No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF HOUSING, USE OF LAND AND ENVIRONMENT
THE ORIENTAL REPUBLIC OF URUGUAY

THE PROJECT ON CAPACITY DEVELOPMENT FOR WATER QUALITY MANAGEMENT IN MONTEVIDEO AND METROPOLITAN AREA

FINAL REPORT

VOLUME 2: MAIN REPORT

JANUARY 2007

CTI Engineering International Co., Ltd.

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07-002

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The cost estimate in this study is based on the price level on March 14, 2005 and the applied foreign currency exchange rates are as stated below:

EXCHANGE RATE

US Dollar (US$) 1.00 = Uruguay Pesos ($) 25.20
Japanese Yen (¥) 1.00 = Uruguay Pesos ($) 4.17

PREFACE

In response to a request from the Government of the Oriental Republic of Uruguay, the Government of Japan decided to conduct a project on Capacity Development for Water Quality Management in Montevideo and Metropolitan Area and entrusted the study to Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Keiji Sasabe of CTI Engineering International Co., Ltd. and consists of members from CTI Engineering International Co., Ltd. to Uruguay between October 2003 and January 2007.

The team held discussions with the officials concerned of the Government of Uruguay and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Uruguay for their close cooperation extended to the team.

January 2007

Ariyuki Matsumoto
Vice President
Japan International Cooperation Agency

January 2007

Mr. Ariyuki Matsumoto
Vice President
Japan International Cooperation Agency
Tokyo, Japan

Sir:

LETTER OF TRANSMITTAL

We are pleased to submit herewith the Final Report on *the Project on Capacity Development for Water Quality Management in Montevideo and Metropolitan Area in the Oriental Republic of Uruguay.*

The study was conducted by CTI Engineering International Co., Ltd. under contracts with Japan International Cooperation Agency (JICA) during the period from October 2003 to January 2007. In conducting the study, we have paid much attention to formulate a realistic master plan of capacity development of water quality management in Montevideo and Metropolitan Area and to conduct effective trial implementation of the part of the master plan with due consideration to the present situation of Uruguay.

We wish to take this opportunity to express our sincere gratitude to the Government of Japan, particularly, JICA, the Ministry of Foreign Affairs, and other offices concerned. We also wish to express our deep appreciation to the National Directorate of Environment, Ministry of Housing, Use of Land and Environment and other authorities concerned of the Government of Uruguay for their close cooperation and assistance extended to the JICA study team during the study.

Finally, we hope that this report will contribute to the further promotion of capacity development for water quality management.

Very truly yours,

Keiji Sasabe
Leader, JICA Study Team
CTI Engineering International Co., Ltd.

LEGEND

Boundary of the Project Area
Partial Basin of the La Plata River
Whole Basin of the Santa Lucia River

Boundary of the Departments
Main Water Courses
Lakes and Lagoons
Routes
Towns

LOCATION MAP OF THE PROJECT AREA

COMPOSITION OF THE REPORT

Volume 1: Summary

Volume 2: Main Report

Volume 3: Supporting Report (CD version only)

- **Sector A Module No.1: Establishment of Policies and Strategies**
- **Sector B Module No.2: Pollution Source Management**
- **Sector C Module No.3: Ambient Water Quality Monitoring**
- **Sector D Module No.4: Dissemination, Education and Public Participation**
- **Sector E Implementation of Pilot Projects**
- **Sector F Technical Transfer**
- **Sector G Steering Committee Meetings**

Location Map

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ABBREVIATIONS

Organization, Programs and Projects

Abbreviation	:	English / *Spanish or Other Language*
ANONG	:	*Asociación Nacional de ONGs Orientadas al Desarrollo* (National Association of NGO oriented to the Development)
APRAC	:	*Asociación Pro Recuperación del Arroyo Carrasco* (Association for Carrasco Creeck Recovery)
CARU	:	*Comisión Administradora del Río Uruguay* (Administrative Commission of Uruguay River)
CIID Canada	:	*Centro Internacionnal de Investigacion para el desarrollo, Canada* (International Center of Investigation for the development, Canada)
COTAMA	:	*Comisión Técnica Asesora del Medio Ambiente* (Technical Advisory Commission on Environment)
DGRNR	:	*Dirección General de Recursos Naturales Renovables, Ministerio de Ganadería, Agricultura y Pesca* (Directorate General of Renewal Natural Resources, Ministry of Livestock, Agriculture and Fishing)
DGSA	:	*Dirección General de Servicios Agrícolas* (General Directorate of Agricultural Services)
DINAMA	:	*Dirección Nacional de Medio Ambiente* (National Directorate of Environment)
DINAMIGE	:	*Dirección Nacional de Mineralogía y Geología, Ministerio de Industria, Energía y Minas* (National Directorate of Mining and Geology, Ministry of Industry, Energy and Mining)
DINASA	:	*Dirección Nacional de Agua y Saniamiento* (National Directorate of Water and Sanitation)
DNH	:	*Dirección Nacional de Hidrografía, Ministerio de Transporte y Obras Públicas* (National Directorate of Hydrograph, Ministry of Transport and Public Works)
DNM	:	*Dirección Nacional de Meteorología, Ministerio de Defensa Nacional* (National Directorate of Meteorology, Ministry of National Defense)
DNTN	:	*Dirección Nacional deTecnología Nuclear* (National Directorate of Nuclear Technology)
ECOPLATA	:	*Apoyo a la Gestión Integrada de la Zona Costera Uruguaya del Río de la Plata* (Support to the Integrated Management of Coastal Zone of Uruguay along La Plata River)
EmCD	:	Emission Control Department, Environmental Control Division, DINAMA
EnCD	:	Environmental Control Division, DINAMA

EQED	:	Environmental Quality Evaluation Division, DINAMA
EU	:	European Union (*Unidad Europea)*
FAO	:	United Nations Food and Agriculture Organization (*Organización de las Naciones Unidas para la Alimentación y Agricultura*)
FREPLATA	:	*Protección Ambiental del Rio de la Plata y su frente marítimo* (Environmental Protection of Plata River and its front to the sea)
GAM	:	*Grupo Ambiental de Montevideo* (Environmental Group of Montevideo)
GTZ	:	*Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH* (Technical Cooperation of the Republic of Germany)
IDB	:	Inter-American Development Bank (*Banco Interamericano de Desarrollo*)
IFAD	:	International Fund for Agricultural Development (*Fondo Internacional para Desarrollo Agricola*)
IMC	:	*Intendencia Municipal de Canelones* (Municipality of Canelones)
IMF	:	*Intendencia Municipal de Florida* (Municipality of Florida)
IML	:	*Intendencia Municipal de Lavalleja* (Municipality of Lavalleja)
IMM	:	*Intendencia Municipal de Montevideo* (Municipality of Montevideo)
IMSJ	:	*Intendencia Municipal de San José* (Municipality of San José)
INAPE	:	*Instituto Nacional de Pesca* (National Fishing Institute)
JICA	:	Japan International Cooperation Agency (*Agencia de Cooperacion Internacional del Japón*)
JUNAGRA	:	*Junta Nacional de la Granja* (National Council of Farming)
LATU	:	*Laboratorio Tecnológico del Uruguay* (Technological Laboratory of Uruguay)
MDN	:	*Ministerio de Defensa Nacional* (Ministry of National Defense)
MGAP	:	*Ministerio de Ganadería, Agricultura y Pesca* (Ministry of Livestock, Agriculture and Fishery)
MRREE	:	*Ministerio de Relaciones Exteriores* (Ministry of Foreign Affairs)
MTOP	:	*Ministerio de Transporte y Obras Públicas* (Ministry of Transport and Public Works)
MVOTMA	:	*Ministerio de Vivienda, Ordenamiento Territorial y Medio Ambiente* (Ministry of Housing, Use of Land and Environment)
OPP	:	*Oficina de Planeamiento y Presupuesto, Presidencia de la República* (Office of Planning and Budget of Presidency)

OSE	:	*Administracion de Las Obras Sanitarias del Estado* (Administration of Sanitarian Works of the State)
PNUMA	:	*Programa de Naciones Unidas para el Medio Ambiente* (United Nations Environmental Program)
PRENADER	:	*Programa Recursos Naturales y Desarrollo del Riego* (Program on Natural Resources and Irrigation Development)
PROCON	:	*Programa de Control de Contaminacion* (Pollution Control Program)
RENARE	:	*Dirección Nacional de Recursos Naturales Renovables, Ministerio de Ganadería, Agricultura y Pesca* (National Directorate of Natural Renewable Resources, Ministry of Livestock, Agriculture and Fishery)
RETEMA	:	*Red Tematica Medio Ambiente* (Network on Environmental Subjects)
SOHMA	:	Servicio de Oceanografia, Hidrografia y Meteorologia de la Armada (Service of Oceanography, Hydrography and Meteorology of the Army)
UDELAR	:	*Universidad de la República* (University of Republic)
UNDP	:	United Nations Development Program *(Programa de Desarrollo de las Naciones Unidas)*
UNESCO	:	United Nations Educational, Scientific and Cultural Organization *(Organización Educacional, Cientifico y Cultural de las Naciones Unidas)*
WB	:	The World Bank *(Banco Mundial)*
WQD	:	Water Quality Department, Environmental Quality Evaluation Division, DINAMA
WWF	:	World Wildlife Fund *(Fondo Mundial de Fauna Silvestre)*

Others

BHC	:	Benzene Hexachloride *(Hexacloruro de benzeno)*
BOD	:	Biochemical Oxygen Demand *(Demanda Bioquimica de Oxigeno)*
COD	:	Chemical Oxygen Demand *(Demanda Quimica de Oxigeno)*
DDT	:	Dichloro-Diphenyl-Trichloro-ethane *(Dicloro-Difenil-Tricloro-etano)*
DO	:	Dissolved Oxygen *(Oxigeno Disuelto)*
EIA	:	Environmental Impact Assessment *(Evaluación de Impacto Ambiental)*
FY	:	Fiscal Year *(Año Fiscal)*

GC	:	Gas Chromatography *(Gas Cromatográfico)*
GDP	:	Gross Domestic Product *(Producto Interno Bruto)*
GIS	:	Geographic Information System *(Sistema de Información Geografica)*
GNI	:	Gross National Income *(Ingreso Nacional Bruto)*
GRDP	:	Gross Regional Domestic Product *(Producto Interno Regional Bruto)*
ICA	:	*Indice de Calidad de Agua* (Water Quality Index)
ISCA	:	*Indice Simplificado de Calidad de Agua* (Simplified Water Quality Index)
MIS	:	Management Information System *(Sistema de Gestión de la Información)*
NGO	:	Non-Governmental Organization *(Organización No Gubernamental)*
O&M	:	Operation and Maintenance *(Operación y Mantenimiento)*
PCM	:	Public Consultation Meeting *(Reunión de Consulta Pública)*
PCM	:	Project Cycle Management *(Manejo del Ciclo del Proyecto)*
Peso	:	*Pesos Uruguayos* (Uruguayan Pesos)
USD	:	United States Dollar *(Dolar Estadounidense)*

MEASUREMENT UNITS

(Length)

mm	:	millimeter(s)
cm	:	centimeter(s)
m	:	meter(s)
km	:	kilometer(s)

(Area)

mm^2	:	square millimeter(s)
cm^2	:	square centimeter(s)
m^2	:	square meter(s)
km^2	:	square kilometer(s)
ha	:	hectare(s)

(Weight)

g, gr	:	gram(s)
kg	:	kilogram(s)
ton	:	ton(s)

(Time)

s, sec	:	second(s)
min	:	minute(s)
h, hr	:	hour(s)
d, dy	:	day(s)
y, yr	:	year(s)

(Volume)

cm^3	:	cubic centimeter(s)
m^3	:	cubic meter(s)
l, ltr	:	liter(s)
mcm	:	million cubic meter(s)

(Speed/Velocity)

cm/s	:	centimeter per second
m/s	:	meter per second
km/h	:	kilometer per hour

CHAPTER 1. INTRODUCTION

1.1 Background of the Project

The capital of the Republic of Uruguay, the city of Montevideo, and its Metropolitan Area are a part of a major area with the other departments. This area is generally associated with rural Montevideo and San José and Canelones Departments. The Santa Lucía River Basin is the river basin that comprehends the wider Metropolitan Area integrating also Florida and Lavalleja Departments. The area of the Santa Lucía River Basin represents approximately 10% of the national territory and a population of approximately two million, over 60% of that of the whole nation, concentrates in this basin.

The Santa Lucía River Basin with an area of 13,482 km^2 is one of the six main hydrographic basins of Uruguay. The basin is very important since it is the source of drinking water to the population of the south of the country. The other five major basins in the country are: Negro River basin (68,140 km^2); Uruguay River basin (45,860 km^2); Laguna Merin basin (28,950 km^2); Plata River basin (12,780 km^2) and Atlantic Ocean basin (8,480 km^2). The Project Area covered the Santa Lucia River Basin and complementarily a minor coastal space of La Plata River Basin between creeks of Cufré (San José Department) and Pando (Canelones Department).

In the Santa Lucía River Basin, there is clean water to protect, as can be seen forward in the Executive Summary, and there are many others that are in process of deterioration. Causes of the deterioration of the aquatic environment of Metropolitan area are: increasing domestic loads, industrial discharges produced by the concentration of industries, illegal dumping of solid wastes on the urban zones, and agricultural activities with the use of fertilizers and chemicals on drinking water sources in the rural areas. Because of the changes of the conditions of the aquatic environment during the last years, the national and local governmental institutions, the companies and the civil society organizations, are beginning to do researches and contributions to the determination and implementation of measures aimed to improvement of water quality.

To face the highlighted environmental deterioration, the Government of Uruguay, with the support of the Government of Japan, decided to impulse a Project of Institutional Strengthening. On 2002, the Government of Uruguay together with the Japan International Cooperation Agency (hereinafter referred to as “JICA”), acknowledged the need to implement a project to strengthen the capacity for water quality management in the highlighted area, by agreeing formally to realize joint work between the Ministry of Housing, Use of Land and Environment (hereinafter “MVOTMA”) and JICA, on December 5, 2002. Finally, JICA selected a consulting firm, CTI Engineering International Co., Ltd. On October 2003, the first JICA technical team came to Uruguay to support the execution of the cited project. The work executed by the joint DINAMA-JICA team (with the support of other organizations) continued until December 2006.

1.2 Objectives of the Project

1.2.1 Overall Goal

Overall goal of the Project is given as follows:

River water quality in Montevideo and Metropolitan Area is improved; Public hygiene environment is improved; and, Future water pollution is prevented.

1.2.2 Project Purpose

The capacity of water quality management of DINAMA and relevant organization in Montevideo and Metropolitan Area is improved.

1.2.3 Outputs of the Project

Outputs of the Project have been assumed as follows:

- An integrated master plan for strengthening water quality management of rivers in Montevideo and Metropolitan Area is formulated;
- Technology transfer to DINAMA is conducted for the implementation of activities necessary for improvement of river water quality improvement in close collaboration with related organizations; and,
- Capacity of DINAMA and related agencies is developed paying attention to their ownership.

1.3 Subject Area of the Project

The Project Area covers the river basins located in Montevideo and Metropolitan Area consisting of the Santa Lucía River Basin and the La Plata River Basin between Arroyo Cufré and Pando.

1.4 Concept of the Integrated Master Plan on the Capacity Development for the Water Quality Management

The Integrated Master Plan targets coordinated, systematic and overall water quality management system under the collaboration of all the related organizations. Integrated Master Plan consists of realistic action plans with “who” does “what”, “when”, “how” for the concrete activities for water quality management.

The Master Plan in the present Project is not a fixed and sole one, but the one updated and renewed thorough the implementation of pilot projects and trial implementation by the Uruguayan side.

The concept of the Integrated Master Plan is as illustrate in **Figure 1.4.1**.

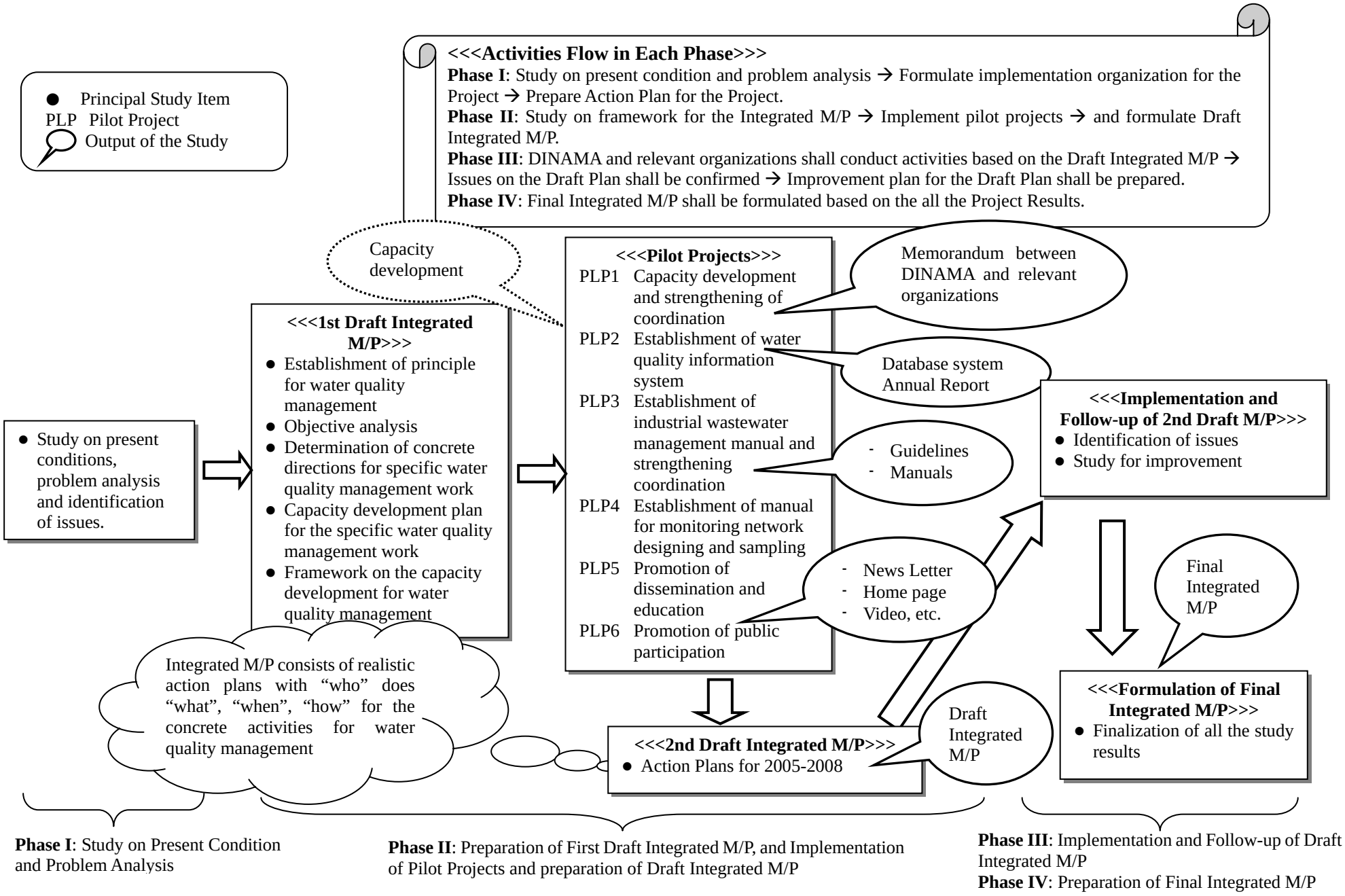
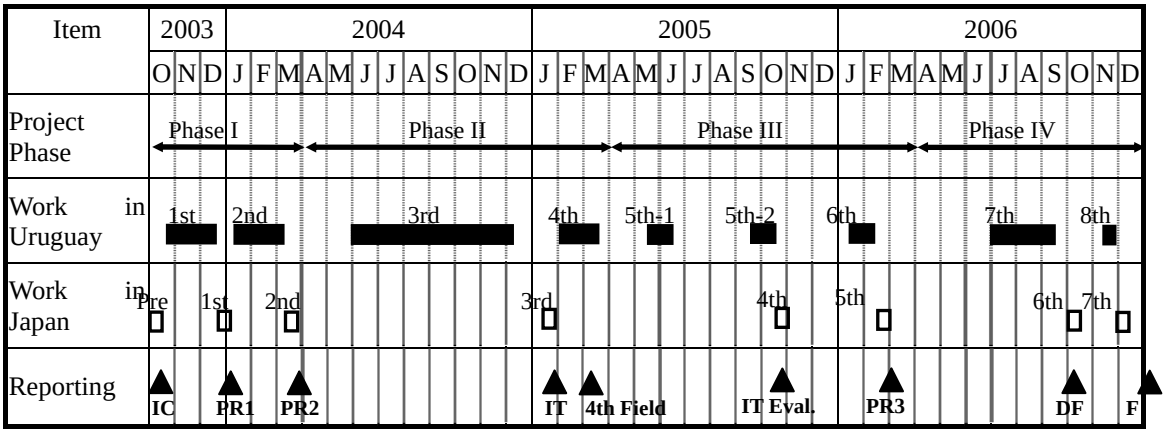


Figure 1.4.1 Concept of the Integrated Master Plan on Capacity Development for Water Quality Management

1.5 Implemented Schedule and Input

The implemented overall project schedule is given in Figure 1.5.1. The total duration of the Project is 39 month.



Legend: IC: Inception Report PR: Progress Report IT: Interim Report
4th Field: 4th Field Report IT Eval.: Interim Evaluation Report
DF: Draft Final Report F: Final Report

Phase I: Study on Present Conditions and Problem Analysis
Phase II: Preparation of Draft Integrated Master Plan and Implementation of Pilot Projects
Phase III: Implementation and Follow-up of Draft Integrated Master Plan
Phase IV: Preparation of Final Integrated Master Plan

Figure 1.5.1 Implemented Schedule of Overall Project

Members of the JICA Project Team and JICA Advisory Mission are as listed below:

Table 1.5.1 Members of JICA Project Team and JICA Advisory Team

Name	Designation
JICA Advisory Committee	
Mr. YAMADA Taizo	Chairman / Environment Management
Mr. ITO Hiroyuki Mr. OHNUMA Katsuhiro	Member (Administration for Water Quality Management)
Project Team	
Mr. SASABE Keiji	Team Leader / Capacity Development Specialist
Mr. YAJIMA Makoto Mr. ITO Tsuyoshi	Water Quality Management Systems Specialist
Mr. SHOJI Tadashi Mr. KIN Hitoshi	Water Quality Management Techniques Specialist
Mr. ISHIKAWA Kunio	Laboratory Management Specialist
Mr. KAGEYAMA Kazuyoshi	Water Quality Monitoring Specialist
Mr. TAMAGAWA Kazuhiko	Water Quality Analysis and Laboratory Specialist
Mr. TAKAHARI Tomoo	Water Pollution Sources Control Specialist
Mr. Hector Villaverde	Environmental Education Specialist
Mr. Sebastian G. Jara	Organization and Institution Specialist
Mr. ISHII Masaki Mr. YAMADA Hideyuki Mr. SHIMOKOCHI Hitoshi	Administrative Coordinator

Input to the Project is summarized as follows:

(1) Japan Side

(a) Dispatch of Experts

(b) Provision of Equipment

- Three sets of computer with two printers and a plotter
- Laboratory equipment

(c) Input for the Preparation of Education Material

- Education video
- Illustrated story (Kamishibai) for environment education

(2) Uruguay Side

(a) Establishment of Steering Committee and Technical Committee

(b) Appointment of counterparts

(c) Provision of an office space and necessary equipment

1.6 Project Implementation Organization

Figure 1.6.1 presents the organizational structure for the implementation of the Project. The Project Team discussed strategic matters for project implementation with the Steering Committee. With the Technical Committee, the Project Team exchanged technical information and technical transfer has been taken place in every aspect of the Project.

