the total of the applied cost.

In case that a sector cannot receive the benefit at the commissioning of the facilities, for example the water supply sector is not necessary to intake water from the reservoir developed by the dam but definitely will be necessary within five years, the applied cost can be discounted at prescribed interest for each sector.

These calculations should be conducted by the entity in charge of the water resources management (SUCEAM under the control of SEMA), with the unified cost estimation standards. The cost allocated to each sector, such as hydro-power, water supply or irrigation, could be charged on consumers of the service through respective tariff collection system. The cost allocated for flood control purpose could be covered by the tax collection imposed on the assets of the area.

(4) Water Pricing and Charging for Optimal Water Allocation and Demand Control

Water would be transformed into an economic good when the water resources as considered as limited resources corresponding to the demand escalation. Principle of opportunity cost pricing would be recommendable to be introduced, especially in the Upper Iguazu River Basin. Opportunity cost includes the following three components.

- 1) resource use cost: the economic value of goods or service forgone by the commitment of construction and operation for the use
- 2) natural resource depletion cost in terms of quantity and quality
- 3) damage cost incurred by the use

As for resource use cost, the discussions are given above and the previous chapter. The natural resource cost might vary according to; i) volume of intake, ii) location of intake, iii) season of intake, iv) ratio of return flow v) quality of natural water and required for the use. Damage cost should be discussed as compensation. Opportunity cost pricing for natural resource depletion cost in practice might lead to charging; i) by quantity, ii) by basin, iii) by purpose of use and iv) for effluent discharge by volume and by quality. Even though actual modifications of the pricing can be made as social or industrial promotion subsidy or income re-distribution, opportunity cost should be analyzed by basin and by each type of use, and modifications should be made explicitly with statement of the reason and amount of modification in pricing drafting.

Charging for effluent discharging can be separately be discussed from damage compensation or fines against disobedience of the standards. Charging for direct discharge to the river can be promoted with the following objectives:

- to provide continuing incentives for optimal discharges
- to obtain pollution reduction and to attain water quality standards at the minimum cost, provided that pollutant is charged at the same rate in a certain zone (as discussed in the Institutional Strategy)
- to enforce "polluters-to-pay" principle

The followings are to be noted for the introduction of an effluent charging system.

- Effluent charging should be start with a low rate, with clear indication of the amount and timing of rate increases.
- Effluent standards should not have relation in calculation of the charge.
- Effluent charging will perform best where cooperation to achieve economies of large scale waste treatment facilities can be promoted.
- Effluent charging should emphasize regional differences.
- Effluent charging should start with simple administration, and be adjusted suitably for the local conditions of the basin.

The role of economics in water environment strategy formulation and management would grow in the following fields

- data availability
- demand projection for optimal development planning
- enhancement of economic efficiency in water allocation
- analytical methods for the selection of alternative investments
- water pricing and cost recovery of the services

Establishment of a unit or staff enhancement for the investigation and policy drafting for water pricing would be necessary in the SUCEAM, coupled with strengthened coordination with economic planning and statistics section of the Government. This unit or enhanced staff could also be responsible for regulatory functions on water supply and sanitation tariff from point of economic view as well.

CHAPTER 7 COMMENTS ON WATER LEGISLATION

7.1 Preparation of Guidelines, Instructions and Manuals

Finite stocks of freshwater resources have been coming under increasing pressure to satisfy ever-growing economic, social and environmental demands of present interdependent societies over the world. In response to this pressure, Governments virtually everywhere are substituting themselves for individual landowners as the master or simply guardians of water resources. As a result, Government-administered legislation regulating the development, use and protection of water resources has supplanted litigation of basic tort and property doctrines as primary framework of rights and obligations for all who use and manage water resources.

Enactment of such legislation involves settling issues of policy and principles on one hand, and matters of implementing detail on the other hand. The two facets of water resources legislation are complementary, yet it is often found that policies and principles fail to be enforced or implemented precisely because of the lack of necessary subsidiary legislation giving them effects. As the result, legislation laying down policies and principles of water resources development and management remain ineffective practically or fall into disuse in many countries of the world.

Legislative study should be intended to contribute, bridging the gap between policy/principle and implementation of water environment management, referring actual legislative examples or legal instrument to facilitate the enforcement or operation of the policies and principles. In the State of Paraná also, the status described above is prevailing in water resources development, conservation and water use. The legal study for institutional improvement emphasizes introduction of subordinate legislation for the drafting which might be suitable for Paraná in respect to the following by the competent regulatory institutes such as SEMA.

As currently discussed, the National Water Policy would emerge in the near future. The Policy would be one of the most sophisticated water legislations in the world, introducing river basin management as a basic concept of the administration. Only coupled with preparation of subsidiary legislation, norms, guidelines, instructions and manuals, the Policy can be properly enforced. These documents should be prepared not only for staff for the administration, but also for water users and the people who have interests in water conservation. Easy to read and brief commentaries will be necessary as well, to extend its policy into community level.