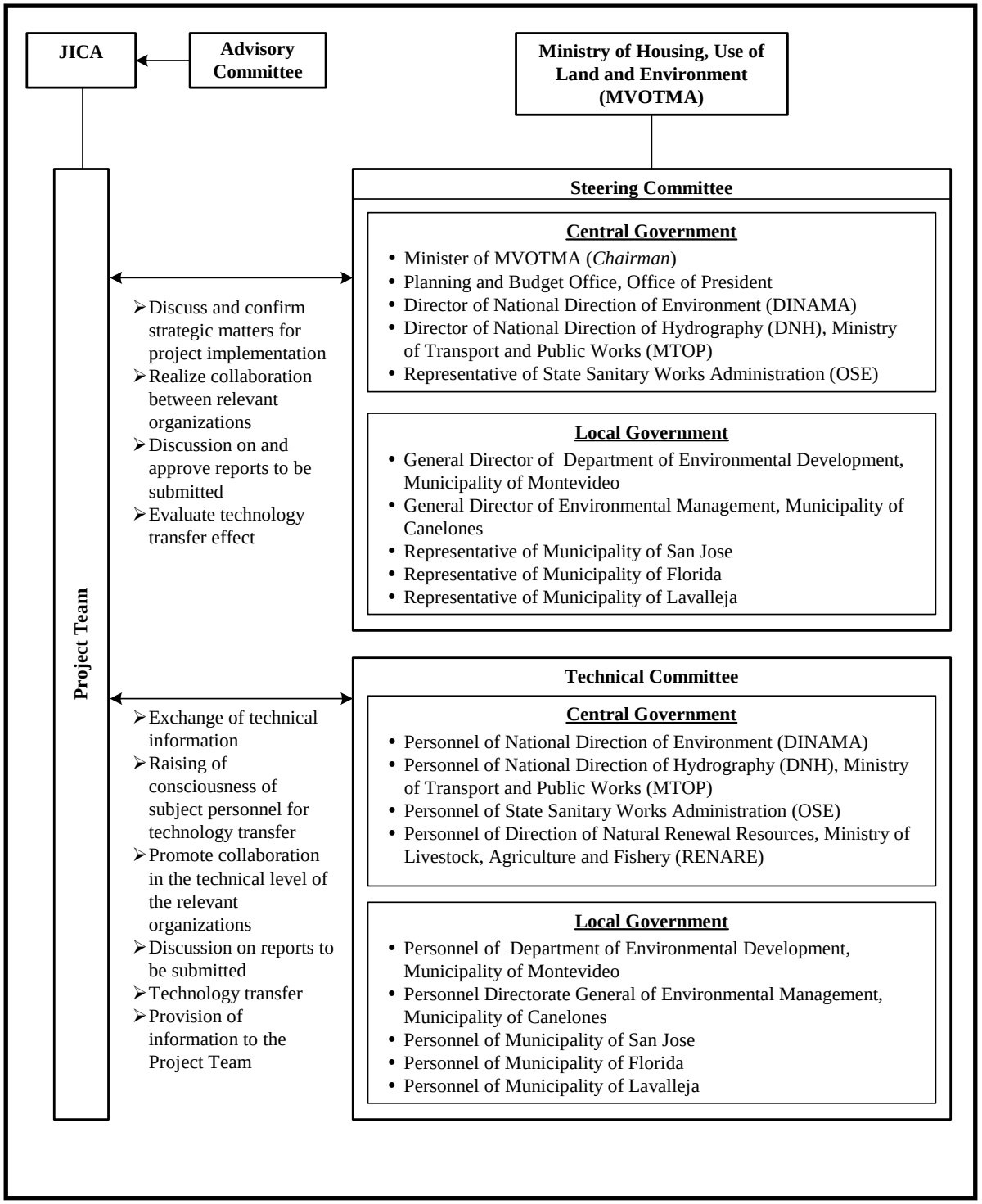


Figure 1.6.1 Project Implementation Organization

CHAPTER 2. GENERAL CONDITION OF THE PROJECT AREA AND PRESENT CONDITION OF WATER QUALITY

2.1 National Government Administration and Economy

2.1.1 Land, River Basins and Population

The Oriental Republic of Uruguay is located on the left bank of the La Plata River in South America bordering on Argentine and Brazil. It has a land area of 176,215 km^2 and is located between 30°06' – 34°58'24" South latitudes and between 53°11' – 58°26'18" West longitudes. The whole area of the country consists of hilly terrains with an average elevation from the sea level at 116.7 m and the highest peak is at Catedral Hill in the Municipality of Maldonado with an elevation at 513.66 m. National population as of the year 2004 is 3.43 million and of these, 1.4 million people live in the Municipality of Montevideo, the capital of the nation. Low birth rate and rapid aging is a characteristic of the country.

Uruguay is divided by six major river basins, namely, Río Uruguay (45,860 km^2), Río de la Plata (12,780 km^2), Oceano Atlantico (8,480 km^2), Laguna Merin (28,950 km^2), Río Negro (68,140 km^2), and Río Santa Lucía (13,482 km^2). In the water environment sector, the highest concern is given to the Santa Lucía River Basin since it accommodates more than 60% of the national population in the area around 10% of the national territory.

2.1.2 Government

Uruguay is a nation of democratic republican system declared independence in 1825. The country is governed by the three separate powers, the Executive Power, the Legislative Power, and the Juridical Power. The President of the Republic exercises the Executive Power conjointly with the respective Ministers, currently thirteen. The Legislative Power is represented by the General Assembly composed of two chambers. The country is divided into 19 local Municipalities. A Municipal Mayor and the Municipal Council govern each Municipality.

The Frente Amplio – Encuentro Progresista – Nueva Mayoría coalition won the presidential election on October 31, 2004 and marked the first time in more than 170 years that the executive power is not from either of the two traditional parties, namely, Partido Colorado and Partido Nacional. The coalition also occupied majority in both upper and lower chambers. They extended their power during the local election in May 2005 realizing mayors of the EP-FA group in eight municipalities.

2.1.3 Economy

Major industries are export-oriented agriculture and livestock, food processing, leather, and textile. Major trading countries are Brazil, Argentine and U.S.A., though the orders are different in export and import. Gross National Income (GNI) in 2004 was 13.4 billion US dollar and GDI per capita was USD 3,950. The economy has been debilitated by the four years of recession, especially affected by the recession in Argentine from 2001-2002, lower demand from Brazil and the apparition of the cow disease in 2001.

GDP of the Municipality of Montevideo shares more than half of that of the whole nation. The contribution of the metropolitan area to the national economy is high and thus the higher priority in the environmental sector should also be given.

2.1.4 Manifesto

The former government started in March 2000 puts principal issue as: decrease in government expenditure; strengthening of agriculture and livestock industry; stabilization and vitalization of the economy through expansion of export; development of MERCOSUR; administrative reform; deregulation; social development. After the economic decline in 2001, the Government emphasized priority for the promotion of national reform (including financial diminution).

The new Government started in March 2005 has embraced an agenda for change, though has also signaled continuity in many of the policies. It has given the highest priority to the measures for the socially weak group, creating Ministry for Social Development and established Social Emergency Plan (Law No.17869, May 12, 2005: Plan for Attention for Social Emergency and Program for Citizen Income). The Government puts emphasis on reforms, e.g., administrative reform (reformation of government agencies), improvement of taxation system (equalization of income distribution), improvement in legal system (simplification of procedures), and decentralization and others.

Regarding "water", a plebiscite took place together with the presidential election in October 2004 asking "Should water be managed by the state or not?" The result was Yes. Article 47of the Constitution, shown in the next paragraph, has accordingly been reformed adding a description as shown in Italic characters as follows:

Article 47: the protection of the environment is of general interest. The persons must abstain of any act that causes predation, destruction or serious pollution to the environment. The law will regulate this disposition and will prevent sanctions for the transgressors.

The water is a natural resource essential for the life. The access to the potable water and the access to the sanitation constitute fundamental human rights.

1) The national policy on water and sanitation will be based on:

- *a) The land use, conservation and protection of the environment and the restoration of the nature*
- *b) The sustainable management, with solidarity with the future generations, of the water resources and the preservation of the hydrological cycle that constitutes issues of general interest. The users and the civil society, will participate in all instances of planning, management and control of water resources; establishing the water basins as basic units.*
- *c) The establishment of priorities for water use by regions, basins or part of them, being the first priority the water supply to the populations*
- *d) The principle, by which the services of water supply and sewerage are given, must be realized prioritizing the reasons of social aspects to the economical aspects.*

All authorization, concession or permission that in any form affects these principles must left without effect.

2) *The surface water and underground water, with exception of pluvial water, integrated in the hydrological cycle, constitutes a unity resource, of general interest, that form part of the state public dominium, as hydraulic public dominium*
3) *The public services of sanitation and the public service of water supply for human consumption will be given on exclusive base and directly by institutions of the state.*
4) *The law, for the 3/5 of votes of each Chamber, could authorize the water supply, to other country, when this is facing with shortage of water or by means of solidarity.*

The Government then established an organization responsible for water, namely, National Directorate of Water and Sanitation, under the article No.327 in the Law No.17,930, December 19 2005) saying that the "Ministry of Housing, Use of the Land and the Environment" shall propose to the Executive Power the formulation of national water and sanitation policies, pursuant to the provisions of Article 47 of the Constitution of the Republic (The protection of the environemt is of general interest. People shall refrain from doing an action which may cause significant predation, destruction or pollution to the environment. Access to drinking water access to sewerage are fundamental human rights.) Article No.328 then declared an organization responsible for water, namely, National Directorate of Water and Sanitation, DINASA. DINASA has been established on January 17 2006 with the mandate to formulate national policies on water and sanitation. This new institution is starting to do activities, and its development is still very weak. It has not defined yet its relationship with water quality management, where DINAMA is remaining as playing a leading role in the field of water quality.

2.1.5 Management and Development Plans in Environment Sector

Relevant plans for management, development, and institutional improvement related to water quality are summarized as follows:

(1) DINAMA and Other Central Government

DINAMA had a program named **Program to Strengthen the Environmental Management Capacity Development (DINAMA) (ATN/SF-4735-UR)** funded by IDB for the execution by MVOTMA, and approved in October 1993. Total amount for the program in USD million is IDB 1.4 and Local 0.3 with a total at 1.7. The overall objective of this non-reimbursable technical cooperation is to support the institutional development of DINAMA, the country's principal environmental protection agency. The output of the program is not clearly reported.

Those related to water quality include the following: **Water Quality Goal Project 2000** has been conducted with the purpose to examine the water quality goals for major rivers in the country. **PROCON (Program for Contamination Control)** is underway by **CARU** since 1987 and four campaigns have been performed a year except in some exceptions. **ECOPLATA** is a program to coordinate activities for “Integrated Management of Coastal Zone of Uruguay along La Plata River”. **FREPLATA (Frente del Rio de la Plata)** commenced in 2001 to conduct proper management of common water area of Rio de la Plata. (See **Chapter 3** for more detail of ECOPLATA and FREPLATA)

A project supported by CIID Canada is **“Indicadores” DINAMA/EMS-SEMA/IDRC-CRDI Program** is for the definition of Environmental Indicators for

air, soil, water quality, bio-diversity, and social aspect, and to diffuse these data to the public through Internet. Web site (prototype) is ready.

National Implementation Plan (NIP-Uruguay) is funded by UNEP/GEF. It addresses the chemical products management in the framework of Stockholm Convention on Persistent Organic Pollutants (POP). The goal of the project is the formulation of the National Plan to improve the management of chemical products in Uruguay through prevention and control during the whole life cycle.

Project on Institutional Framework Strengthening for Pesticide Management in Uruguay is implemented with the agreement between MGAP and the Research and Productivity Council of New Brunswick (RPC) from Canada was made on November 25, 2003. The purpose is to strengthen government and private organizations involved with pesticides, in order to improve policies and practices related with the safe use of phytosanitary products as well as to develop and strengthen appropriate standards for a rational management of these substances. DGSA and JUNAGRA under MGAP are in charge of the project.

In the sector of groundwater, **Integrated Management of Groundwater Resources** is a study to improve the groundwater management for the Raigon aquifer jointly undertaken by relevant government agencies.

(2) NGOs

Activities by APRAC (Asociacion Pro-Recuperacion del Arroyo Carrasco) are the major ones (see **Chapter 3** for detail).

(3) OSE

OSE Modernization and Systems Rehabilitation Program Project (P063383) is fund by WB and approved in June 2000 for execution by OSE with an amount in USD million at 27.00 by IBRD and 21.09 by Other with a total at 48.09. Objective is to increase the efficiency, coverage and sustainability of water supply and sanitation services in Uruguay through: i) improved efficiency and effectiveness of OSE; ii) treated water pumping capacity increases in Montevideo and UFW (unaccounted-for-water) reductions in the interior; and, iii) increased sewage treatment and a new strategy for sewerage expansion.

Master plan for the Santa Lucía River Basin with the target year 2035 has been established in **National Portable Water and Sewerage Program (Stage I) (785/OC-UR)**. The program was funded by IDB and approved in November 1993 for the execution by OSE. The program amount in USD million was 45.0 by IDB and 22.2 by Local with a total at 67.2.

(4) Municipality Level

There are programs and projects for Municipalities. **Municipal Development and Management Program (1489/OC-UR)** was fund by IDB, approved in November 2003 for the execution by OPP with the amount in USD million at 60 by IDB and 15 by Local with a total at 75. The program's objective is to improve the fiscal situation

of the municipal governments outside of the metropolitan Montevideo area, upgrade the quality of municipal services and make their delivery more efficient.

The similar program is **Municipality of Montevideo Modernization Program (1425/OC-UR)**, fund by IDB and approved in September 2002 for the execution by IMM with the amount in USD million at 3.000 by IDB and 1.225 by Local with the total at 4.225. Main objective is to modernize the government of Montevideo, thereby improving the quality of the services it provides to the community.

Municipal Development Program III (993/OC-UR) is fund by IDB and approved in March 1997 for the execution by OPP with an amount in USD million at 54.6 by IDB and 23.4 by Local 23.4 with a total at 78.0. The central objective of the program is to increase the efficiency of Uruguay's municipal governments by consolidating them as decentralized governing institutions that can promote local development.

A project for the development of sewerage system in Montevideo is **Montevideo, Stage III (948/OC-UR)**, fund by IDB and approved in September 1996 with an amount in USD million 153.3 by IDB 153.3and 65.7 by Local 65.7 with a total at 219.0. The program is for the improvement of living conditions for the population in the Montevideo metropolitan area by increasing sewer service coverage and reducing industrial and household pollution in the city's bodies of water, particularly in the Pantanoso, Miguelete and Carrasco watersheds and Montevideo Bay.

Montevideo and Metropolitan Area Solid Waste Management Project is funded by IDB and started study in November 2003. While, under planning is **Metropolitan Montevideo Sanitation Program Stage IV**. The objective is to construct interceptor from the Miguelete Creek to the west until Punta Lobos, treatment and pumping plant.

2.2 Outline of the Project Area

2.2.1 Land Area and Population

The land area and population by Municipality and those in the Project Area are tabulated in **Table 2.2.1** below:

Table 2.2.1 Land Area and Population in the Project Area

Municipality	Area (km^2)		Population (person except otherwise shown)				
	Area	Project Area	1996	2002	Annual Increase Rate (%)	Density (person/ km^2)	2002 Project Area 1/
Montevideo	530	530	1,344,839	1,382,149	0.46	2,607.8	1,382,149
Canelones	4,536	3,266	443,053	513,279	2.48	113.2	490,000
San José	4,992	4,992	96,664	105,786	1.51	21.2	105,786
Florida	10,417	4,688	66,503	68,627	0.53	6.6	55,000
Lavalleja	10,016	2,168	61,085	62,493	0.38	6.2	44,000
Others		1,061					
Total	30,491	16,705	2,012,144	2,132,334	0.97	69.9	2,077,000
Nation	176,215 2/		3,163,763	3,360,868	1.01	19.1	---

Note: 1/ is estimated value by the Project. 2/ from 2003 National Statistics.

The average monthly income of houses in 2002 of the Municipalities in the Project Area varies from 8,883 Pesos in San José to 15,191 Pesos in Montevideo, while unemployment rate in the same year varies from 14.1% in San José to 22.9% in Florida.

2.2.2 River Basins, Meteorology, Hydrology and Water Use

River Basins

The Project Area is the Santa Lucía River Basin and the La Plata River Basin between the creeks of Cufré and Pando with a total area of 16,705 km^2 located between 33°41' and 34°56' South latitude and between 56°11' and 58°33' West Longitude.

Geologically, the Project Area is mainly founded by Pre-Cambrian rocks with Mesozoic to Cenozoic rock cover in the southern part. Weathering is generally advanced. Large-scale sedimentation is not observed due to topography without steep-sloped mountains and to geology without faults and volcanoes. Soil in Uruguay is classified into five groups according to the predominant types, and the Project Area is mostly covered by a group that is rather deep, heavy textured with low and medium permeability and high to medium fertility.

Meteorology and Hydrology

In Uruguay, National Directorate of Meteorology (DNM) solely undertakes climatologic observation. Data is released to the public through Internet and national statistical data book. Of the total 24 stations in the nation, there are six meteorological stations in the Project Area, namely, San José, Libertad, Prado, Florida, Carrasco, and Minas.

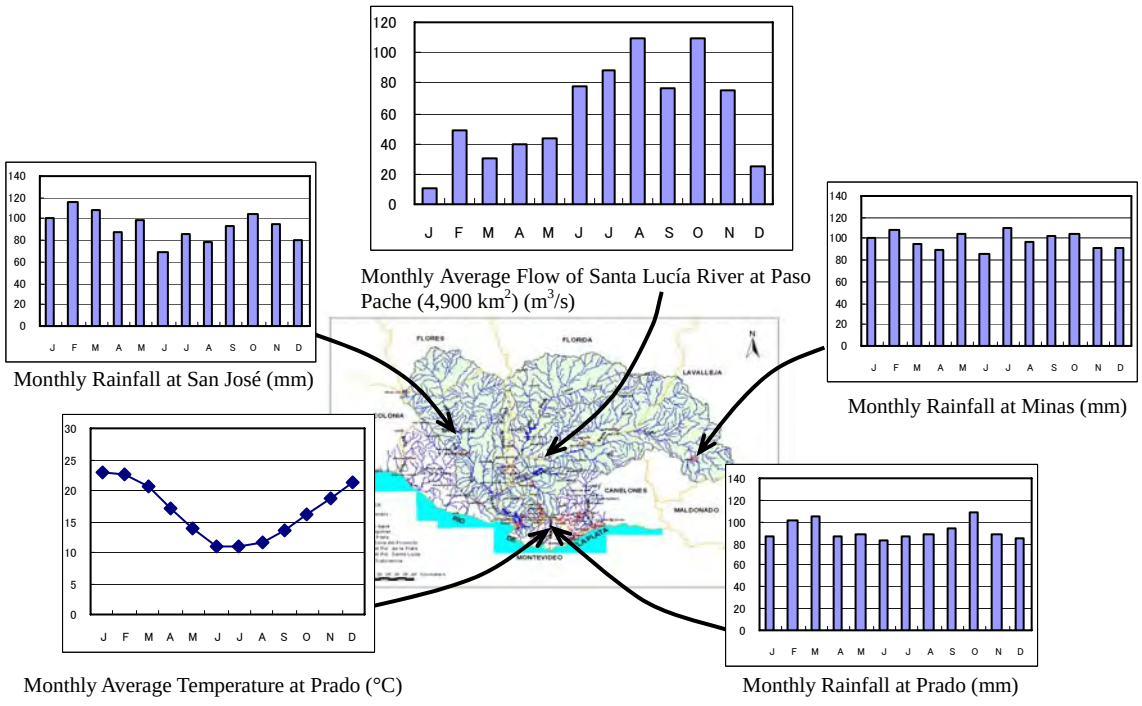


Figure 2.2.1 Meteorology and Hydrology in the Project Area

Hydrological observation for surface water has been conducted also solely by National Directorate of Hydrograph (DNH). In the Project Area, there are 28 and 8 water level/discharge gaging stations, respectively in the Santa Lucía River Basin and in the La Plata River Basin. Annual variation of temperature, rainfall, and flow of the Santa Lucía River is as shown in **Figure 2.2.1**.

The mean flow of the Santa Lucía River at Paso Pache Station (catchment area of 4,900 km^2) is estimated at 61.24 m^3/s for 14 years (1980-93). Seasonal variation of the flow at the same station is shown in **Figure 2.2.1**. Assuming the annual rainfall at 1,200 mm/year, the runoff ratio is estimated at 33%. The water resources potential of the Santa Lucía Basin is thus estimated at approximately 5.3 billion m^3/year.

River and Water Use

All water drawings and uses have been managed and controlled by DNH according to "Water Code" (Codigo de Aguas, Ley No.14859/978). Therefore, all water uses shall be reported and registered every year to DNH through the consultation by "Integrated Commission" composed of DNH, DGRNR of MGAP, and User's Representatives, as compiled into "National Inventory of Surface Water Exploitation". In the Project Area, the volume of intake-water is estimated at 8.77 m^3/s, 7.99 m^3/s from the Santa Lucía River and 0.78 m^3/s in the La Plata River Basin. The water intake for domestic water is the largest at 6.733 m^3/s (76.8%), followed by irrigation at 1.755 m^3/s (20.0%), industry at 0.226 m^3/s (2.6%), and others at 0.057 m^3/s (0.6%).

Potable water supply is managed and operated by the State Sanitary Works Administration (OSE). In the Project Area, there are two and six intake sites in the La Plata River Basin and Santa Lucía River Basin, respectively, with a total intake volume at 6.733 m^3/s, as shown in **Table 2.2.2**.