Establishment of legal hierarchy is also recommendable. Fundamental laws, which stipulate the policies for administration of each sector, should be debated in a political process and approved by the legislative power of the Government. Frequent changes of the principal laws will hamper reliable administration. Subsidiary legislation for a specific affair, in a form of a decree, a regulation, a directive or an instruction follows in accordance with the needs in societies, which are changing rapidly with accelerated pace. Amendments can occur in subsidiary legislation corresponding to the socio-economic changes. Decentralized level of the Government, such as State, Municipalities or Basin Management entities, entitled by the upper level, can stipulate supplementary subsidiary legislation suitable for local conditions.

7.2 Revision of State Environmental Policy and Policy on Pollution Control

The National Environment Policy was established in 1990, while State Environment System was enacted in 1979. The State Law on industrial pollution control was stipulated in 1973, 13 years before the establishment of the CONAMA's effluent standards and two years before enactment of the Federal Law. Even though there could be few chances that these couples of laws contradict the other, the new primary legislation might introduce the new approaches that the older subsidiaries do not take account. Currently, the National Environmental Policy does not accompany the Federal or the State subsidiary legislation, having no major legal instruments for its accomplishment. The industrial development and the development of environmental science and technology might have necessitated the creation of the Federal and State Pollution Control Policy stipulated in legislation in the frame formulated in the National Environmental Policy.

7.3 Comments on Ecological ICMS

The Ecological ICMS is a unique approach or challenge coupled with the land use restriction in catchment areas of sources of public water supply. However, detail examination reveals some necessity for the revision or modification. The following discussions are made through limiting the focus on the water sources protection. The following discussions do not cover the environmental conservation units, which is the other facet of the legislation.

(1) Who Pay the Cost in the Ecological ICMS ?

The Ecological ICMS is a scheme for budgetary transfer, funded with a part of ICMS collected by the State Government. The tax payer of ICMS pays the cost. Since industries and commercial establishments can reflect the tax to their prices, the consumers of commodities or services pay the cost for funding Ecological ICMS.

(2) Who are the Beneficiaries in the Ecological Legislation?

The Municipalities are direct beneficiaries funded with the scheme. Water users provided by the public water supply sourced from neighboring catchment are included in the beneficiaries. The SANEPAR may obtain benefits with well-conserved water source, reducing its investment and operation costs. The SANEPAR may reflect the benefits to its water price.

(3) Who Lose in Water Source Conservation ?

The land owners in the catchment areas might be the largest loser in water catchment preservation, restricted their use of the property. The Municipalities, which manage the catchment areas destined as water sources to neighboring urban centers, allocate their resources for the conservation and bear the cost for the management. The Municipalities may also lose in its tax collection on real estates, whose prices in the catchment areas are lowered or remained low by the restriction.

(4) Equity of the Legislation

According to the above discussion, there could be pointed out two issues:

- 1) Water users and consumers of commodities and services are not necessarily same, even though majority of them can be counted in the both groups.
- 2) The direct losers in the source conservation, such as owners of the real estates, should be compensated for the loss, to some extent.

(5) Alternative or Complementary Measures

As for the first issue, revision of water tariff in the public supply can be an alternative. Regional water pricing might be more suitable, applying the users-to-pay principle. Regional pricing may also serve as a demand control measure. In case of the introduction of regional pricing, taking water resources conservation costs into account of the pricing and transferring the conservation costs to the implementing entities of the resources conservation, some modification of the Ecological ICMS scheme and revision of the relevant laws would be necessary.

As for the second issue, some complementary measures to directly compensate the loss of landowners would be necessary in parallel to the Ecological ICMS scheme. The best measure can be land acquisition and replotting, however, the cost might be huge. Some promotion or encouragement of the industrial or commercial activities with little pollutant loads or pollution prevention would also necessary to be examined. The compensation and incentives required for the promotion could be funded with Ecological ICMS scheme and/or raised water tariff.

Literature Cited

Other than a great volume of documents provided by the counterparts, including those on legislation of water environment, the following materials are referred throughout the Study. The followings are recommendable for reference in continuous further studies by the staff of relevant authorities of Paraná.

1. Stefano Burchi, "Preparing National Regulations for Water Resources Management, Food and Agriculture Organization (FAO) of the United Nation, 1994
2. Guy Le Moigne, Ashok Subramanian, Mei Xie, Sandra Giltner, "A Guide to the Formulation of Water Resources Strategy", the World Bank, 1994
3. Harald D. Frederiksen, "Water Resources Institution", the World Bank, 1992
4. John R. Teerink, Masahiro Nakashima, "Water Allocation Rights and Pricing", the World Bank, 1993
5. "Resettlement and Development", Environment Department of the World Bank, 1994
6. "Pricing of Water Services", Organisation for Economic Co-operation and Development, 1987
7. "River Law" of Japan, Law No. 167, July 10, 1964, and its English translation, translated by the River Bureau, the Ministry of Construction
8. Mohan Munasinghe and Jeremy J. Warford, "Electricity Pricing", published for the World Bank by the Johns Hopkins University Press, 1982

9. Mohan Munasinghe, "The economics of Power System Reliability and Planning", a World Bank Research Publication, 1979

JICA