According to "Water Code", the irrigation water can be exploited and acquired by the farmers themselves. DNH may give authority for extraction and use of irrigation water to those who developed, through the consultation by Integrated Commission. In the Project Area, the volume of irrigation water intake is estimated at 1.755 m^3/s, 1.055 m^3/s in the Santa Lucía River Basin and 0.700 m^3/s in the La Plata River Basin. It is supplied to maize, fruit and vegetable. Rice cultivation, which needs more water consumption than the other agricultural products, is not practiced in the area.

Table 2.2.2 Water Intake for Domestic Use in the Project Area

Name of Site	Name of River/Creek	River Basin	Intake (m^3/s)
OSE-Pando	Pando	La Plata	0.022
OSE-Sauce	Pantanoso/Sauce/Pando	La Plata	0.008
OSE-Florida	Santa Lucía Chico	Santa Lucía	0.070
OSE-San José	San José	Santa Lucía	0.090
OSE-Santa Lucía	Santa Lucía	Santa Lucía	0.135
OSE-San Ramon	Santa Lucía	Santa Lucía	0.033
OSE-Aguas Corrientes	Santa Lucía	Santa Lucía	6.366
OSE-Fray Marcos	Santa Lucía	Santa Lucía	0.009
TOTAL			6.733

Industrial water supply is not dominant to the surface water intake in the Project Area. Only 0.226 m^3/s has been utilized for industries, which corresponds to less than 3% of all surface water intakes. Most of the industries in the area may acquire the groundwater for their uses.

Recently, over-quarrying has been conducted along the Santa Lucía River, which has brought large scouring of some channel sections and sediment deposits in the channel bed. In order to control quarrying activities, DNH has conducted investigation "National Inventory of Riverbed Materials Quarry in National Land, December 1999". In 1998, the total volume of quarry in the nation is estimated at 418,000 m^3, of these 183,000 m^3 (44%) is from the Santa Lucía River. The second largest sources are the rivers and creeks in the La Plata River Basin.

The groundwater of Raigon aquifer with a total area of 2,271 km^2 having the maximum potential in Libertad has been used for domestic, industrial and agricultural purposes, though the water is vulnerable for salinity and soil alkalinity. The groundwater of Raigon aquifer is one of the key factors for the regional development, as the study to improve the groundwater management was jointly undertaken by DNH, DINAMA, OSE, DINAMIGE, DNTN, PRENADER, DGRNR and UDELAR, namely "Integrated Management of Groundwater Resources". Pumping and utilization of groundwater are reported and registered to DNH for every well. Items of registration are well's location, code number, purpose of use, depth, and pumping discharge and volume.

2.2.3 Land Use, Vegetation, Flora and Fauna

In terms of land cover, grasslands dominate the whole Uruguay. Most of the Project Area is of Grassland (winter type), except in the northern part that is of Grassland (winter/summer type) and in the eastern part of Grassland (summer type).

The well-known flora in the country is represented by something less than 2,500 species, distributed in 811 genres (Marchesi, 1992). The prairies constitute atmospheres with the highest wealth in species; there are almost two thousands species of the total. The number of shrubs and trees is smaller. In Uruguay, 224 species of wood plants have been registered, of which something more than one hundred are trees and the rest shrubs (Lombardo, 1964).

Related to the fauna, listed are around 930 species of vertebrates, distributed in the following groups: Fish 350, Amphibians 34, Reptiles 56, Birds 426 (of which 160

species are birds–paseriformes), and 90 mammals. At present, it is considered that approximately 26 Uruguayan species of superior vertebrates have some degree of threat.

The wetland area in the west of the Municipality of Montevideo constitutes a unique ecosystem in the south of the country, when being associated to a unique native scrubland that is important to preserve. Lands next to the Santiago Vázquez village on the mouth of the San Gregorio Creek, Peral Creek and Turtle Creek are of municipal property having a land near 1,000 hectares. In June 1999 this area was designated as Municipal Natural Park. There is a forest-ranger team in charge of taking ahead the plan of handling the protected wild area.

2.3 Present Water Quality Condition in the Project Area

Present status of water quality in the Project Area is the precondition of the water quality management to be implemented in the future. This section describes current status of water quality of river and coast in the Project Area, followed by the general status for the pesticide pollution and groundwater pollution.

2.3.1 River Water Quality

Rivers in the Project Area are largely divided into regional rivers flowing through local areas in the Municipalities of Canelones, Lavalleja, Florida and San José and urban rivers in the urban areas of the Municipality of Montevideo. The former ones are represented by the Santa Lucía River and its tributaries and rivers belong to the La Plata River Basin, and the latter ones are the Pantanoso, Miguelete, Carrasco, Pando rivers, etc.

(1) Regional Rivers in the Santa Lucía River Basin

General Organic Pollution

Precise assessment of current water qualities of each regional river is difficult, since periodical and systematic ambient water quality monitoring by DINAMA has been suspended recently. Based on the water quality data measured by OSE in 1999, it is assessed that main courses of the Santa Lucía River and its tributaries are largely maintained well with BOD at 5 mg/l and less, as shown in **Figure 2.3.1**. These water qualities are almost correspondent to the value of the Class 1 specified in the environmental standard of water quality in Uruguay, which is applicable for the raw water of potable water. Therefore, the water of regional rivers in the Santa Lucía Basin is not affected significantly in terms of general organic pollutants.

In the La Plata Basin, however, most rivers appear significantly influenced by artificial activities, namely, wastewater discharged from industries, urban areas and agricultural lands. The Pando and Sauce rivers, for example, show the BOD value beyond the one specified in Class 1 of the environmental standard. Apart from main courses of regional rivers, sections of rivers passing through local urban centers, like capitals of Municipalities, show a polluting tendency. Such pollution is caused by wastewater generated in urban and industrial activities, though the degree of pollution varies depending on the locations.

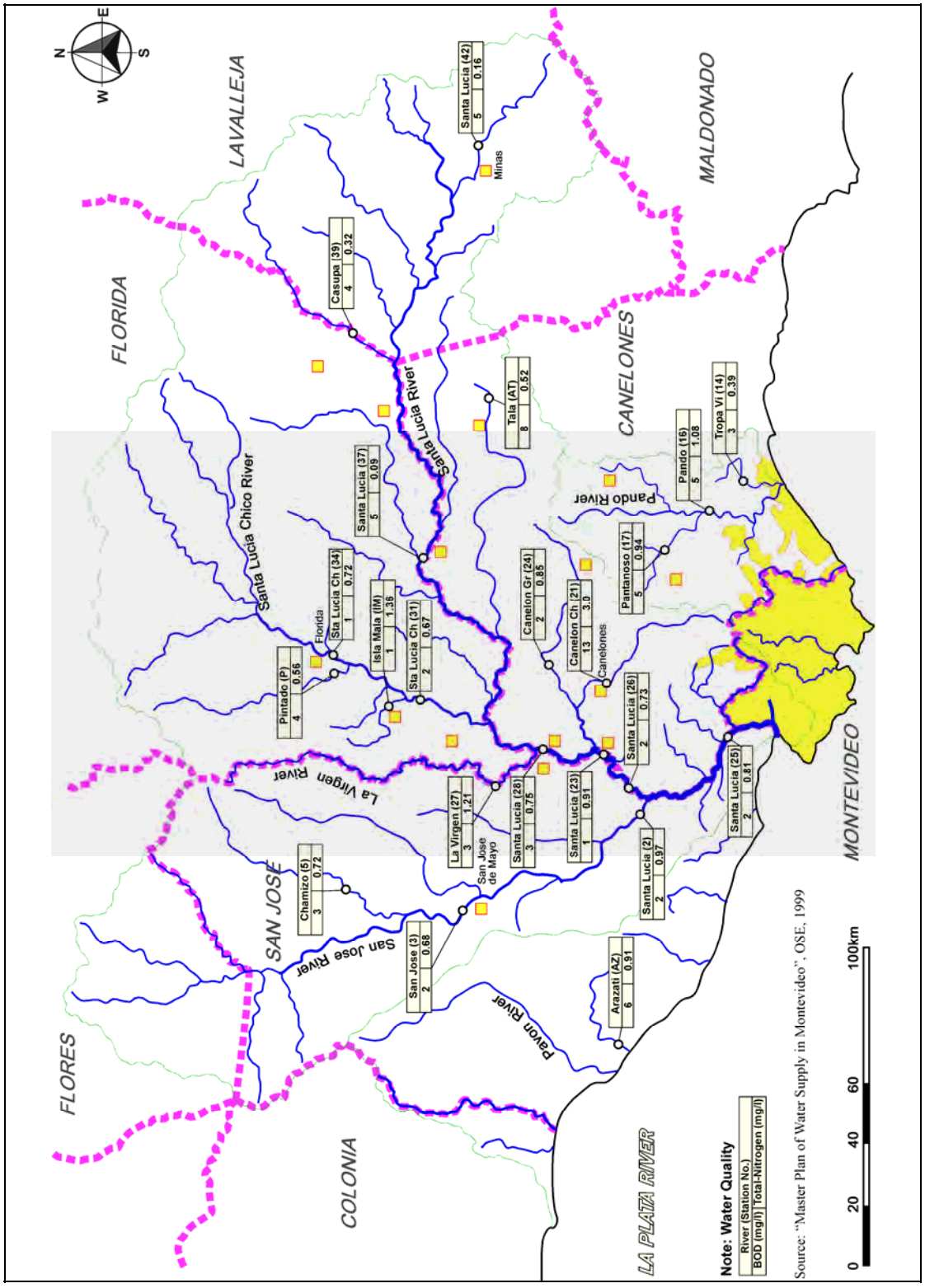


Figure 2.3.1 Water Quality of Regional Rivers

Eutrophication

The environmental standard of water quality in the Decree 253/79 prescribes that the nitrate expressed as nitrogen and phosphorus concentration should be kept under less than 10 and 0.025 mg/l, respectively. Although these limitations for nutrient constituents are applied for rivers, they are giving lax values, if river water is stored in various reservoirs for drinking water intake.

As in **Figure 2.3.1**, the upstream stretches of the Santa Lucía River in Minas and Chamizo are still maintained with lower nitrogen. The middle stream and down, however, the nitrogen concentration is increased in places. This is mainly because tributaries such as the Santa Lucía Chico, La Virgen, Canelon Grande and Canelon Chico are polluted by high-level nitrogen. The status of nitrogen in the river water implies the possibility of the eutrophication phenomena in reservoirs in these areas.

The Decree 253 does not set the water quality standard for reservoirs and lakes. **Table 2.3.1** compares them with the environmental standard of Japan for lakes for reference.

Table 2.3.1 Comparison of Nutrient Concentration in Environmental Standards

Parameters	Uruguay	For lakes in Japan
Nitrate (mg/l as N)	Less than 10	Less than 0.1 to 1.0[1)] (TN as mg/l of N)
Phosphorus (mg/l as P)	Less than 0.025	Less than 0.01 to 0.1[1)]

Note: 1) The standard values of Japan for lakes are depending on the Classes set for water utilization.

Although the causes for this higher nitrogen concentration have not been verified, it is almost certain that major sources of nitrogen are wastewater from urban area, industrial activities and agricultural lands. Fortunately, though remarkable eutrophication phenomena have not been reported as of today, it is a possible threat for raw water sources predominantly used for the potable water of the metropolitan area.

OSE measured precisely the nitrogen concentrations of the Santa Lucía Chico, at the downstream stretch from Florida City. The measurement results over the time in **Table 2.3.2** show that the increase in nitrogen concentration is distinct for the past ten years, and currently exceeding by far the values set in the environmental standard of Japan in both nitrogen and phosphorus.

Table 2.3.2 Nutrient Concentration in Paso Severino Reservoir

Locations / Nutrients	Inlet of Reservoir		Inside of Reservoir		Outlet of Reservoir		Environmental Standard of Japan for lakes
	1989	1997	1989	1997	1988	1996	
Total Nitrogen (mg/l)	0.85	5.49	1.44	2.14	1.27	1.90	0.1 to 1.0
Total Phosphorus (mg/l)	0.17	0.38	0.13	0.31	0.13	0.21	0.01 to 0.1

Source: "Master Plan of Water Supply in Montevideo", OSE, 1999.

(2) Urban Rivers

Water Quality

The Pantanoso, Miguelete and Carrasco rivers are typical urban rivers, flowing the center area of Montevideo and pouring into the Montevideo Bay or the La Plata River. All urban rivers flowing in the Municipality of Montevideo are heavily influenced by domestic wastewater, industrial wastewater and other pollution sources. This is due to heavily concentrated population and industrial activities, and insufficient mitigation against pollution effluent.

As shown in **Figure 2.3.2**, these rivers are suffering from serious pollution. The BOD exceeds by far the allowable standard 15 mg/l for the Class 4 in almost all sections, deteriorating the urban amenity in the capital city. According to the investigation made by the Municipal Government of Montevideo, untreated domestic wastewater, industrial wastewater and illegal dumping of solid waste into rivers from informal solid waste separation are mainly responsible for general organic pollution. Nevertheless, the "Environmental Report" issued by the Municipal Government states that current situation is the indication of being improved year by year as the result of recent interventions.

On the other hand, incompletely treated wastewater discharged from tanneries has been identified as the cause of heavy metal (mainly chromium) pollution. The water quality survey conducted by the Municipal Government of Montevideo indicates the fact that the total chromium concentration is beyond the standard (0.05 mg/l) at nearly half of monitoring stations. Likewise, lead concentration exceeds the standard (0.03 mg/l) at many measurement points, too.

Sediment Quality

The sediment quality measured by the Municipal Government of Montevideo is shown in **Table 2.3.3**. Although particular quality standards for evaluating sediment quality are not available in Uruguay or other countries, these results are expediently compared with the standard of Japan applied for soil pollution. According to this, the level of accumulated lead appears rather high. There is no explanation besides the industrial discharge containing heavy metals over a long period.

Table 2.3.3 Sediment Quality in Montevideo Bay

Parameters	Sampling Points				Standard of Japan[1)]
	B1	B2	B3	B4	
Chromium (mg/kg-Dry)	110	110	-	35	250 [2)]
Lead (mg/kg-Dry)	180	196	145	35	150

Source: Water Basin Monitoring Program/Final Report 2002, The Government of Montevideo, 2003

Note: 1) The standard is applied to the soil pollution.

2) The value is applied to not total chromium but hexavalent chromium.

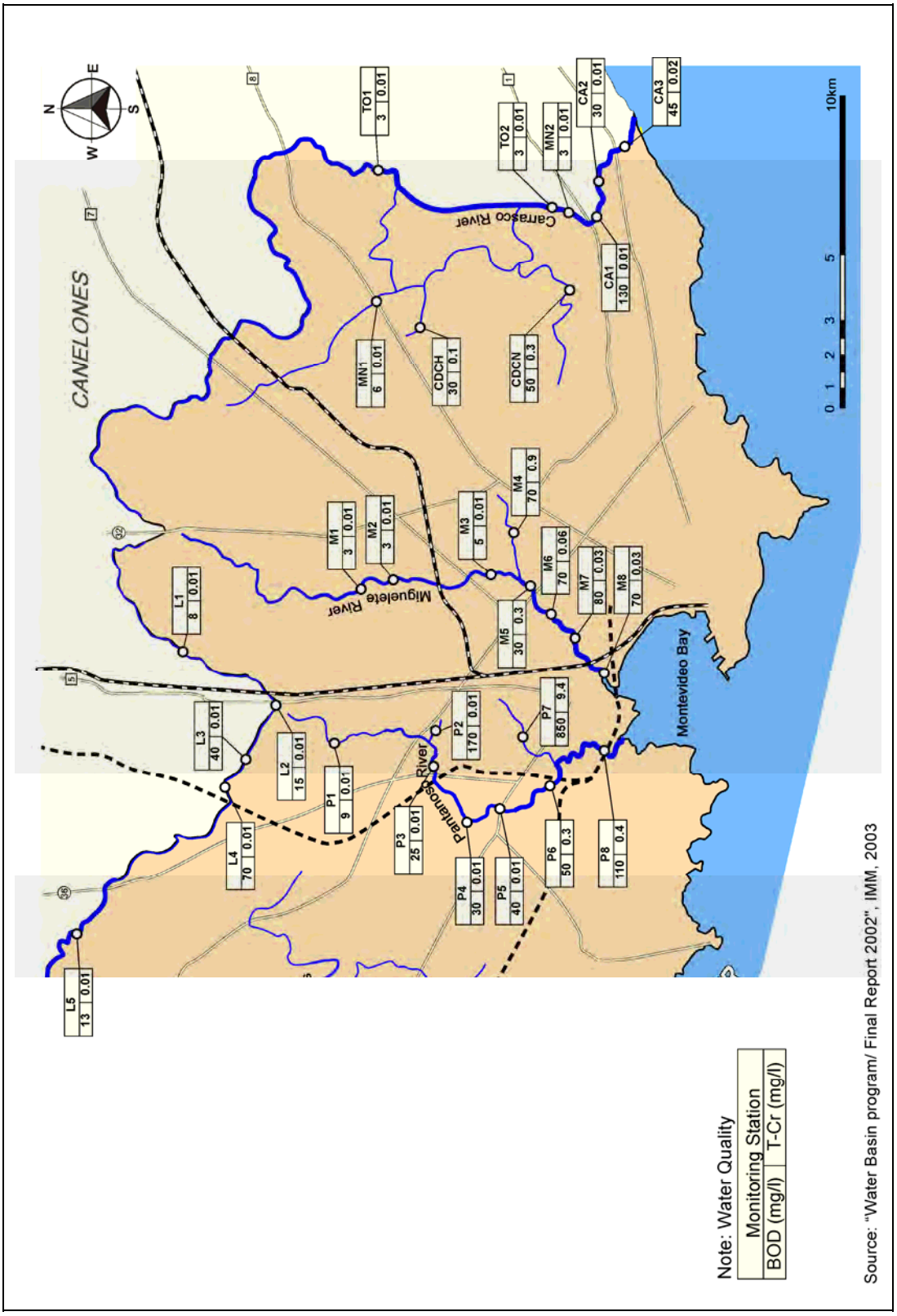


Figure 2.3.2 Water Quality of Urban Rivers

2.3.2 Coastal Water Quality

(1) Tendency of Coastal Water Quality

Beaches along the coast of the La Plata River are popular for citizens and tourists for recreation and tourism, especially in the summer season. These beaches become improper conditions with the increase of fecal coliform caused by sewage discharge from Montevideo, depending on various conditions.

Coastal water maintains suitable conditions for bathing at beaches located away from the center zone of Montevideo. However, coastal water shows the sign of pollution in the zones that are located in the estuaries of the Pantanoso, Miguelete and Carrasco rivers, indicating that total coliform is sometimes near to the environmental water quality standard, as shown in **Figure 2.3.3**.

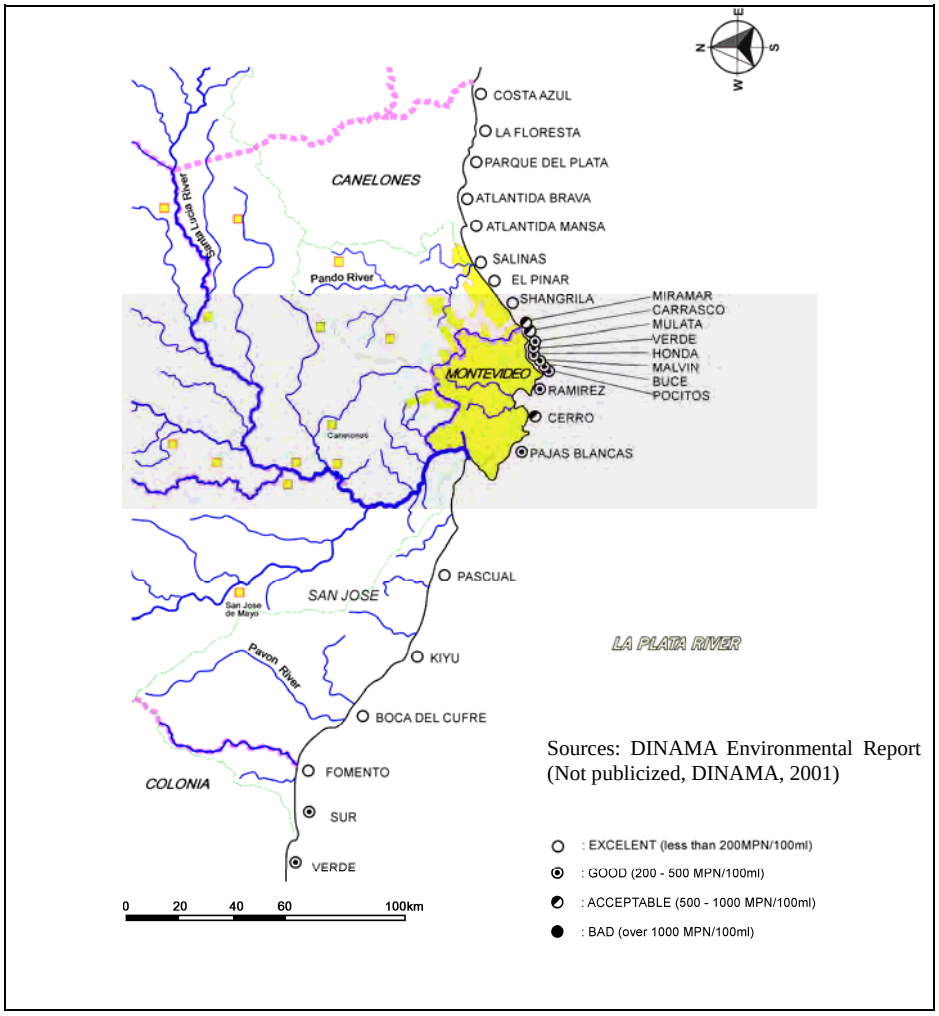


Figure 2.3.3 Coastal Water Quality

Meanwhile, it is known that the total coliform of coastal water becomes extremely high, after raining. This is partly because sewerage system of Montevideo is largely of the "combined type" that collects domestic wastewater and rainwater together with same pipes and, therefore, domestic wastewater may reach the watercourses due to the overflows of the pipelines especially in the event of heavy precipitation.

Uncollected domestic wastewater directly flowing into rivers is also another reason for this pollution.

(2) Possible Influence of Direct Sewage Discharge

Most of sewage generated in the center of Montevideo is discharged into the bottom of the La Plata River through the 2.2 km long pipe. Treatment before the discharge is only the removal of coarse substances and greases. According to the survey of the Municipal Government of Montevideo, there is no possibility that discharged sewage returns and pollutes beaches. Considering the additional installation plan of sewage discharge pipes in the future, the Government is now conducting the computer model simulation on the water quality of the La Plata River.

The La Plata River where fresh and seawater mix has received the occurrence of "green tide" and "red tide" recently, causing a hindrance to bathing several times a year. Though the pollution discharge might be responsible for, this phenomena is calling for a scientific research cooperated over the regions and countries benefited from the La Plata River.

2.3.3 Pesticide Pollution

The contamination of pesticides in the water environment has little been surveyed and clarified up to now. The survey result on the La Plata River[1], which is only available information now, indicates that the amounts of pesticides such as aldrin, dieldrin and DDT exceed established limit to aquatic life but all the values are lower for human health criterion.

Despite the production, import and usage of chlorate insecticides except dodecachlor and endosulfan were prohibited by Ministry Resolution in 1997, concerns about the pesticides pollution of water resources are voiced in Uruguay. Because the measurement and analysis require sophisticated equipment and technology, only LATU and a few other institutions are capable of this task at present. Given that the environmental standard of water quality in Uruguay lists numbers of pesticides, necessary monitoring becomes the issue from now on.

2.3.4 Groundwater Pollution

The Raigon aquifer stretching in the southern zone of the country is the most extensive and promising groundwater source in Uruguay. While the possibility of saline intrusion in a certain degree is in existence, this aquifer is used widely for irrigation water, industrial water and, also, potable water in the areas where the OSE's piped water service is not reached in the municipal area of San José. A main concern about groundwater is the possibility of pollution to be caused by the intrusion of wastewater discharged from industries and solid waste dumping but little information is available on this matter.

In other areas of the Project Area, groundwater is often used for various purposes. There are many cases that low-income people living in the periphery of urban centers tend to take living water from shallow wells. Though the groundwater contaminations caused by

[1] : "Presence of organochlorates pesticides in exterior Rio de La Plata", Maritime Front, 11, 1987.

leachate from solid waste dumping site and by the intentional infiltration of industrial wastewater treatment are concerned, the water quality observation in this regard has little been in place, yet.

2.4 Implemented Mitigation Measures for Pollution Source

In general, pollution sources may be classified into: point sources and non-point sources. Domestic wastewater (gray wastewater and night soil), industrial wastewater and other wastewater generated from fixed places belong to point pollution sources. Meanwhile, such land areas as agricultural lands, urban areas, etc., which discharge sorts of pollutants belong to non-point pollution sources.

In the Project Area, the pollution derived from non-point sources is significant, because the Project Area has vast agricultural land like livestock farm, fields, etc. Therefore, this could become major issues in water quality management. Nutrients discharged from agricultural lands appear to be one of major causes for possible eutrophication in the Santa Lucía Basin. Meanwhile, rainwater that contains pollutants from urban areas exerts the pollution with coliforms in coastal areas, as mentioned in the previous section.

In this section, current status of mitigation measures now being undertaken or being planned by various sectors in the Project Area is described.

2.4.1 Industrial Wastewater

(1) Structure of Industries

In Uruguay, all industries that discharge wastewater are obligated to get the authorization of DINAMA and the effluent quality discharged from them must be complied with the effluent standard designated in the Decree 253/979. Namely, the basic principle applied is the “Command and Control”. As of today, a total of 516 entities are authorized and registered in the whole of Uruguay, and, of these, 331 entities (about 60 %) are located in the Project Area. As shown in **Figure 2.4.1**, of the 331 industries in the Project Area, Montevideo accounts for almost 50 % and Canelones accounts for 33%. This means nearly half of industries in the whole of Uruguay concentrate in the Project Area.

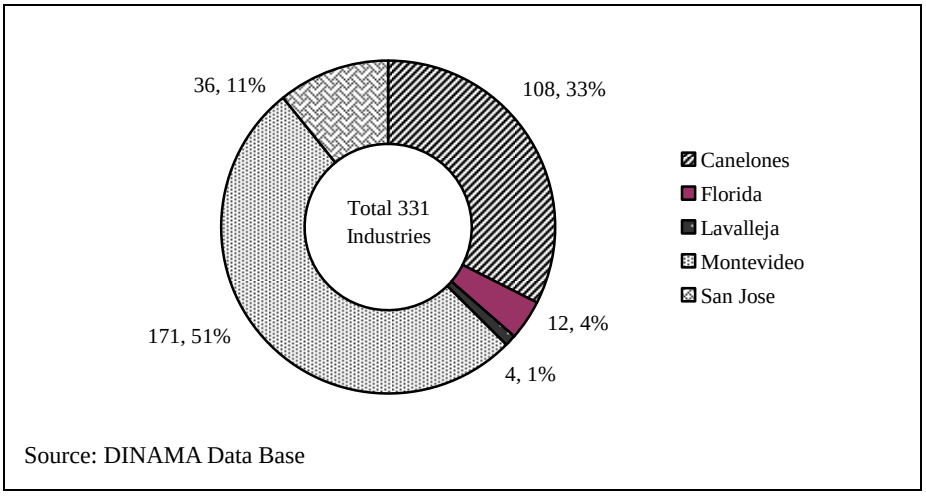


Figure 2.4.1 Distribution of Industries by Municipality

The categories of industries located in the Project Area are mainly occupied by livestock-related ones like: meat processing, leather tanning etc., which are relatively of heavy-pollution type, as shown in **Figure 2.4.2**. It should be remarked that large numbers of leather tanning are located in the Project Area, because they use hexavalent chromium, strong toxic substance for a living thing, in the tanning process.

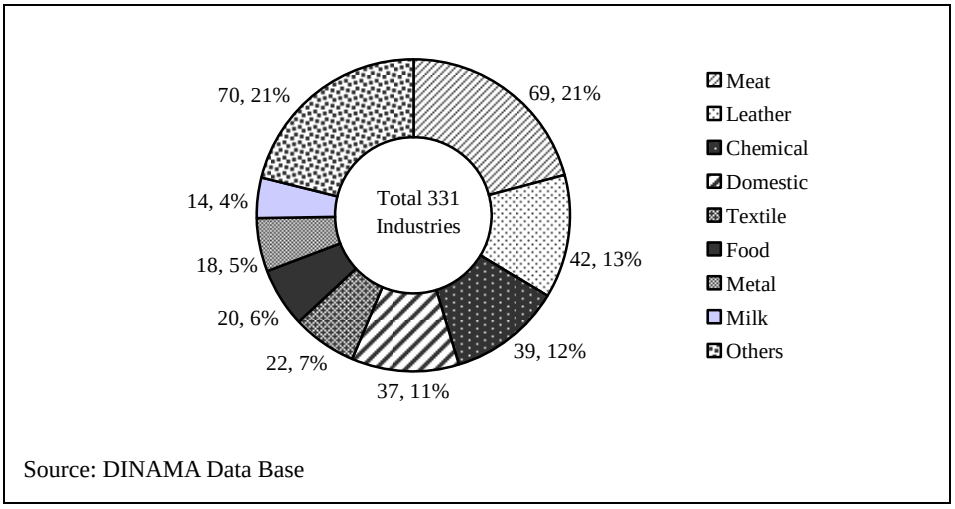


Figure 2.4.2 Industrial Categories

(2) Discharge of Industrial Wastewater

Industrial wastewater of about 100,000 m^3/day in volume and about 50,000 kg-BOD/day of pollution load is generated in the Project Area[2]. In terms of wastewater volume (m^3/day) generated in industries, domestic wastewater is the largest one as shown in **Table 2.4.1**. Meanwhile, in terms of generated BOD (before treatment, kg/day), meat and leather occupy a large portion, accounting for over 50 % of the total pollution load.

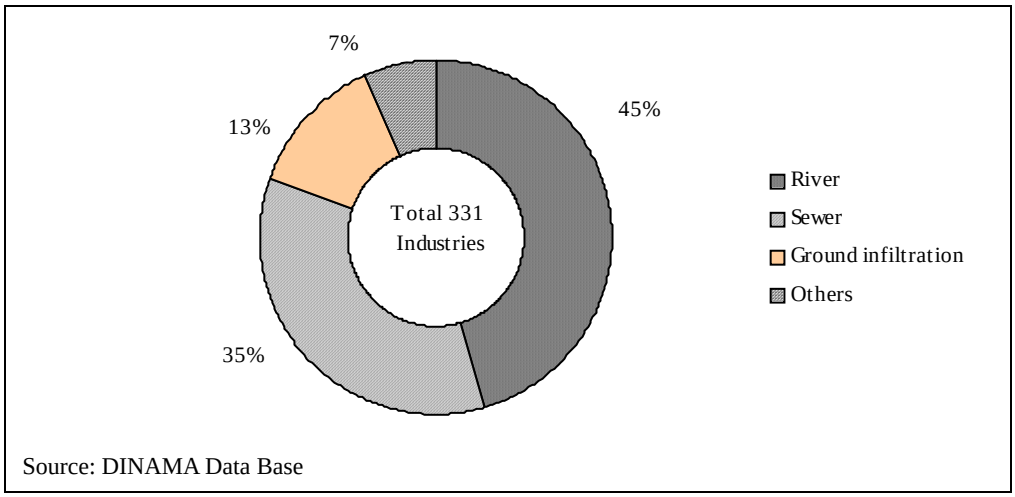
[2] : The Project Team calculated pollution load derived from industries using unit rates, based on the data of SADI.

Table 2.4.1 Largest Four Categories in Generated Wastewater and Pollution Load

Order	Wastewater Volume			Generated BOD (before treatment)		
	Industrial Categories	Volume (m^3/d)	Rate (%)	Industrial Categories	BOD (kg/d)	Rate (%)
1	Domestic	23,890	23.1	Meat	15,615	31.4
2	Fuel oil	20,072	19.4	Leather	12,397	24.9
3	Meat	19,518	18.9	Milk	4,986	10.0
4	Leather	9,537	9.2	Domestic	4,778	9.6
5	Others	30,257	29.3	Others	12,013	24.1
	Total	103,274	100.0	Total	49,789	100.0

Source: The JICA Project Team calculated based on the Industrial Inventory made by DINAMA.

Figure 2.4.3 shows the receiving bodies of wastewater discharged from industries. A total of 45 % industries discharges their wastewater into rivers, after treating to the required water quality level in the effluent standard, 35 % industries depend on sewers after necessary pre-treatment in their sites. It should be noted that ground infiltration, in which the likelihood of groundwater pollution is possible, is still permitted in Uruguay. Also to be reminded is in Montevideo where large numbers of industries are operating, discharged wastewater into sewers simply empties to the La Plata River, since the sewerage of Montevideo has no treatment plant.



Source: DINAMA Data Base

Figure 2.4.3 Discharge Destinations of Industrial Wastewater

(3) Actual Status of Industrial Wastewater Treatment

Data and information explaining actual status of industrial wastewater treatment are not available. According to the Decree 253/979, DINAMA is supposed to verify the wastewater treatment schemes to be applied in the stage of the authorization. Therefore, proper treatment facilities with technologies suitable for respective characteristics of wastewater should be provided. Periodical report is also submitted to DINAMA to secure the operation and maintenance of treatment facilities.

As for the compliance with the water quality required in the effluent standard, there is no reliable information. In this regards, the Municipal Government of Montevideo has reported the result of the water quality inspection for the effluent discharged into

rivers, sewers, etc., by industrial categories including a total of 60 entities, as shown in **Table 2.4.2**.

This table suggests that, in the BOD of wastewater from industries, more than half at 63 % fail to satisfy the effluent standard, even in Montevideo where industrial wastewater management is actively conducted. Likewise, it has been clarified that, among 60 entities, 17 entities are not complied in oil and fats, 6 entities in suspended solids, 10 entities in total chromium and 7 entities in lead. It is conceivable that there are so many cases of water quality violations in the whole of Uruguay.

Table 2.4.2 Result of Water Quality Inspection in Municipality of Montevideo

Basins	Total Numbers of Industries	Numbers belonging to Incompliant Categories in BOD	Incompliance rate in BOD (%)
Pantanoso Basin	19	15	79
Miguelete Basin	29	13	45
Carrasco Basin	1	1	100
Montevideo Bay	4	2	50
Coastal Basin	7	7	100
Total	60	38	63

Source: Data was derived from the calculation by using "Environmental Report 2002, Municipal Government of Montevideo, 2003".

2.4.2 Domestic Wastewater

The implementation of sewerage works in Uruguay except for the Municipality of Montevideo is exclusively enforced by OSE, in financing, planning, constructing and operating/maintaining. As of today, the coverage rate (at the population base) of sewerage is 48 % in the whole of Uruguay, around 80 % in the Municipality of Montevideo and 28 % in the rest of countries.

(1) Sewerage in Montevideo

Montevideo is the first city where sewerage was introduced in South America. The sewerage of the Municipality of Montevideo is undertaken by the Municipal Government of Montevideo. At present, the sewerage in Montevideo shown in **Figure 2.4.4** covers 1,100 ha (equal to 21 % of the total land area of 53,000 ha) and 1.1 million people (equal to 79.5 % of total population 1.4 million).

The sewerage of Montevideo is basically of the "combined type", which collects and transports wastewater and rainwater with the same sewers. Major portions of collected sewage are discharged into the bottom of the La Plata River through the 2.3 km long discharge pipe at Punta Carretas, after the simple treatment with grid separation and screening. As such, there is, at present, no sewage treatment plant for removing pollutants contained in sewage in Montevideo.

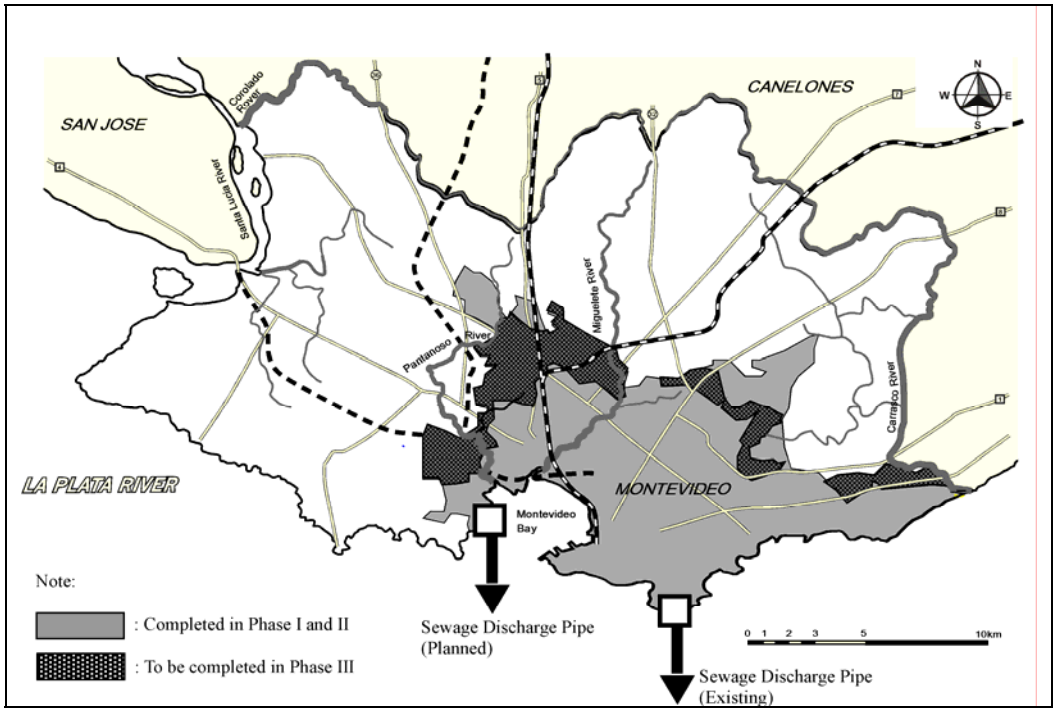


Figure 2.4.4 Sewerage Development Plan of Montevideo

Historically, the development of sewerage in Montevideo proceeded in the following phased programs:

- PSU I (Urban Sanitation Plan I): The target of this phase was to improve the water quality, especially in the eastern coastal beaches between the Carrasco River and Punta Carretas.
- PSU II: The target was to improve the water quality, especially in the western coastal beaches from Punta Carretas to Rock Fill Sarandi, and to extend the sewerage to the eastern area in Punta Rieles and La Chacarita.

As of September 2005, the sewerage development in Montevideo is entering the PSU III. This phase is ongoing with the following specific objectives:

- The expansion of sewers networks, increasing the population coverage to 88 %,
- The expansion of rainwater drainage, increasing the drainage area by 600 ha,
- The acceleration of projects for industrial wastewater control program and the improvement of water quality in receiving bodies, and
- Institutional improvement of related divisions responsible for the environmental quality and for industrial effluent, etc.

(2) Other Municipalities

Coverage rate of sewerage in the local municipalities with the population of over 10,000 and 5,000 are 42 % and 38 %, respectively as of 1998. Almost all the collection methods of the sewerage by OSE are of the "separated-type", collecting separately wastewater and rainwater, and rainwater drainages are constructed by local governments, separately. Common problems to sewerage are that there are

breakdown and clogging at many points resulting into a high-rate infiltration due to over-aged facilities (largely 30 to 40 year old).

Table 2.4.3 shows the profile of existing sewerage in the Project Area. Though a total of 12 sewerages is being operated, many of them are over capacity and need to be expanded. Most of treatment plant receives sludge collected from septic tanks in none-served areas by vacuum vehicles. Some sewerage collects and treats industrial wastewater as well as domestic wastewater.

As mentioned in **Section 2.3**, eutrophication becomes a concern in the Santa Lucía Basin. Conceivably, this is why recent treatment plants planned by OSE are furnished with the nutrient removal process (nitrogen and phosphorus). The situation of sewerages of capital cities of the local municipalities in the Project Area and their functions are briefly described as follows:

Canelones

At present, the sewage treatment plant consists of only two imhoff tanks as primary treatment. Therefore, effluent with undesirable quality is discharged into the Canelon Chico River. Large slaughterhouses are also located in Canelones City, the Canelon Chico River receives high-level contamination, especially in terms of nutrients. Nitrogen removal is called for in both sewage treatment plant and slaughterhouse so as to recover the water quality of the Canelon Chico River that is one of the tributaries of the Santa Lucía River.

San José

San José City has only imhoff tanks as primary treatment plant with low treatment efficiency. Besides, because many vacuum tankers for collecting septic sludge come and discharge to this plant, people nearby often claim for offensive odor. The study for the secondary treatment is reportedly ongoing.

Florida

In Florida City, an expansion work of old imhoff tanks has completed. This new facilities cover 75 % population in 2015 and are equipped with the coagulated sedimentation for the removal of phosphorus.

Lavalleja

New treatment plant for Minas City, which will treats effluent form the existing plant, is now under construction. The coverage rate of sewerage will increase to 80 % after the completion of this facility. This plant accommodates the section for removing nitrogen: de-nitrogen and nitrification tanks.

Table 2.4.3 Profile of Sewerage by OSE in the Project Area

Municipalities/ Locations	Living People (people)	Served People (people)	Coverage (Population base) (%)	Design Population (people)	Length of Main Sewers (km)	Type of Treatment Plant
- Canelones						
Aguas Corrientes	1,040	1,040	100	1,400	10.0	Stabilization pond
Canelones	19,335	9,970	52	9,700	28.9	Imhoff tank
La Paz	19,625	3,530	18	11,700	26.5	Stabilization pond
Las Piedras	66,095	11,650	18	7,330	30.3	Secondary treatment type
Pando	24,368	7,870	32	10,600	24.9	2-step anaerobic reactor
Santa Lucía	16,601	8,190	49	15,700	38.3	Activated sludge tank
- San José						
Libertad	8,314	3,680	44	2,400	16.6	Stabilization pond
San José	34,927	15,490	44	9,300	50.3	Imhoff tank
- Florida						
Casupa	2,595	-	-	2,200	3.4	Extended aeration tank
Florida	31,448	14,110	45	29,700	46.2	Activated sludge with phosphorus removal
Sarandi Grande	5,650	2,460	44	3,400	16.9	Extended aeration tank
- Lavalleja						
Minas	37,092	15,500	42	5,800	45.5	Imhoff tank (under construction of new plant)

Source: Sector Analysis of Water Supply and Sanitation in Uruguay, WHO, 2001.

2.4.3 Solid Waste Disposal

Solid waste management, which municipal governments are responsible for, is very modest in the Project Area. Almost all the final disposal sites are of simple dumping type without any care for sanitation, landscape and negative impact to the nearby environment. Major dumping sites are listed in **Table 2.4.4** and, besides these, at Arequita in Lavalleja and the riverside land of the Pintado River in Florida, solid waste dumping is likewise taking place.

From the standpoint of water pollution, solid waste disposal exerts two issues. One is leachate coming out dumping sites, especially in raining. Another is illegal dumping of residues into river courses caused by informal solid waste handling. Leachate is a common concern in dumping sites in the Project Area, because all of sites are not equipped with adequate water-seal structures and rainwater drainage. In many dumping sites, it can be observed that leachate directly enters rivers that are often used for potable water source.

Table 2.4.4 Profile of Solid Waste Dumping Sites

Municipalities	Montevideo	Canelones	San José
Locations	Plant 7	Cantera and Canada Grade	Rincon de La Bolsa
Incoming Waste (ton/ day)	1,600	250 in Cantera 320 in Canada Grande	53
Land Area of Sites (ha)	20	7 ha in Cantera 1.5 in Canada Grande	10
Estimated Remainig Life (years)	10	Almost terminated in Cantera 5 in Canada Grande	10
Leachate Control	Under planning	Not existing	A little care taking place

Source: "Inception Report, Master Plan of Solid Waste in Montevideo and Metropolitan Area", FICHTNER-LKSUR Associate, December 2003.

The second issue is explained in the connection of social problem, because this is caused by informal collectors and separators of solid waste. In Montevideo, a large portion of solid waste are collected and separated for the purpose of recycling. After that, remaining residues predominantly consisting of organic garbage are discarded into nearby rivers. These practices can be seen in many places along urban rivers. According to the estimation[3] made by the Municipal Government of Montevideo, the BOD loading caused by this practice reaches as high as 63 % of total pollution load, by far exceeding those from domestic wastewater and industrial wastewater.

2.5 Pollution Load Assessment for the Subject Five Municipalities

Various kinds of pollution are generated and discharged into the water environment. In the Project Area, major pollution sources are domestic wastewater, industrial wastewater and wastewater originated from solid waste as point sources, and urban rainwater, runoff from fields and farmlands for livestock as non-point sources. BOD, nitrogen and phosphorus may be major pollution indexes. The water environment in question is in the Santa Lucía basin and the La Plata Basin in this Project.

Generated and discharged pollution load has been estimated to discuss the basic direction of water quality management in the future. **Figure 2.5.1** shows pollution load discharged into the water environment from the municipalities in the Project Area, which were roughly calculated based on the following assumption:

- Domestic wastewater generated from the urban areas in **Table 2.4.3** is treated by existing treatment plant with correspondent removal rate of BOD, nitrogen and phosphorus,
- Industrial wastewater mentioned in the **Section 2.4** is treated up to qualities prescribed in the Decree 253/979 in terms of only BOD,
- As non-point sources, urban areas in Montevideo and fields and farmlands which are used for predominantly stock-breeding (equivalent to around 75% of the total land area of the Study Area) in Canelones, San José and Florida and Lavalleja discharge BOD, nitrogen and phosphorus with assumed rates being often applied in Japan, and
- Pollution loads originated from solid waste are neglected in this calculation.

[3] : "Work shop of Water Resources 2002", the Municipal Government of Montevideo, 2002.

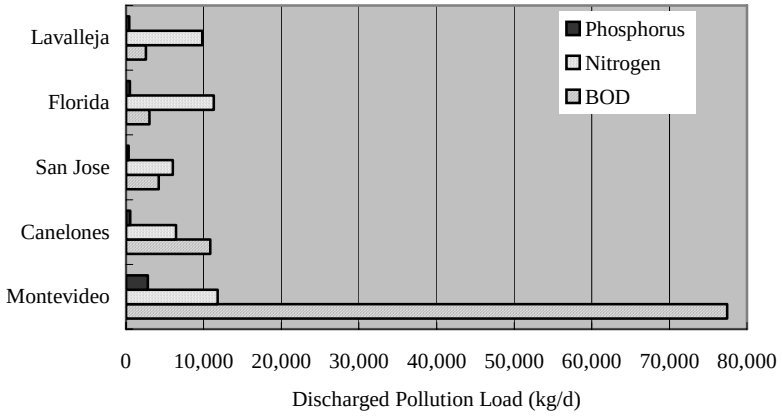


Figure 2.5.1 Projected Pollution Load Discharged into Water Environment

It is evident that Montevideo is discharging a huge amount of pollution loads, especially BOD into the La Plata River, because of its large population and no sewage treatment. Meanwhile, in other municipalities located along the Santa Lucía River, a significant amount of nitrogen and phosphorus are discharged from both domestic wastewater and agricultural lands. As shown in **Figure 2.5.2**, in this rough calculation, 90 % of nitrogen is derived and 63 % of phosphorus from non-point sources.

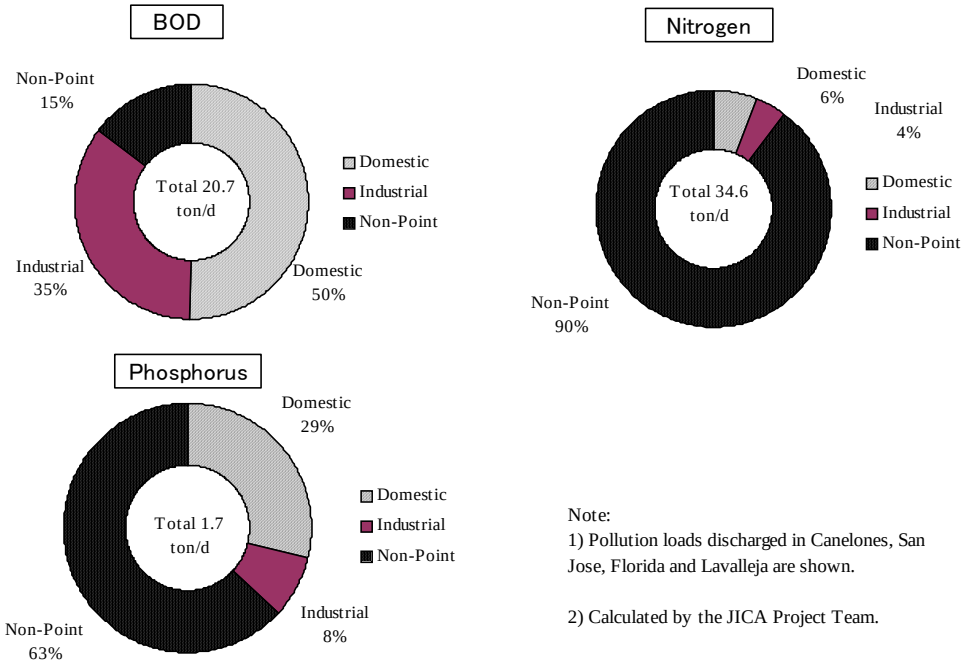


Figure 2.5.2 Sources of Discharge Pollution Load

CHAPTER 3. PRESENT CONDITION OF WATER QUALITY MANAGEMENT (TO APRIL 2004)

3.1 Establishment of Policies and Strategies on Water Quality Management

3.1.1 Government Policies

The Government maintains the policies on water quality management according to the environmental 5-year plan for DINAMA correspondent to the former national development project (2000-2004). In the environmental plan, DINAMA aimed mainly:

- To formulate strong consciousness to the environment;
- To conserve the environment in a sustainable manner;
- To prevent the pollution;
- To preserve the quality of water resources;
- To setup natural protection areas;
- To establish the systems for the evaluation of environmental quality and management;
- To establish the system for environmental impact assessment;
- To improve environmental management system; and,
- To enhance the decentralization of environmental management.

More specific policies directly governing the management in terms of water quality are not available for the time being. At the same time, while the website of DINAMA carries only general mandates as the major player of water quality management, specific policies and strategies are not found.

3.1.2 General Principles of the Environmental Policy

Some of the recent advances in Uruguayan environmental legislation were the establishment of General Law on Protection of the Environment (Law No.17283). In the Article 6, general principles of the environmental policy are given as tabulated below (Article 6):

A. Uruguay is characterized as "Natural Country", considering the sustainable development that integrates economical, cultural, and social aspects;

B. The prevention and prevision are the criteria with the highest priority against any others in the environmental management. Therefore, it is not possible to argue lack of absolute technical or scientific information to take preventive measures, when there is a danger of grave deterioration or irreversible degradation;

C. The gradual and progressive incorporation of new requirements must be considered for the effective integration of the environmental issues to the economic and social development;

D. The protection of the environment is constituted a compromise of the whole society, and, therefore, all persons and representative organizations have the right and duty for participating in relevant activities;

E. It must be recognized that the environmental management should involve many sectors and, accordingly, require the integration and coordination of the various public and private sectors concerned, ensuring the accomplishment of the nationally environmental policy and the decentralization of activities of environmental protection;

F. The environmental management must be based on an adequate management of the environmental information, securing its availability and accessibility by any interested part; and,

G. The international cooperation on environmental matters must be developed and strengthened, promoting the elaboration of common environmental criteria.

The principles highlighted above will serve also as interpretative criterion to solve the questions that could rise from the application of the standards and environmental mandates, and in its relationships with another standards and mandates.

3.1.3 Specific Action Plans

There exist no specific action plans indicating specific measures against problems in water quality nor kinds of action plans for implementing respective approaches of water quality management.

3.1.4 Classification of Water Bodies

The environmental standard of water quality has already been established in the Decree 253/979, dividing into five classes applicable for the water utilization in rivers. The classification of water bodies, in which particular class is designated for each water body, however, has not yet been conducted. DINAMA was engaged in the classification of water bodies in the past. The result of this effort is presented in a document "Water Quality Goal 2000", as shown in **Figure 5.3.1**. This work, however, has been suspended, and in Uruguay, there exists no target water quality of water bodies that is an important pre-condition for water quality management.

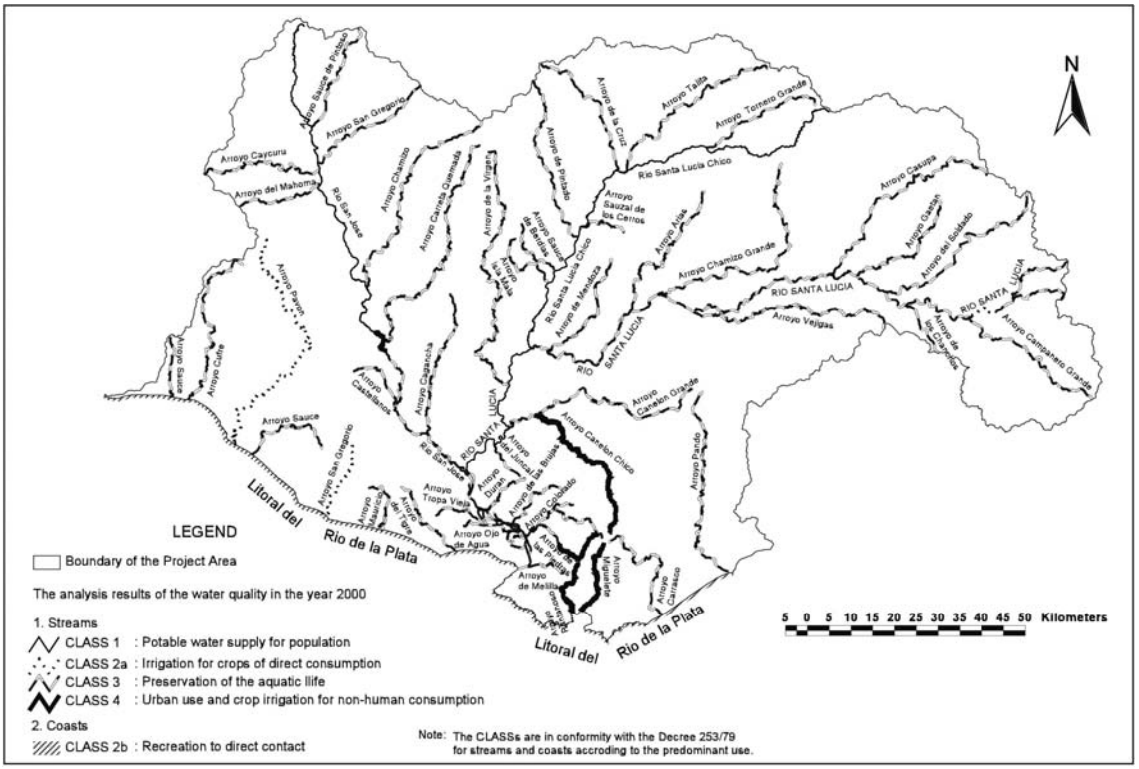


Figure 3.1.1 Classification of Water Bodies (Draft)

3.2 Laws and Regulations

3.2.1 Legal Structure for the Water Quality Management

Uruguay has established a series of laws and regulations to protect and improve the water environment, as shown in **Table 3.2.1**. Of these, the ones directly governing related with water quality are the Law No.17283 (General Environment Protection Law), the Decree-Law No. 14859 (Water Code), the Decree No. 253/979 (Water Quality Control Regulation and Standards) and the Decree No. 257/997 (by this Decree the DINAMA was re-structured).

The current activities and various dispositions prescribed in the Decree No. 253/979, and other laws and regulations concerned have been thoroughly investigated. Based on these results, activities for enforcing water quality management in Uruguay may be expediently categorized into the following component approaches:

- Establishment of policy and strategies (Decree 253/79: Article 19);
- Classification of water bodies (Decree 253/79: Article 3, 5, 6);
- Control of pollution sources including industrial/domestic wastewater, discharge from solid waste disposal, wastewater from non-point sources, Decree 253/79: Article 3, 5, 11, 12, 13, 15, 17, 22, 27, 28, 29, 30, 32); and,
- Ambient water quality monitoring (Decree 253/79: Article 9).

In addition, the prescription for diffusion, education and public participation related with water quality are found in the Law 17,283: Article 11.

Apart from the actual implementation, it is judged that Uruguay, like other developed countries, has most provisions necessary for water quality management in its legal setting.

Table 3.2.1 Laws and Regulations for Water Quality Management

Laws and Regulations	Dated	Expedient Name	Profiles
Law No. 17283	November of 2000	General Environment Protection Law	This is a general law recently enforced for protecting all aspects of the environment including water quality.
Decree-Law No. 14859	December of 1978	Water Code	This is a fundamental legislation for water resources management, which covers surface water and groundwater, containing many dispositions to define rights and obligation of water users.
Decree 253/979 (with modification by Decree No. 232/988, No. 579/989 and No. 195/991)	May of 1979	Water Pollution Control Regulation and Standards	This setups the environmental standards and effluent standard of water quality, including legal procedures and instruments for the management of wastewater discharges.
Decree-Law No. 15239 (Including the regulation 284/990)	December of 1981	Soil and Water Protection Regulation	This declares the national interest, and the use and conservation of soil and surface water for the purpose of agriculture and livestock.
Decree No. 85/983	March of 1983	Pollution Control Norm	This establishes pollution control norms for industries, especially slaughterhouses and other firms.
Decree No. 497/988	August of 1988	Liquid Waste Control Standard	This establishes the regulation for prohibiting the discharges of any kind of liquid waste from vacuum trucks into watercourses.
Law No. 16.466	January of 1994	Environmental Impact Assessment Law	This declares national interest on the environmental protection against any kind of degradation, destruction or contamination, establishing the requirements and procedures for environmental impact assessment.
Law No. 16.112	June of 1990	Establishment Law of MVOTMA	This declares the mandates of MVOTMA and duties.
Law No. 16.858	September of 1997	Irrigation Law	This law declares general interest for the irrigation water use.
Decree No. 435/994	September of 1994	Regulation for Environmental Impact Assessment	This provides the practical procedures on environmental impact assessment.
Decree No. 257/997	July of 1997	Decree that re-organize the DINAMA	This defines the responsibilities and duties of DINAMA including water quality, setting up organizational structures, functions, etc.
Law No. 9515	November of 1935	Law of Administration of Local Governments	This defines administrative structures, competence, duties, etc of local government units.

3.2.2 Organizations Concerned on the Water Quality Management

DINAMA is a major player in the environment sector in Uruguay. In the administration of water quality management, a series of comprehensive and broad mandates for the legal execution are vested to DINAMA in the Decree No. 257/997 with the following provisions (Chapter II):

(1) Conduct planning, implementation, supervision, and evaluation of the plans for monitoring and evaluation of ecology system for the environmental resources including water resources, air, and ecosystems, including natural protected areas and coastal areas;

(2) Conduct planning, implementation, supervision, and evaluation of the plans for prevention of negative impacts by human activities and projects implementation, including promotion of environmental consciousness; giving priority to planning and execution of education, capacity building, information and dissemination activities for the adoption of behaviors consistent with the environmental protection and sustainable development (annexed text from Art. 11 of Law 17283);

(3) Conduct planning, implementation, supervision, and evaluation of plans to control public or personal activities that could impact on environmental quality, and also the same for recuperation and reparation planning that be approved (annexed text from Art.7 of Law 17283),

(4) Conduct planning and coordination for relating national and regional organizations for environmental protection, supporting the environmental management of municipal and local authorities and public institutions in general (annexed text from Art. 9 of Lay 17283). This includes support for the making of agreement between organizations or personals for the purpose of environmental protection.

(5) Conduct establishment and maintenance of relationships with relevant international bodies, to assurance the fulfillment of agreements and commitments related to the environment.

Besides DINAMA, numbers of governmental institutions are involved in water quality management in relation with water utilization, wastewater discharging, regional implementation of water-related measures, etc. DNH (MTOP), OSE, and RENARE (MGAP) are among them.

Meanwhile, Law No. 9515 defines that municipal governments are responsible for maintaining the regional conditions of sanitation and hygiene (Article 35). In the connection of environmental management, the Decree No. 253/979 states that DINAMA may order relevant measures to local governments (Article 31). The Law No. 17283 prescribes that DINAMA may contract parts of work in water quality management to local municipal governments (Article 8).

OSE and DNH are involved in water quality management, discharging their duties in the construction and operation of water supply and sewerage facilities, and the quantitative monitoring for water resources, respectively.

3.2.3 Environmental Standards on Water Quality

In Uruguay, the environmental standard of water quality has been established in the Decree No. 253/979. The watercourses are classified into Class 1 to Class 4, a total of five classes (Article 3), according to the purposes of water utilization, as follows:

Class 1: Rivers and water bodies that can be used for drinking water supply to residents with conventional treatment.

Class 2a: Rivers and water bodies utilized for irrigation and sprinkler on vegetables for eating raw and fruit tree.

Class 2b: Rivers and water bodies utilized for recreational spots where human body contacts directly.

Class 3: Watercourses used for preservation of fishes in general and other components of aquatic flora and fauna, or waters destined for irrigation and sprinkler of crops of which products is not consumed in its natural form or in those case that the product is consumed naturally and irrigation systems is applied where only the land is watered but not products.

Class 4: Watercourses that runs through the urban or sub-urban areas where water quality must be maintained to be harmonized with the surrounded environment, or water courses destined to water crops which are not consumed by humans.

Table 3.2.2 shows water quality standard for each class as declared in the Article 5 of Decree No. 253/979.

The Decree No. 253/979 exerts many and important regulations for water quality management as well as the environmental standards. Decree No. 253/979 is thus regarded as a crucial administrative pillar in every aspect of water quality management. Examination for amendment of this Decree is ongoing in COTAMA.

Detailed review of the environmental standard of water quality is out of the scope of the present Project, general review revealed the following issues.

- It specifies simply 10 mg/l of nitrate expressed as nitrogen (NO_3^{--} as N). Thus, this value does not appear to aim at controlling the eutrophication phenomena.
- It stipulates only total chromium as chromium compounds. Meanwhile, hexavalent chromium (Cr^{6+}) that is widely known as intensely toxic substance is not specified, though hexavalent-chromium pollution is possible due to the existence of many tannery factories.

The amendment of the Decree No. 253/979 is ongoing by COTAMA for several years. The reasons for the amendment are (i) the Decree has become outdated without sufficient justification, (ii) effluent discharge regulation in the Decree gives only the rate and it does not regulate total volume, (iii) others.

Table 3.2.2 Environmental Standards for Water Quality

Parameters	Class 1	Class 2a	Class 2b	Class 3	Class 4
Odor	Not detected	Not detected	Not detected	Not detected	Not discomfort
Floating substances	Not detected	Not detected	Not detected	Not detected	Not detected
Color	Not detected	Not detected	Not detected	Not detected	Not detected
Turbidity (NTU)	Max. 50	Max. 50	Max. 50	Max. 50	Max. 100
pH	6.5 - 8.5	6.5 - 9.0	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0
DO (mg/l)	Min. 5	Min. 5	Min. 5	Min. 5	Min. 2.5
BOD_5 (mg/l)	Max. 5	Max. 10	Max. 10	Max. 10	Max. 15
Fats and oils (mg/l)	Not detected	Not detected	Not detected	Not detected	Max. 10
Detergent (mg/l)	Max. 0.5	Max. 1	Max. 1	Max. 1	Max. 2
Phenol (mg/l) as C_6H_5OH	Max. 0.001	Max. 0.2	Max. 0.2	Max. 0.2	
Ammonia (mg/l) as N	Max. 0.02	Max. 0.02	Max. 0.02	Max. 0.02	
Nitrate (mg/l) as N	Max. 10	Max. 10	Max. 10	Max. 10	
Total phosphorus (mg/l) as P	Max. 0.025	Max. 0.025	Max. 0.025	Max. 0.025	
Suspended Solids (mg/l)		Max. 700			
Sodium Absorption Ratio		Max. 10			
Fecal Coliform (CFU/100ml)	Max. 2,000 (Max. 1,000)*	Max. 2,000 (Max. 1,000)*	Max. 1,000 (Max. 500)*	Max. 2,000 (Max. 1,000)*	Max. 5,000 80% of sample
Cyanide (mg/l)	Max. 0.005	Max. 0.005	Max. 0.005	Max. 0.005	Max. 0.05
Arsenic (mg/l)	Max. 0.005	Max. 0.05	Max. 0.005	Max. 0.005	Max. 0.1
Boron (mg/l)	-	Max. 0.5	-	-	-
Cadmium (mg/l)	Max. 0.001	Max. 0.001	Max. 0.001	Max. 0.001	Max. 0.01
Copper	Max. 0.2	Max. 0.2	Max. 0.2	Max. 0.2	Max. 1
Total Chromium (mg/l)	Max. 0.05	Max. 0.05	Max. 0.05	Max. 0.05	Max. 0.5
Mercury (mg/l)	Max. 0.0002	Max. 0.0002	Max. 0.0002	Max. 0.0002	Max. 0.002
Nickel (mg/l)	Max. 0.02	Max. 0.002	Max. 0.02	Max. 0.02	Max. 0.2
Lead (mg/l)	Max. 0.03	Max. 0.03	Max. 0.03	Max. 0.03	Max. 0.05
Zinc (mg/l)	Max. 0.03	Max. 0.03	Max. 0.03	Max. 0.03	Max. 0.3
Pesticides (Max. value)	Aldrin + dieldrin: 0.004 mg/l, chlordane: 0.01 mg/l, DDT: 0.001 mg/l, endosulphan: 0.02 mg/l, endrin: 0.004 μg/l, heptachlor + heptachlor Epoxy: 0.01 μg/l, lindane: 0.01 μg/l, metoxychloro: 0.03 μg/l, mirex: 0.001 μg/l, 2,4 D: 4 μg/l, 2,4,5 T: 10 μg/l, 2,4,5 TP: 2 μg/l, parathion: 0.04 μg/l, poliaromatics compounds: 0.001 μg/l.				Ten times of the values presented in the left column.

Note:

1) (*) marks stand for geometric mean with min. 5 samples.
2) Pesticides stipulated in the environmental standard of water quality are also specified in the standard besides the above-mentioned parameters.

Source: Decree 253/979.

3.2.4 Effluent Standards for Industrial Wastewater and Discharge Control

The regulation for industrial wastewater in Uruguay is basically complied with the principle of "Command and Control". The Decree No. 253/979 states numbers of legal requirements for the qualities of wastewater discharged from industries.

The effluent standard of wastewater, shown in **Table 3.2.3**, is specified depending on the discharge destinations: Sewerage, rivers and ground (Article 11).

Table 3.2.3 Effluent Standards for Industrial Wastewater

Parameters \ Discharge Points	Drain to the Public Sewerage	Direct discharge to river	Infiltrate into soil
Floating matter	Not detected	Not detected	Not detected
Temperature	Max. 35°C	Max. 30°C but not exceed temp. of water area +2°C	Max. 35°C
pH	5.5 - 9.5	6.0 - 9.0	5.5 - 9.0
BOD_5 (mg/l)	Max. 700	Max. 60	
Solid deposit (mg/l)	Max. 10	Max. 150	Max. 10
Total solid (mg/l)			Max. 700
Fats and oils (mg/l)	Max .200	Max. 50	Max .200
Sulfide (mg/l)	Max. 5	Max. 1	
Phenol (mg/l)		Max. 0.5 (C_2H_5OH)	
Flow rate	Max.2.5 times of average flow rate	Max. 1.5 times of average flow rate	
Ammonia (mg/l)		Max. 5	
Phosphorus (mg/l)		Max. 5	
Coliform bacteria (CFU/100ml)		Max. 5,000	
Cyanide (mg/l)	Max. 1	Max. 1	Max. 1
Arsenic (mg/l)	Max. 0.5	Max. 0.5	Max. 0.5
Cadmium (mg/l)	Max. 0.05	Max. 0.05	Max. 0.05
Copper (mg/l)	Max. 1	Max. 1	Max. 1
Total Chromium (mg/l)	Max. 3	Max. 1	Max. 3
Mercury (mg/l)	Max. 0.005	Max. 0.005	Max. 0.05
Nickel (mg/l)	Max. 2	Max. 2	Max. 2
Lead (mg/l)	Max. 0.3	Max. 0.3	Max. 0.3
Zinc (mg/l)	Max. 0.3	Max. 0.3	Max. 0.3

Source: The Decree 253/979

Note: Pesticides stipulated in the environmental standard of water quality are also specified besides the above-mentioned parameters.

DINAMA as an directorate responsible for the environment in MVOTMA is vested numbers of responsibilities in the regulation of industrial wastewater by the Decree No. 253/979. Major legal instruments for enforcing its competence are summarized below:

(1) Authorization of Wastewater Discharge

Entities that generate wastewater in their industrial activities are obligated for authorization by MVOTMA (Article 23 and 29). Entities are also obligated to obtain the permission from OSE beforehand, when they discharge wastewater into the water bodies classified as the Class 1 or the sewerage managed by OSE (Article 25). In practical, the "entities" are defined to include housings, thus, domestic wastewater from housing zones are the subject for the authorization.

(2) Registering and Processing of Qualified Expert and Report of Operation

To plan, construct and operate wastewater treatment facilities, qualified expert must be selected and registered to MVOTMA (Article 26). The qualified experts are obligated to periodically report the operating status of the facilities to MVOTMA (Article 27).

(3) Order of Improvement

In case wastewater treatment facilities do not meet the given standards, MVOTMA may order necessary measures for the improvement to entities (Article 17 and 28).

(4) Compliance Inspection

MVOTMA along with OSE and municipalities may enter the site of entities to inspect relevant facilities and take water sample for the effluent monitoring (Article 30).

(5) Imposition of Fines against Violation

Entities are fined for the violation to the legal requirements of the Decree No. 253/979, such as: negligence of application for the Authorization, negligence of the submission of required information, incompliance for the improvement order, etc. (Article 32).

Apart from the Decree No. 253/979, the Municipality of Montevideo has established the resolution for the regulation of industrial wastewater discharge. This resolution, shown in **Table 3.2.4**, specifies the phased regulation values with lax values at the beginning as compared those of the Decree No. 253/979. This phased regulation schemes are explained as the expedient and viable way for attaining the actual accomplishment of water quality improvement.

Table 3.2.4 Effluent Standard in Municipality of Montevideo

Parameters	Units	Discharge for Sewerage			Discharge for River Courses		
		1st stage Mar. '97	2nd stage Jul. '98	3rd stage Dec. '99	1st stage Mar. '97	2nd stage Jul. '98	3rd stage Dec. '99
BOD_5 for General	mg/l	-	1,000	700	150	100	60
Exceptions							
Textile Washing		-	-	3,000	300	150	60
Leather Tannery		-	2,000	1,000	300	150	60
(Decree 253)		(700)			(60)		
Total Chromium	mg/l	10	10	5	5	5	1
(Decree 253)		(3)			(1)		

Source: Municipal Government of Montevideo, Resolution 761/96, February 1996.
Note: This table shows only selected parameters.

3.3 Organizations and Resources

Information on organizations and resources described hereafter is that of April 2006.

3.3.1 National Directorate of Environment (DINAMA)

(1) General

The Water Code (Decree-Law No. 14,859) is a fundamental law in water quality management in Uruguay and originally MTOP was designated as an authority institution of this law. However, with the creation of MVOTMA in 1990, some competences were transferred from MTOP to MVOTMA. Currently, the function of MTOP through DNH is to manage water resources from the point of view of quantity and, meanwhile, MVOTMA through DINAMA from the point of quality.

(2) Tasks

DINAMA, one of the directorates of MVOTMA created in 1990 by the Law No. 16112, is a central organization for enforcing water quality management in Uruguay, with a series of the wide competence. The Decree No. 257/979 defines that DINAMA is responsible for the formulation, execution, supervision and evaluation of national plans of environmental protection and to propose the national policy taking into account a sustainable development.

Besides, the Decree No. 257/997 defines functions of DINAMA more specifically in Chapter III, as follows:

- To operate the Environmental Quality Measurement and Evaluation System, through the development of evaluation programs for air, water and ecosystems.
- To operate the Environmental Information System (including the Annual Report on Environment highlighted by Art. 12 of Lay 17283) related to air, water (including water resources inventory highlighted by Art.7 of Water Code), soil and biota and the development of technical standardization for methodologies of measurement and evaluation of the environmental quality;
- To operate the Environmental Control System, through the development of programs of emissions to the air, noise, wastewater, solid waste management,

dangerous substances and activities in especial protected areas; and programs of recuperation and reparation that be approved (annex text of Art.7 of Law 17283)

- To support COTAMA's functions, providing technical and administrative assistances;
- To administrate the National Fund for Environment and the Fund for Protected areas (annexed text from Art. 16 of Law 17234 – National System for Protected Areas);
- To implement management tools not contained in the Law 17283 or another legal relevant framework (annexed text from Art.7 of Law 17283).

(3) Technical Advisory Commission on Environment (COTAMA)

COTAMA is an inter-institutional organization of MVOTMA that involves different sectors, for the advice and coordination in policy and environmental management matters, as stated in the Ministry Creation Law (Law No. 16,112).

Its main objective is to advise the Minister of MVOTMA on environmental matters. It is composed of 27 members including representatives from all ministries, OPP, Congress of Mayors, University of Republic, Trade Unions, Industrial and Commercial Association and NGOs. The Minister of MVOTMA is the president of COTAMA. The vice-president is the Director of DINAMA and the permanent secretary is the legal adviser of DINAMA. COTAMA adopts decisions of different nature and it may advise MVOTMA on different environmental matters.

(4) Organizational Structure and Personnel

DINAMA, as shown in **Figure 3.3.1**, is organized by five line divisions: the Environmental Quality Evaluation Division, the Environmental Impact Division, the Environmental Control Division, the Natural Protected Area Division and the Administration Division. The total staff is 68 as of 2004 including the national director and division directors.

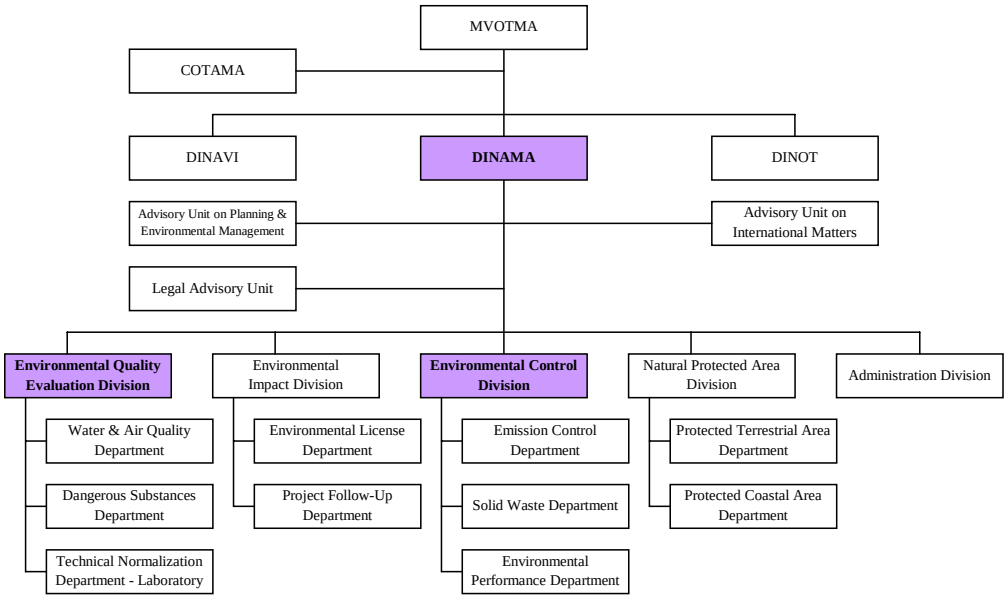


Figure 3.3.1 Organization of DINAMA

Among the divisions, the Division of Environmental Quality Evaluation and the Division of Environmental Control are directly involved in water quality management. Their main functions are summarized as follow:

Division of Environmental Quality Evaluation

- To ensure the implementation and efficient functioning of the system on measuring and environmental quality evaluation, through the development of evaluation programs of air, water and ecosystem;
- To initiate and maintain the system of environmental information related to air, water, soil and biota and the development of methodologies of measurement and evaluation of the environmental quality; and,
- To propose the regulations and to control the activity of measurement of physicochemical and biological parameters undertaken by third parties.

Division of Environmental Control

- To ensure the implementation and efficient functioning of the system on environmental control, through the development of control programs of air, noise, wastewaters, solid waste management, dangerous substances and activities on special areas of protection; and,
- To propose the regulations and to control the activities of the measurement of physicochemical and biological parameters undertaken by third parties.

As of May 2004, human resources allocated to both divisions are 31 in total, as detailed in **Table 3.3.1**. Of these, a total of 15 (2 for water quality management, 8 for measurement and analysis in laboratory, and 5 for industrial wastewater management) are working exclusively for water quality management. The currently allocated numbers are very limited, especially in water quality monitoring and evaluation, when their vast duties in water quality management are considered.

Several years ago DINAMA had a unit for the environmental education. However, there was no specific unit to work for dissemination and education on water quality management as of April 2004. Today there are four specialists with university degree (a social communicator, a licentiate and master in education, an architect and a library licentiate), working for editing, elaboration and publishing of a bimonthly newsletter "Ambiente Uruguay". They work on dissemination campaigns on an irregular basis, but they were engaged in only limited work on water quality dissemination in the last six years. In relation to public participation, there is only one person with university degree (an education licentiate), working in COTAMA Secretariat.

Table 3.3.1 Personnel of DINAMA

Categories of Personnel	Whole of DINAMA	EQED <1>	EnCD <2>	Staff for Water Quality Management of <1> & <2>
Senior Administrator (national and div. directors)	7	1	1	2
General Expert for economic, legal, personnel, etc.	2	0	0	0
Technical Expert	33	9	8	8
Technicians and Laborers	14	4	4	5
Clerical Staff	12	3	1	0
Total	68	17	14	15

Note: EQED: Environmental Quality Evaluation Division, EnCD: Environmental Control Division
Data are as of April 2004

Individual technical level of staff is generally relevant to duties, with sufficient knowledge and skills necessary for their routine work. However, given that their current tasks are only a part of their original duties, its individual abilities are required to be much more strengthened so as to efficiently and effectively perform their works.

On the other hand, DINAMA's decision-making system and leadership as an institutional unit appears to be vague and, thus, the abilities of staffs may be constrained.

(5) Water Quality Laboratory

DINAMA has a water quality laboratory (Technical Normalization Department) with a total of 8 employees (3 graduated and 5 assistants). Major tasks for the water quality management are to measure and analyze samples that are brought by the Division of Environmental Quality Evaluation (water samples) and the Division of Environmental Control (industrial effluent samples).

Equipment for Measurement and Analysis

The laboratory has a floor area of about 200 m^2 and is well equipped for analyzing water, air, soil as well as materials contained in the wastewater. Available equipments are for various kinds of manual analysis, analysis of heavy metals, bacteria and pesticides, etc. It should be noted that Atomic Absorption Spectrophotometer (AAS) has been operated since its installation in late 1980s, and

Gas Chromatograph (GC) and High Performance Liquid Chromatograph (HPLC) have been nearly seven years since their installation but they have been used for only a short-term. Major items of equipment are as follows:

- Manual Analysis: Drying equipment, incubator (for BOD), muffle, centrifugal separator, Soxhlet extractor,
- Instrumental Analysis: Conductivity meter, pH meter, ion electrode, gas chromatograph, UV-visible spectrophotometer, atomic absorption spectrophotometer, high-performance liquid chromatograph, and
- Microbiology: Autoclave, dry heat sterilization, laminar flow chamber, incubator, portable incubator, freezer, microscope.

The laboratory of DINAMA is able to measure and analyze almost all parameters listed in water quality standards, and it sometimes relies on contractors for the analysis of some specific parameters. The maximum capacity of the laboratory is reported to be 20 to 30 water samples a week. Until April 2004, the analysis of pesticides has never been implemented for practical purposes so that GC has never been used for over 6 months and therefore, the limit of detection was unknown.

Quality Assurance

Inter-calibration was conducted a few years ago with the laboratory of IMM to make a crosscheck of the analysis data. The Pan-American Center of Sanitary Engineering (CEPIS) in Lima, Peru supplied the sample. In addition, Inter-calibration is conducted several times a year with Aquacheck of UK. In 2003, for example, it has been implemented five times. The methods of sample preservation and analysis are in compliance with standards of US Environmental Protection Agency (EPA) and American Public Health Organization (APHA). Manual of analysis procedures is available in the laboratory but some parameters (especially for pesticides) are lacking in either water quality or wastewater standards. In this case, EPA or APHA becomes a problem-solving document.

Certificate

The laboratory is certified ISO9001: 2000 so that all routine work is carried out according to this system and procedures. Therefore, various forms and documents are used to make sure the effective workflow. Furthermore, the laboratory is currently in preparatory stage to obtain accreditation ISO/IEC17025 for 7 parameters (BOD_5, COD, Cr, Pb, SS, total coliform and fecal coliform).

(6) Procedural Manuals and Standards

Manuals for analysis and measurement of water quality are elaborated for the laboratory. The basic methods applied comply the standards of US-EPA and APHA. These manuals cover almost all of parameters of water quality except for parameters like pesticides and others, which the laboratory does not handle. The laboratories in local municipalities can use the manuals prepared by DINAMA for their practical work and training.

Environmental Control Division has elaborated manuals for the measurement of industrial wastewater flow and for the sampling of groundwater. Besides these, DINAMA has no any other kind of procedural manuals and standards. Practical work in industrial wastewater management, water quality monitoring, etc. is taking place depending on knowledge and experience of individual staff.

(7) Information System

Filing of Water-Related Information

While DINAMA owns its central library for collecting general documents and materials, the information of water-related matter is separately filed by the divisions or departments related to water resources development and water works projects. Basic data and information necessary for water quality management like geographic conditions, precipitation, water discharges of rivers and groundwater, sources of pollution loads, and pollution control facilities are not coordinately filed.

Organizations concerned with water quality management like the Municipality of Montevideo or OSE have been engaged in respective studies, generating massive data and information useful for DINAMA. The Division of Environmental Quality Evaluation, however, has not established systems to file such reports and publications.

In the Division of Environmental Control, documents for administrative processing, authorization of industrial wastewater, etc. have been stored in specified places. Especially, data and information relating with authorization are stored and well maintained in the database system called the “SADI (Application for Authorization of Industrial Discharge)”.

Database System

The Division of Environmental Control has established "SADI" System for the industrial wastewater management. The system maintains data and information for the entities registered by DINAMA (currently 513 in numbers) over the whole Uruguay. Main data and information stored in the database are name of entity, location, industrial categories, etc. In this system, name of the corresponding person for each wastewater treatment plant are also recorded.

In terms of water quality data monitored in the past, a database has not been developed, and measured data are just kept in the form of spreadsheet. Relevant information like sampling locations is not properly filed. Therefore, these water quality data are not practically accessible for third parties.

Website

DINAMA has a LAN system. DINAMA maintains a webpage and publicize its policy, activities and other environmental information. In terms of water quality management, the webpage publicizes the data and information of industries with SADI procedure. Qualified experts necessary for the authorization for industrial wastewater discharge are also available in the webpage.

The utilizations of the webpage for publication are different depending on divisions. Environmental Control Division actively opens information related to industries, however, Environmental Quality Evaluation Division opens some information except the data related to water quality.

(8) General Facilities

Environmental Quality Evaluation Division and Environmental Control Division have the office with the floor area of 450 m^2, two tuck-type vehicle (for the whole of DINAMA use) and 33 sets computers.

3.3.2 Local Governments in the Project Area

(1) Participation of the Local Governments to the Water Quality Management

Local municipal governments are responsible for the collection and disposal of solid waste, the construction of urban and secondary roads, environmental hygiene controls, etc. Although their functions do not include the provision of sanitation services (water supply and sewerage) except for the Municipality of Montevideo, municipal governments implements water and sanitation development in rural area.

Major sources of finances of the local government are revenues in land and vehicle taxes, garbage collection, commerce, maintenance of infrastructure and various fines. The other important sources of municipalities are the transference of budgets from the Central Government. The Law of National Budget determined the percentage allocated to the municipalities in the total resources of the country like: 3.2 % for the year 2001, 3.4 % for the year 2002 and 2003 and 3.5 % for 2004.

The constitutional reform in 1996 gave the bases of the institutional arrangement to accelerate the decentralization of the country. To realize this decentralization, the commission consisting of the association of Mayors and Central Government was organized and, along this initiation, OPP is preparing the decentralization policy.

In terms of decentralization of the environmental administration, the General Environment Law (No. 17,283) empowered recently emphasizes that the participation of municipal governments into the environment management and widely opened public attentions are of the most importance along with the decentralization.

(2) Municipality of Montevideo

Organization

The Municipal Government of Montevideo was restructured in 2000, composed of a total of eight line departments, as shown in **Figure 3.3.2**. Of these, the Environmental Development Department is in charge of sewerage, industrial wastewater and monitoring of watercourses as a unit related to water quality management.

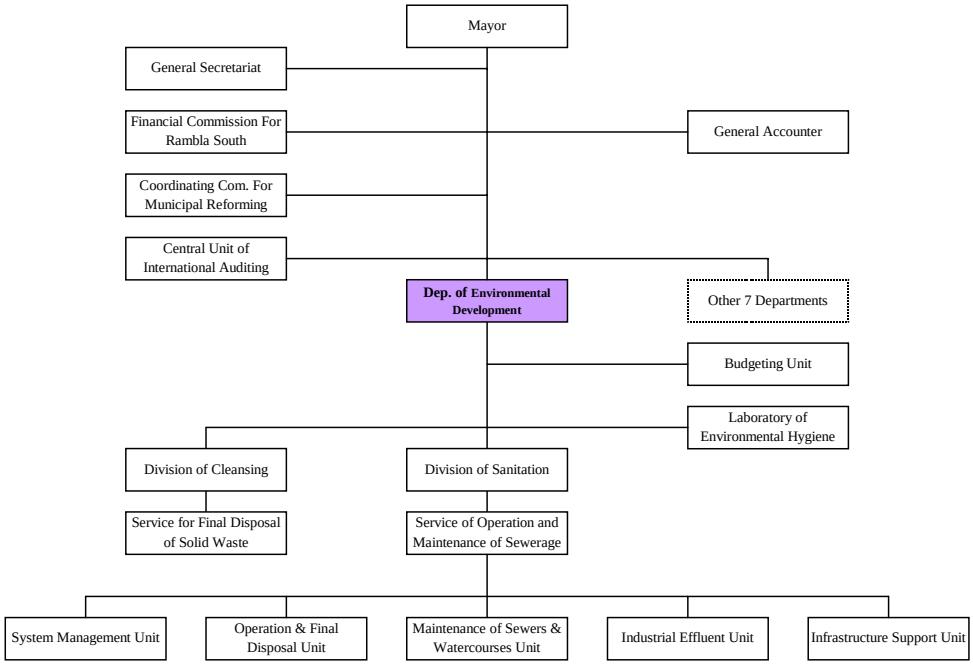


Figure 3.3.2 Organization Structure of Municipal Government of Montevideo

The main functions of the Environment Development Department are summarized below:

- To study, project, manage and control all related to the environmental subjects;
- To control, administrate and manage the execution of all work of sewerage, cleansing, control of industries, control of streams and beaches;
- To implement diffusion through environmental campaigns, workshops, and environmental education;
- To elaborate technical reports on air composition, electromagnetic radiations, noise mapping and other aspects related to the environment;
- To regulate the storage, transport, holding, manipulation and combustion of liquid and gas combustible products to be managed in safe manner and with the minimum possible contamination; and,
- To mange all procedures related to connections and inspection on the environmental matters.

Human Resources

The Government of Montevideo is rich in the staff numbers. Of a total staff of about 8,700, about 1,800 including contract-base belong to the Environment Development Department, as shown in **Table 3.3.2**. The Department has two main divisions: the Division of Cleansing with about 1,400 employees and the Division of Sanitation with about 280 employees. The Department also accommodates other units such as: the Environmental Hygiene Laboratory Unit, the Executing Unit for Urban Sanitation, the Environmental Education Group, the Administration Commission for Swampy Areas of Santa Lucía, etc. **Table 4.2.2** shows the staff numbers of these units related to water quality management.

Table 3.3.2 Staff Numbers of the Water-Related Units of the Municipality of Montevideo

Categories of Personnel	Units	Maintenance of Sewers & Water Courses	Industrial Effluent	Env. Hygiene Laboratory	Env. Education	Adm. Commission for Swampy Area
University Degree	(person)	9	3	11	1	1
Technical Degree	(person)	17	-	6	9	2
Administrative Degree	(person)	12	1	3	3	2
Laborers/Inspectors	(person)	99	-	-	-	1
Total	(person)	137	4	20	13	6

Individual capacity of staff in water quality management appears to be well relevant to respective tasks, with sufficient opportunities of experience.

Laboratory

The Government of Montevideo has a well-equipped laboratory at Punta Carretas for manual and instrumental analyses, with a total of 20 employees. The laboratory is capable of conducting manual analysis for physical/chemical analysis, and heavy metal and biological analysis but will not be able to analyze pesticides, since there is no proper equipment for this purpose. Inter-calibration has been carried out with DINAMA to assure the precision of analysis data. It is informed that analysis methods are the same as DINAMA, which means that they follow EPA and APHA.

Information System

The Government of Montevideo has a LAN system in the Government office and has also established the website, publicizing much information on water-matters. It issues annually the "IMM Environmental Report" since 2000, summarizing their activities in environmental sectors.

Dissemination, Education and Public Participation

There is an Environmental Education Group, with 15 persons: one with university degree, nine with technical degree, and three administrative. For public participation, the Government has formed GAM (Montevideo Environmental Group) with a very wide participation and has a working group on water resources. GAM has regular meetings to elaborate Montevideo Environmental Agenda. The Government supports all the activities needed for the functioning of GAM, with meeting rooms, materials and computers.

The Government of Montevideo also has formed the Citizen Environmental Monitoring Commission with municipality officers, NGOs and citizen environmental local commissions. The objective of this network is to monitor and control environmental problems and pollution sources with citizen participation. The Government has allocated necessary facilities in each local zone to meet together the local commissions.

(3) Municipality of Canelones

In the Municipal Government of Canelones, the General Directorate of Environmental Management, the General Directorate of Health Attention and the Environment Inspectorate are related to water quality management, as shown in **Figure 3.3.3**.

The Government of Canelones has a total staff of about 4,800. Of these, 550 are engaged in water quality-related work, as shown in **Table 3.3.3** and majority of them are charged in physical labor work. Laboratory has limited equipment for measuring pH, DO, BOD and bacteriological analysis. Individual capacity of staff engaged in water quality management appears to be limited, because of the lack of proper training and actual experience.

With respect to dissemination, education and public participation on water quality issues, the Government of Canelones has neither specific department nor staff. Some representative from the General Directorate of Environmental Management and the General Directorate of Health Attention and Environment Inspectorate participate on an irregular basis in related seminars and workshops.

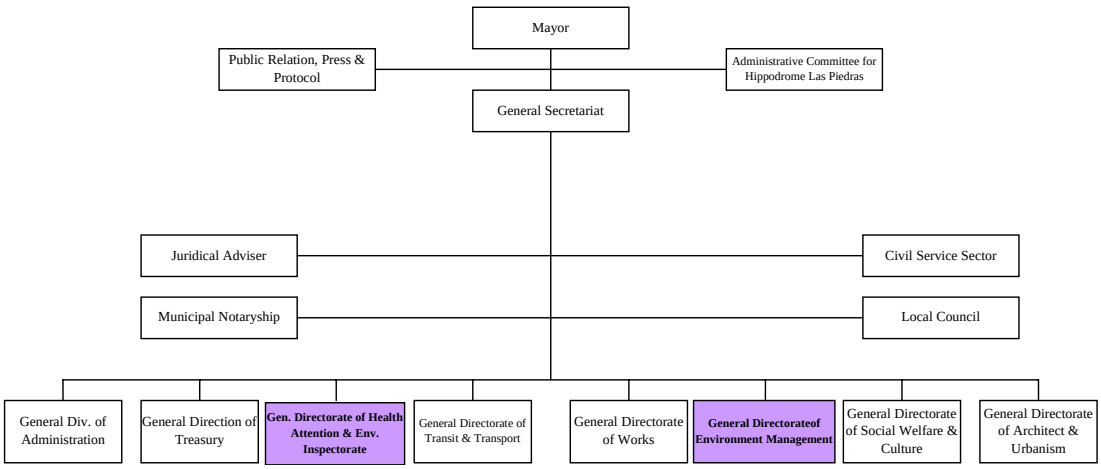


Figure 3.3.3 Organizational Structure of Municipal Government of Canelones

Table 3.3.3 Staff Numbers of the Water-Related Units of the Municipality of Canelones

Categories of Personnel	General Direction of Environmental Management	General Direction of Health Attention and Environment Inspectorate	Laboratory
Senior Chief	4	4	1
University Degree	10	8	-
Technical Degree	5	2	2
Administrative	42	42	-
Laborers/Inspectors	433	13	1
Total	494	69	4

Note: Data are as of 2004

(4) Municipality of San José

In the Municipal Government of San José, the Department of Hygiene, the Office of Land Use and Environment Office are related to water quality management, as shown in **Figure 3.3.4**.

The Government of San José has a total staff of 715. Of these, a total of about 70, as shown in **Table 3.3.4**, is engaged in water quality-related work but majority of them are charged in physical labor work. Laboratory has limited equipment only for bacteriological analysis. Individual capacity of staff engaged in water quality management appears to be limited, because of the lack of proper training and actual experience.

Office of Territorial Ordering and Environment together with different stakeholders of the society including primary and secondary schools deals environmental education programs. Two persons with university degree and two persons with technical degree are working in this office.

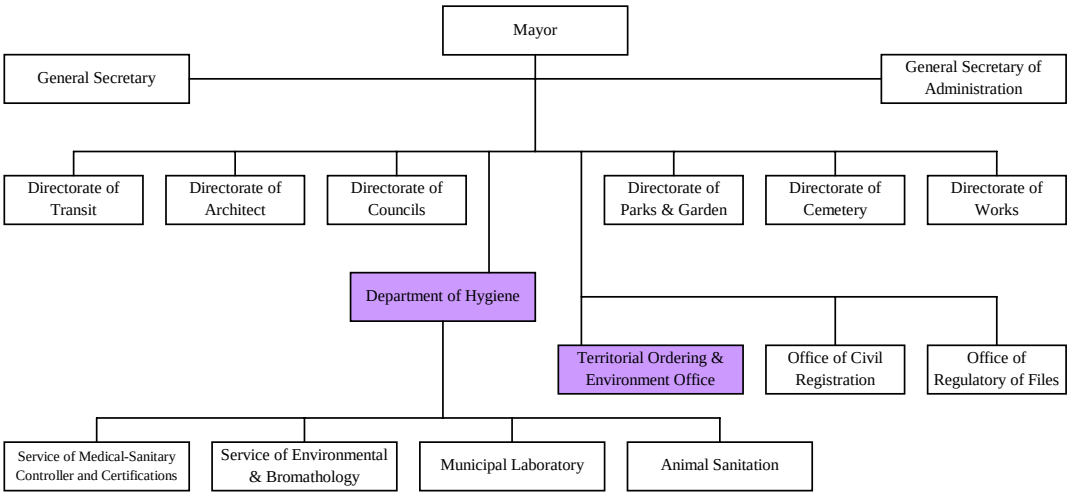


Figure 3.3.4 Organizational Structure of Municipal Government of San José

Table 3.3.4 Staff Numbers of Water-Related Units of the Municipality of San José

Categories of Personnel	Land Use and Environment Office	Department of Hygiene	Laboratory
University Degree	2	3	1
Technical Degree	2	-	-
Administrative	-	17	2
Laborers/Inspectors	-	41	-
Total	4	61	3

(5) Municipality of Florida

In the Municipal Government of Florida, the General Directorate of Hygiene is related to water quality management, as shown in **Figure 3.3.5**. The total staff of the Municipal Government of Florida is 1,145. Of these, a total of 142, as shown in

Table 3.3.5, are allocated to the General Direction of Hygiene. In water quality-related work, majority of them are charged in physical labor work.

Laboratory owns limited equipment for bacteriological analysis. Individual capacity of staff engaged in water quality management appears to be limited, because of the lack of proper training and actual experience.

The General Directorate of Hygiene is in charge of promoting massive education campaigns in order to improve the health of the population, but no area or staff is devoted to environmental education activities on water quality issues.

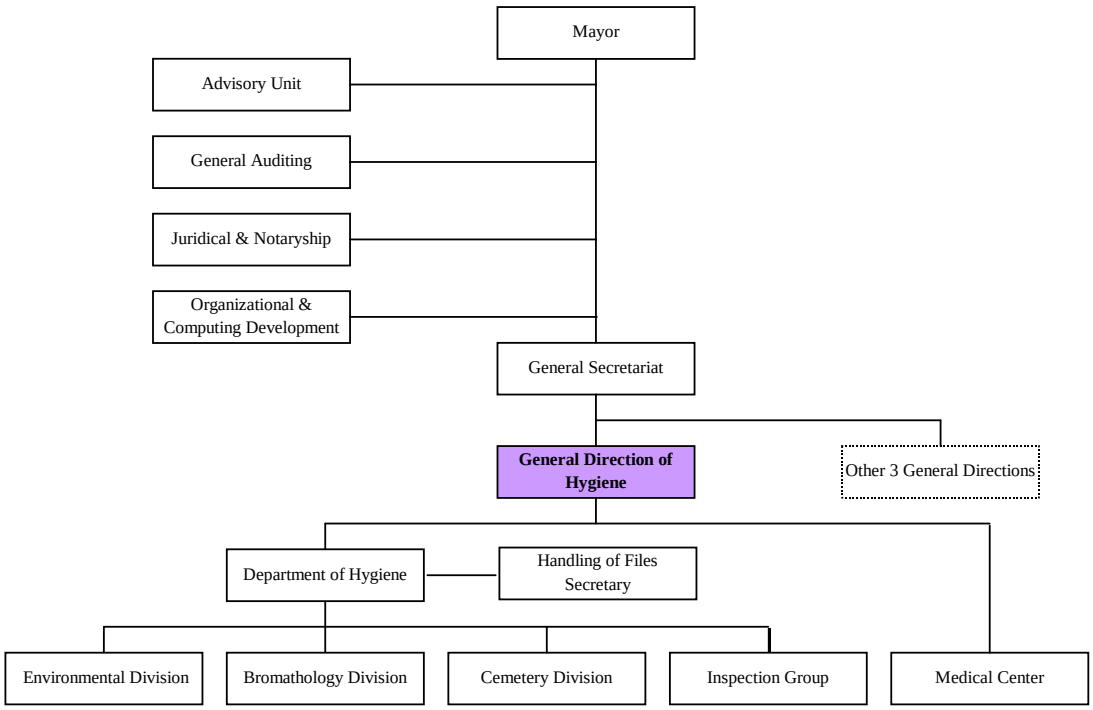


Figure 3.3.5 Organizational Structure of Municipal Government of Florida

Table 3.3.5 Staff Numbers of Water-Related Units in the Municipality of Florida

Categories of Personnel	General Direction of Hygiene	Laboratory
University Degree	21	1
Technical Degree	5	-
Administrative	33	2
Laborers/Inspectors	83	-
Total	142	3

(6) Municipality of Lavalleja

In the Municipal Government of Lavalleja, the General Directorate of Hygiene, Environment and Lifestyle is related to water quality management, as shown in **Figure 3.3.6**. The total staff of the Municipal Government of Lavalleja is 1,288. Of

these, a total of 29, as shown in **Table 3.3.6**, is allocated to the General Direction of Hygiene, Environment and lifestyle.

In water quality-related work, majority of them are charged in physical labor work. Laboratory has limited equipment only for bacteriological analysis and pH. Individual capacity of staff engaged in water quality management appears to be limited, because of the lack of proper training and actual experience.

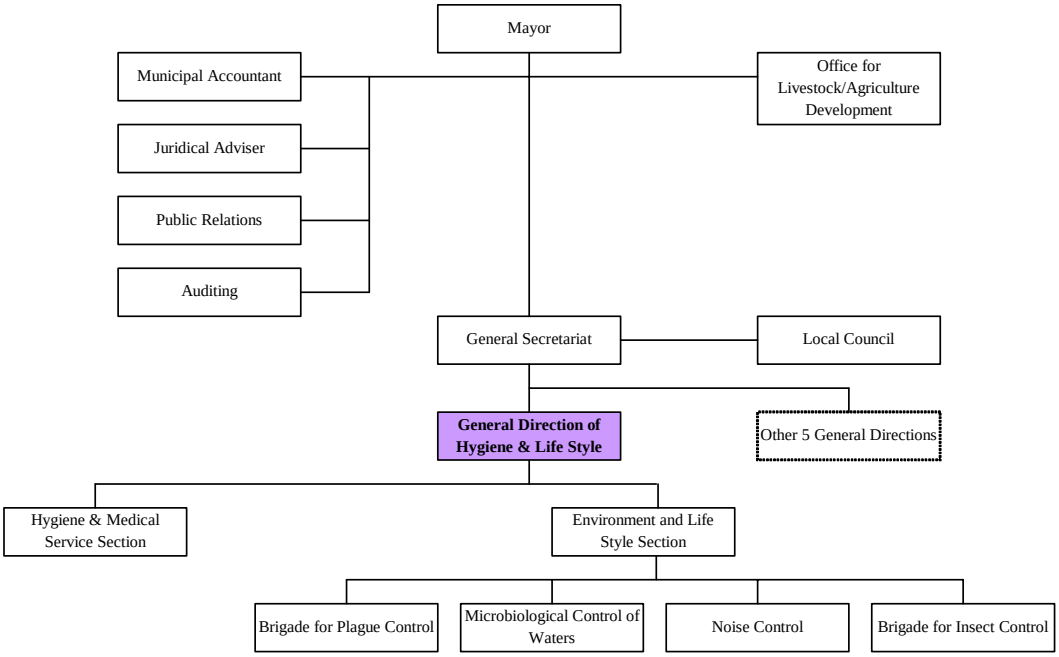


Figure 3.3.6 Organizational Structure of Municipal Government of Lavalleja

Table 3.3.6 Staff Numbers of Water-Related Units in the Municipality of Lavalleja

Categories of Personnel	General Direction of Hygiene, Environment and Lifestyle	Laboratory
University Degree	6	1
Technical Degree	4	2
Administrative	7	-
Laborers	12	-
Total	29	3

3.3.3 Related Organizations in Central Government

(1) National Directorate of Hydrograph, Ministry of Transport and Public Works

General

DNH belongs to the jurisdiction of MTOP. The main law by which DNH is governed is the Water Code. Currently, the function of MTOP through DNH is to manage water resources from the viewpoint of quantity and, meanwhile, MVOTMA through DINAMA from the viewpoint of quality.

Tasks

According to the Law No.16,858, water use permission or concession for irrigation can be issued by the executive power under MTOP. In this connection, DNH is responsible for giving such permissions and concessions. The Article 4 of the said law stipulates the following requisites for obtaining the permissions or concessions:

- The availability of water in quality and quantity must be verified, according to the regulation of the executive power;
- The applicant must have a soil and water use plan approved by MGAP; and,
- The applicant must be the owner of the land to be irrigated or to own the rights for the land use.

Regional Advisory Council for irrigation was created by the same law. This Council is composed of a representative from MTOP as the president, a representative from MGAP as a secretary, two representatives from the water users and two representatives of landowners.

The Council owns the flowing duties:

- To coordinate with users in equitably distributing the available surface water, especially in drought periods;
- To emit opinion on new application for water extraction permission; and,
- To advise the work and measures to be adopted by the authority and water users, in order to increase the availability of water and promote a efficient use.

Inter-Relations with Water Quality Management

DNH and DINAMA must be connected in the following aspects so as to implement their respective duties:

- DNH requires water quality data and information measured by DINAMA to authorize water permissions or concessions; and,
- DINAMA requires hydrological data and information measured by DNH to assess the water environment.

At present, the above-mentioned collaboration appears to be constrained, mainly due to insufficient availability of water quality data in DINAMA and other reasons.

Opportunities for Public Participation

There is an instance of public participation in the Regional Irrigation Councils. While DNH Regional Officer has as a duty to take the presidency of each regional council, producers and irrigation users can take part in this public participation opportunity.

(2) Administration of Sanitation Works of the State (OSE)

General

OSE was created by the Law No. 11,907 in 1952 as a decentralized organization of MTOP. OSE, however, came under the administrative tutelage of MVOTMA, based on the Decree 387/990. OSE is responsible for rendering water supply and sewerage service in the whole of country except for the sewerage service in the Municipality of Montevideo.

Tasks

The article 3 of the Law No. 11,907 established the basic criteria for the provision of services: the provision of sanitary services and duties of institution must be done, prioritizing the social aspects over the economical ones from the viewpoint of hygiene. The article 229 of the Law No. 13,737 in 1969, however, had transformed OSE to a commercial organization belonging to the State.

According to relevant laws, OSE is originally obligated duties on water-related matters, as follows:

- To take part in the management process of water use permission; and,
- To carry out hygiene control of watercourses used for water supply services.

After the Water Code (Law No. 14,859) has been enacted in 1978, the first duty has become not clear but the second one is considered still to be in existence. In fact, according to the Decree 253/979, OSE can intervene various kinds of management on the water bodies classified to the Class 1; namely, the authorization of discharges of wastewater in watercourses or in sewage collectors; and, the enforcement of inspections for industrial wastewater.

OSE, as the provider of water supply and sewerage, is required to obtain the permission of DNH as a water user and, at the same time, to be complied with environmental standard of water quality specified in the Decree 253/979 as a wastewater discharger.

Water Quality Laboratory

OSE has water quality laboratories; one at headquarters and another one at Aguas Corrientes where an intake and purification plant for water supply to the Metropolitan Area is located. EPA and APHA are commonly used in the laboratory of OSE. The laboratory at headquarters covers manual analysis, heavy metals, microbiology and pesticides (GC-MS). Inter-calibration has been carried out with DINAMA.

Inter-Relations with Water Quality Management

OSE and DINAMA are deeply related in the following aspects so as to do their respective duties:

- The collaboration between OSE and DINAMA is crucial for the preservation of water quality, in planning of mitigation measures and in monitoring and evaluation of water quality status, and
- Mutual exchange of data and information on water quality data.

At present, the above-mentioned collaboration appears to be constrained, mainly due to insufficient availability of water quality data in DINAMA.

Environmental Education

There is an Educative Cycle Unit under Public Relations Office and four of facilitators are engaged in specific education matters on water issues.

(3) General Directorate of Renewable Natural Resources (RENARE), Ministry of Livestock, Agriculture and Forestry

General

RENARE under the jurisdiction of MGAP exerts specific roles in legal procedures related to water use for agricultural/livestock purposes. The Decree-Law No. 15,239 governs water and soil conservation, and irrigation for agriculture/livestock use, establishing necessary norms. The Law No. 16,858 gives the competence to RENARE for the approval of the water and soil use plan as an indispensable requirement for obtaining water use permission.

Tasks

The duties of RENARE are connected to the conservation of natural resources like water and soil from the viewpoint of agricultural uses. Major tasks are enumerated as below:

- To formulate a national plan on the sustainable management of the renewable natural resources;
- To enforce laws related to activities on the use and management of renewable natural resources;
- To promote and regulate the use and integral management of renewable resources related to agricultural/livestock activities, taking into account the water basins;
- To administrate the natural resources under the jurisdiction of MGAP;
- To establish and maintain international relations to ensure the accomplishment of agreements or actions for the use and sustainable management of the renewable natural resources; and,
- To formulate regulations and standards on the techniques for soil, water, fertilizers, inoculants and pesticides analysis.

Water Quality Laboratory

Laboratory equipment of MGAP, which can be utilized by RENARE, is well prepared for handling manual analysis, heavy metals, bacteria and pesticides/herbicides.

Dissemination and Environmental Education

About 13 temporary employees with university degree are mobilized for an irregular basis. They work for dissemination and education on soil and water issues in workshops and seminars. Some videos were produced for this purpose some years ago.

(4) National Directorate of Water and Sanitation (DINASA)

General

National Directorate of Water and Sanitation (DINASA) was established on January 17th, 2006 based on the Law No. 17,930 dated December 19th, 2005. Article 327 of the Law No. 17,930 establishes that the Ministry of Housing, Use of Land and Environment shall propose to the Executive Power the formulation of national water and sanitation policies, according to what is stated under article 47 of the Constitution of the Republic. Article 328 establishes that in order to fulfill the assignments stated on article 327, the "National Directorate of Water and Sanitation" should be created under Ministry of Housing, Use of Land and Environment.

Tasks

DINASA is a newly created organization and it is presently studying and planning what will be their future function. Thus the task is still not clear, but Article 47 of the Constitution of the Republic where DINASA is originated states as follows:

Article 47 (new): *the protection of the environment is of general interest. The persons must abstain of any act that causes predation, destruction or serious pollution to the environment. The law will regulate this disposition and will prevent sanctions for the transgressors.*

The water is a natural resource essential for the life. The access to the potable water and the access to the sanitation constitute fundamental human rights.

1) The national policy on water and sanitation will be based on:

a) The land use, conservation and protection of the environment and the restoration of the nature

b) The sustainable management, with solidarity with the future generations, of the water resources and the preservation of the hydrological cycle that constitutes issues of general interest. The users and the civil society, will participate in all instances of planning, management and control of water resources; establishing the water basins as basic units.

c) The establishment of priorities for water use by regions, basins or part of them, being the first priority the water supply to the populations

d) The principle, by which the services of water supply and sewerage are given, must be realized prioritizing the reasons of social aspects to the economical aspects.

All authorization, concession or permission that in any form affects these principles must left without effect.

2) The surface water and underground water, with exception of pluvial water, integrated in the hydrological cycle, constitutes a unity resource, of general interest, that form part of the state public dominium, as hydraulic public dominium

3) The public services of sanitation and the public service of water supply for human consumption will be given on exclusive base and directly by institutions of the state.

4) The law, for the 3/5 of votes of each Chamber, could authorize the water supply, to other country, when this is facing with shortage of water or by means of solidarity.

Participation to the Water Quality Management

Concrete participation to the water quality management by DINASA is still not known. Considering the background of the creation of DINASA, it should strongly participate to the water quality management in the country.

3.3.4 Other Organizations

Besides organizations mentioned above, the following governmental or non-governmental organizations are working in certain areas that generates data, which can be used for water quality management. For DINAMA, they are possible collaborators in the sense of providing basic data and information for water quality management.

LATU (Uruguayan Technological Laboratory)

Main tasks of LATU are to control and manage industrial standards as well as tests and analyses of materials, and provide services of water quality materials for industry, etc. It is provided with sophisticated equipment and techniques for manual analysis, heavy metals, bacteria and pesticides/herbicides.

DINAMIGUE (Directorate of Mining and Geology)

Main tasks of DINAMIGUE, under the jurisdiction of MIEM, are to manage mineral resources and soils, and study on geology and hydrogeology for mining development and environment. Its current activities related to water quality include: the integrated management of groundwater resources under the collaboration with DNH, DINAMA,

etc., the preparation of national GIS (SIGNAC) with MTOP, the services for water quality analysis of physical and chemical property in its laboratory, etc.

DGSA (General Direction of Agricultural Services)

This institution is an executing unit of MGAP. It provides services to any kind of person or entity. Of the services they provide, it can be mentioned that they own a Laboratory able to carry out analysis of pesticides in vegetable and water.

DNM (National Directorate of Meteorology)

Main tasks of DNM under the jurisdiction of MDN are to observe meteorological conditions, and process and issue related data and information.

IMFIA (Faculty of Engineering, Republic University of Uruguay)

IMFIA carries out the study and analysis on water-related projects and management nationwide. It is currently participating in ECOPLATA, FREPLATA and other national projects/studies.

APRAC (Association of Carrasco River Water Rehabilitation)

APRAC, mainly composed of NGOs, is a function for improving and preserving the environment of the Carrasco River Basin. APRAC has an environmental education program, which links the environmental modules with the regular curricula of public education systems. Its current activities include: the survey on environmental conditions, environmental education and campaign and assistance to the Municipal Government of Montevideo for wastewater treatment.

CEADU (Center of Study, Analysis and Documentation in Uruguay)

CEADU is a non-governmental function for conducting environmental education and campaign. It has a program on wastewater treatment with natural methods (Jardinera de Totoras). Its current activities include: preparation of materials for environmental education and campaign for “Clean Technology” and interview survey for environment matters.

GJM（Group of Youth MERCOSUR)

GJM, a non-governmental organization, has developed a manual made by teenagers that reflects youth opinions and views on environmental problems, including water quality issues.

REDES

REDES, a non-governmental organization, edits the magazine “El Tomate Verde”, an educative tool aimed to children and teachers and a website with water quality issues.

Montevideo Foundation (Project Globe)

The Montevideo Foundation has a project on water quality monitoring by school children.

Bioaqua

The Bioaqua conducts capacity building activities for COMMAC (a NGO, Citizen Environmental Monitoring Commission) monitors.

3.4 Pollution Source Management

3.4.1 Industrial Wastewater Management

Based on the Decree 253/979, DINAMA is engaged in activities for industrial wastewater management in the whole Uruguay. In the Municipality of Montevideo, however, the Municipal Government exerts active interventions differently from the other municipalities, as detailed below.

Management by DINAMA

All industries discharging wastewater must be authorized and registered by DINAMA. As of April 2005, a total of 516 industries in the whole Uruguay and 331 industries in the Project Area are registered. These authorized industries are publicized in the homepage of DINAMA, with the information like name of industry, location, industrial category, names of qualified experts responsible for wastewater treatment, etc.

A series of actual procedures is shown in **Figure 3.4.1**. After submitting the SADI (*Solitud de Autorizacion de Desague Industrial*, Application for Authorization of Industrial Discharge), entities must obtain DINAMA's permit and then can start the construction work. Industries must accordingly submit IPO (*Informe de Puesta en Operacion*, Report of Operation) prior to the operation and finally can attain ADI (*Autorizacion de Desague Industrial*, Authorization of Industrial Discharge) on the condition that they completely satisfy all environmental requirements. In the course of the completion of treatment plant and its operation, DINAMA has the competence to inspect at any time, when necessary.

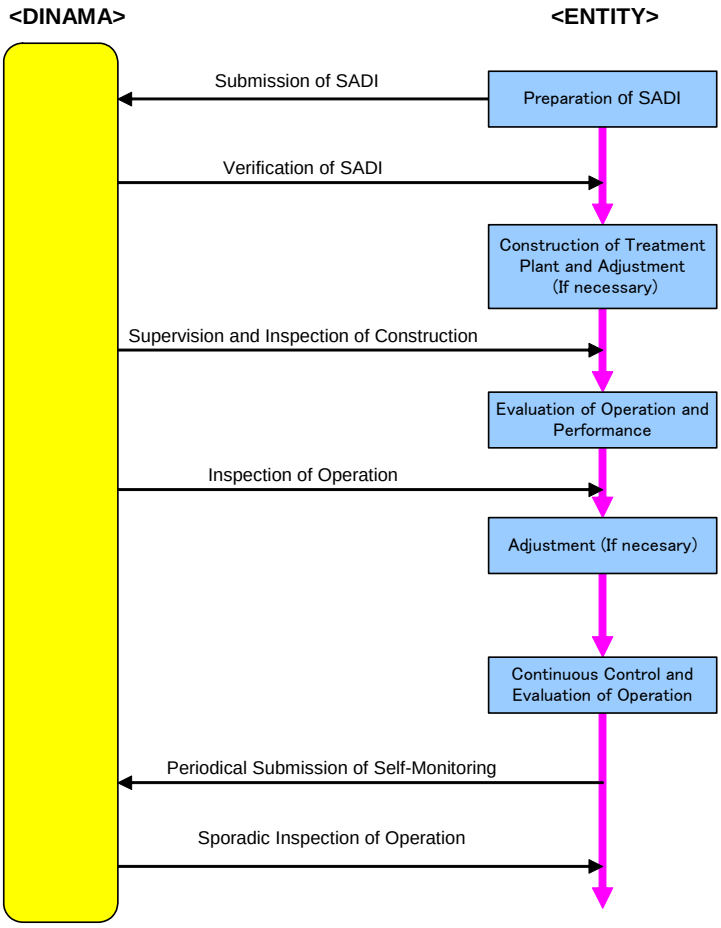


Figure 3.4.1 Procedure of Industrial Wastewater Management

All activities of industrial wastewater discharge are supervised and controlled by DINAMA as mentioned above. In the period of operation, DINAMA conducts the inspection 3 to 4 times a year for major industries (about 10 industries) in the whole country, as a rule. Meanwhile, these inspections are limited to 1 to 2 times for industries located in the Municipality of Montevideo, considering another inspection of several times made by the Government of Montevideo.

Table 3.4.1 shows the records on legal actions taken by DINAMA. In the actual operation of industrial wastewater treatment, there are no evident data explaining whether the prescribed effluent standards are actually observed or not. Based on large numbers of various violations, significant numbers of incompliance appear to exist.

Meanwhile, it should be remarked that all industries are not necessarily equipped with satisfied provisions meeting all environmental requirements, as judged from the fact that only 10 % of industries successfully obtain the ADI.

Another objective of the industrial wastewater management by DINAMA is to analyze and assess the influence of industrial wastewater for the water environment, besides the regulation of industrial effluent. No action, however, can be seen in this respect at present.

Table 3.4.1 Activities and Legal Proceedings Made by DINAMA

Items	Times	2001	2002	2003
Numbers of Inspections	(times/year)	233	463	280
Numbers of Water Sampling	(times/year)	306	373	276
Numbers of Measured Parameters	(parameters/year)	2,194	3,002	2,037
Numbers of Self-Monitoring Reports	(sets/year)	251	78	38
Numbers of Violations[1]	(cases/year)	187	71	35
Numbers of Legal Processing				
- Imposing of Fines	(cases/year)	3	5	15
- Ceasing of Operation of Factory	(cases/year)	0	0	2
- Ordering of Facility Improvement	(cases/year)	204	32	15

Source: The JICA Project Team was given the data by DINAMA.

Notes:

1: In violations for water quality, mal-operation, reporting, etc. are included.

2: The above data represent the ones for the whole Uruguay

Management by Municipal Governments

Municipal governments are involved in industrial wastewater management in a certain extent. Actual interventions of municipal governments are limited to the approval for the start of construction works and sporadic inspections of industries on requests by nearby residents. The status, however, is different in the Municipality of Montevideo.

The Government of Montevideo has actively deployed the actions of industrial wastewater management by itself in the combination with the sewerage development project, separately from DINAMA. Its activities include: setting up of local effluent standards differently from the Decree 253/979, permitting of industrial discharge, enforcement of compliance monitoring of effluent and inspection of industries, etc.

The results of industrial wastewater management by the Government of Montevideo have been publicized in the "Environmental Report" issued yearly. As seen from **Table 3.4.2**, inspections take place systematically based on the classified categories (the first to the third priority), depending on industrial categories. Massive activities with inspections of more or less 300 times and measurement/analysis of about 1,300 parameters a half year have been conducted as shown in **Table 3.4.3**.

Table 3.4.2 Inspection System for Industrial Wastewater in Municipality of Montevideo

Inspection Categories	Numbers of Industries	Frequency of Inspection per year	Industrial Categories
First Priority	23	4	Wool scouring, tannery, vegetable/animal oil and grease, dairy product, slaughter house, meat and poultry, fish processing, petroleum refinery, yeast production.
Second Priority	72	2	Textile, metal industry, paints production, pulp and cardboard, bottle laundry, detergent production, chemical product, canned fruit and vegetable.
Third Priority	-	2	Industries with small pollution loading.

Source: "Environmental Report 2002", Municipal Government of Montevideo, 2003

Table 3.4.3 Inspection Dimension in Municipality of Montevideo

Modality of Inspections	Times	Semester of 2002	Semester of 2003
Inspections with Water Sampling	(times)	220	169
Total Inspections	(times)	331	261
Measured Parameters	(-)	1,470	1,229

Source: "Environmental Report 2002", Municipal Government of Montevideo, 2003

While the situations of industrial wastewater management in the municipalities in the Santa Lucía River Basin are widely different by municipality as shown in **Table 3.4.4**, the compliance inspection by municipalities specializing industrial wastewater, however, has little taken place at this moment, except for Montevideo.

Table 3.4.4 Industrial Wastewater Management in Municipalities

Municipalities	Montevideo (IMM)	Canelones (IMC)	San José (IMSJ)	Florida (IMF)	Lavalleja (IML)
Numbers of Industries[1]	171	108	36	12	4
Major Categories of Industries	Leather, Chemicals, Meats	Meats, Chemicals, Leather, Foods	Meats, Chemicals, Foods	Meats, Textile	Meats, Construction Materials
Numbers of Staff in Charge	Total 9 (All specialize IWWM, including 4 temporary staff)	Total 13 (All are engaged other assignments. No staff specializes IWWM)	Total 3 (All are engaged other assignments. No staff specializes IWWM)	Only 1 (Staff is engaged other assignments. No staff specializes IWWM)	Only 1 (Staff is engaged other assignments. No staff specializes IWWM)
Municipal Regulations for IWWM	Effective	Effective	No	No	No
Actual Situations of Inspections	Periodical inspections take place according to the classified schedule.	No periodical inspection. Sporadic inspection time to time takes place together with the other purposes.	No periodical inspection. Visits to industries take place upon claims.	No periodical inspection. Visits to industries take place upon claims.	No periodical inspection. Visits to industries take place upon claims.
Actual Situations of Effluent Water Quality	Despite periodical inspection, many violations have been reported.	Actual situation is not known but many violations are suspected.	Actual situation is not known but violations are suspected.	Actual situation is not known but violations are suspected.	Actual situation is not known but violations are suspected.

Note 1: Source: SADI record in DINAMA

Measured Parameters in Compliance Monitoring of Industrial Wastewater

Water quality parameters measured by DINAMA and Municipal Government of Montevideo in compliance monitoring of industrial wastewater are shown in **Table 3.4.5**.

Table 3.4.5 Measured Parameters in Compliance Monitoring of Industrial Wastewater

Organization & Program	DINAMA	IMM		
		4 Creeks & Montevideo Bay		
Frequency / Parameters	Basically annually	Quarterly	Bi-annually	Annually
Floating substances				
Temperature	○			
pH	○			
BOD_5 (mg/l)	○	○	○	○
Solid deposit (mg/l)				
Total suspended solid (mg/l)	○	○	○	○
Fats and oils	○	○	○	○
Sulfide (mg/l)	○	○	○	○
Detergents (mg/l) as LAS				
Phenol (mg/l) as C_6H_5OH				
Flow rate	○	○	○	○
Ammonia (mg/l) as N				
Total phosphorus (mg/l) as P				
Coliform bacteria (MPN/100ml)	○	○	○	○
Cyanide (mg/l)	Heavy metals are case by case			
Arsenic (mg/l)				
Cadmium (mg/l)				
Copper				
Total Chromium (mg/l)	○	○	○	○
Mercury (mg/l)				
Nickel (mg/l)				
Lead (mg/l)				
Zinc (mg/l)				

Note: 4 creeks are Miguelete, Pantanoso, Carrasco and Las Piedras.

Quarterly-based monitoring is required for such industries as wool factory, tannery, oil and fat factory, milk factory, slaughterhouse, fish processing factory, oil refinery plant, etc.

Bi-annual-based monitoring is required for such industries as textile, metallurgical industry, painting factory, pulp industry, bottle washing plant, detergent factory, basic chemical factory, food and canning factory, etc.

Annual-based monitoring is required for industries categorized in the third priority, producing or potentially contributing to 10 % of the total pollution load.

3.4.2 Intervention in Domestic Wastewater Management

At present, acitivities being made by DINAMA as the intervention in domestic wastewater management is limited to the supervision of the construction work of sewerage undertaken by OSE.

While the intervention in domestic wastewater management aims to coordinate and supervise the development projects of sewerage system, and to analyze and assess the

influence of sewage for the water environment, no actions by DINAMA can be seen in this regard.

3.4.3 Intervention in Solid Waste Management

(1) Domestic Solid Waste

The intervention in solid waste management by DINAMA aims to coordinate and supervise the development projects of solid waste disposal projects from the viewpoint of water pollution. Furthermore, analysis and assessment on the influence to the water pollution caused by solid waste dumping to water bodies and leachate from dumping sites are another objectives. Despite the fact that significant influence caused from solid waste to water pollution is widely known in the Project Area, actions by DINAMA can little be seen in this respect.

(2) Industrial Solid Waste

COTAMA had conformed a working group denominated "Gesta Industrial Solid Waste" integrated by various stakeholders related to the subject of industrial solid waste. This working group had formulated a technical proposal for the regulation of the integral management of solid waste originated by industrial, agriculture/industrial and services activities.

3.4.4 Intervention in Non-Point Source Pollution Management

The objective of the intervention in non-point source pollution management by DINAMA is to coordinate and assist the actual measures taken by MGAP. In addition, analysis of the pollution originated from non-point sources from agriculture lands is another objective.

Despite the fact of a possible threat of eutrophication for raw water sources in the Santa Lucía Basin, which are predominantly used for the potable water of the metropolitan area, DINAMA doesn't indicate correspondent actions in this respect. Meanwhile, DINAMA is indicating its intention to initiate for the contamination of pesticides in the water environment, asking JICA for providing necessary equipment and relevant technology transfer.

3.5 Ambient Water Quality Monitoring

3.5.1 Monitoring by DINAMA

(1) Overview

Generally, the wording of "water quality monitoring" is used for a serial activity consisting of: monitoring network designing, data generation (water sampling and transportation, measurement and analysis in laboratory, data processing) and information generation including the interpretation. The final output of the ambient water quality monitoring is to generate information containing the interpretation for the updated status of the water environment. This is essential for the decision/policy-making in the establishment of policies and strategies.

DINAMA had implemented ambient water quality monitoring under various projects or programs since its creation in 1990, but its activities have been very constrained recently mainly for the financial reason. Ambient water quality monitoring is originally to be conducted continuously at certain frequencies and at specified points of watercourses. In DINAMA, however, water sampling and quality analysis had been carried out in specific period, so-called campaign, but not periodically. According to the definition of water quality monitoring, most of activities undertaken by DINAMA are of the character different from original water quality monitoring.

Apart from the status above, a program on monitoring of coastal water quality is undertaken by DINAMA (from October to March) in order to provide holidaymakers with information on suitability for bathing as a result of bacteriological analysis.

(2) "Water Quality Goal Project 2000"

Monitoring in the "Water Quality Goal Project 2000" had been implemented by DINAMA for the period between 1990 and 2001, and a total of 76 locations (34 in the Santa Lucía Basin and 42 in the La Plata Basin) had been selected in the Project Area in representative rivers and creeks. Numbers of measured samples over 12 years were 297 in total (190 in the Santa Lucía Basin and 107 in the La Plata Basin).

Parameters measured in this Project were 43 in total, as detailed below. Data obtained from the measurement are stored in the form of spreadsheet, almost without being interpreted and used. A part of obtained data was used in the "DINAMA Environmental Report 2001" that was suspended and not completed. The locations of monitoring station are shown in **Figure 3.5.1** and **Figure 3.5.2**.

Physical:	Temperature, Transparency, Color, Turbidity, Total solid, Volatile solid, Total suspended solid, Soluble suspended solid
Physico-Chemical:	Conductivity, Salinity, TDS, Dissolved oxygen, pH, Oxidation, Reduction Potential, Alkalinity, Calcium, Ortho phosphorus, Nitrite nitrogen, Nitrate nitrogen, Ammonia nitrogen, Total phosphorus, Silicon, Sulfur, Chloride, Manganese, Magnesium, Sodium, Potassium, BOD, COD, Oil and grease, Chlorophyll
Heavy Metals:	Iron, Lead, Nickel, Cupper, Chromium, Cadmium, Mercury, Arsenic
Bacteriological:	Total coliform, Fecal coliform

(3) Other Monitoring Programs

Water quality programs partly involving DINAMA are described below and their profiles are summarized in **Table 3.5.1**.

Table 3.5.1 Monitoring Stations in Programs Involving DINAMA

Project	River/Creek Basin	Number of Stations	Sampling Date
ECOPLATA	Santa Lucía	13	Nov. 2 and 23, 2000
	Carrasco	9	Mar. 3 and 7, 2000
	Pando	8	Dec. 2 and 6, 2000
FREPLATA	Cufré	2	Aug. 22, 2003
	Mauricio	1	Aug. 22, 2003
	Carrasco	2	Sep. 1, 2003
	Pando	2	Sep. 2, 2003
	Solis Chicos	4	Sep. 4, 2003
	Solis Grande	2	Aug. 3, 2003
	Santa Lucía	3	Sep. 10, 2003
	Miguelete	1	Sep. 15, 2003
	Pantanoso	1	Sep. 15, 2003

APRAC (Recovery Association of Carrasco River)

APRAC is a non-governmental organization established in April 1988 to protect natural environment in the Carrasco River Basin, with carrying out water quality monitoring. It consists of 35 members including a number of commissions of local communities, schools, sport clubs, hotel associations, etc. DINAMA was once a member of the association but left a few years ago.

ECOPLATA

An Agreement was concluded on November 17, 1997 between DINAMA and other relevant organizations such as MGAP, SOHMA, and University of the Republic, to coordinate activities for "Integrated Management of Coastal Zone of Uruguay along the La Plata River". The project commenced in March 1998 with the financial support from DINAMA, UNDP, UNESCO and CIID. DINAMA was in charge of water quality monitoring and sediment analysis for the selected 3 rivers, namely, the Santa Lucía, Carrasco and Pando Rivers as a pilot project.

FREPLATA

The project commenced in 2001 to conduct proper management of common water area of the La Plata River in collaboration with SOHMA and the Faculty of Science of the University of the Republic. A total of 20 rivers or creeks have been selected for the monitoring of water quality, and basically 3 samples are to be taken from each river/creek (river water, sea water off the estuary and brackish water). Sampling was carried out in August-September 2003.

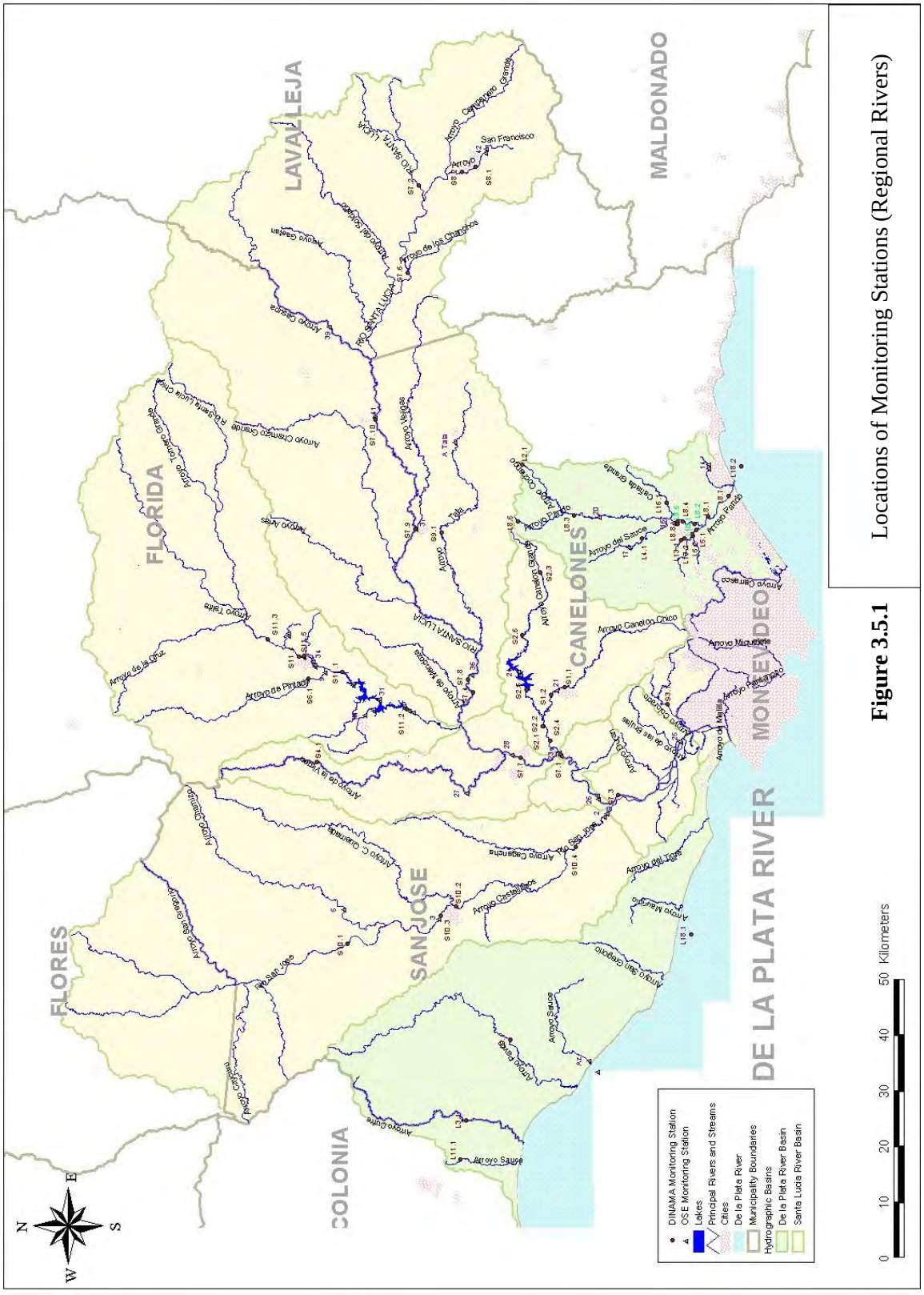


Figure 3.5.1 Locations of Monitoring Stations (Regional Rivers)

Locations of Monitoring Stations (Urban Rivers)

Figure 3.5.2

3.5.2 Monitoring by Municipal Governments

(1) Municipality of Montevideo

The water quality monitoring program carried out by the Government of Montevideo, one of the components of the Urban Sanitation Plan, was commenced early in 1999 by the consortium of consultants. The program continues from the summer 2002 under the responsibility of the Government of Montevideo. It consists of 6 campaigns a year (3 in summer and 3 in winter). In addition, river discharges are measured in the campaign of summer and winter respectively. During the period 1999-2001, sampling has been conducted at 33 monitoring stations in the four selected rivers (Pantanoso, Miguelete, Carrasco, and Las Piedras) and in Montevideo Bay. The Government added one more station in the Carrasco River Basin in 2002 to evaluate impact on water quality by industrial wastewater. All analysis work is carried out in the laboratory of the Government located at Punta Carretas.

Information on existing monitoring stations of the Municipal Government of Montevideo is summarized in **Table 3.5.2**. The results of the monitoring are publicized in the "Environmental Report" issued annually.

Table 3.5.2 Monitoring Stations of Government of Montevideo

River/Creek Basin	Number of Stations	Monitoring Frequency
Miguelete	9	Bi-monthly
Pantanoso	7	Bi-monthly
Carrasco	9	Bi-monthly
Las Piedras	5	Bi-monthly
Montevideo Bay	4	Bi-monthly

Source: "IMM Environmental Report 2002", The Municipal Government of Montevideo, 2003

(2) Other Municipal Governments

The Government of Canelones takes 15 water samples every week from the beach of the La Plata River. The river coast is divided into three blocks and samples are taken from five selected beaches at each block, and sampling points are scheduled to change every week according to a five-week rotation plan. Collected samples are analyzed in the laboratory of the Government for such parameters as pH, DO, BOD and coliform. With respect to the creek, the estuaries of the Carrasco, Pando, Solis Chico and Solis Grande River are the focus of the water quality monitoring.

The other municipal governments of San José, Lavalleja and Florida are expressing interest in water quality. However, due to the small capacity of their own laboratory, parameters are limited only to pH and coliform, which may be useful for the people's health care about bathing in the creek.

3.5.3 Water Quality Measurement by OSE

OSE has around 10 monitoring stations in the Santa Lucía River Basin. These are located within 50 km upstream from the water intake weir of Aguas Corrientes. Monitoring is

conducted every week for the analysis of 11 parameters. Water quality at the intake is analyzed at 6 times a day for 6 physical and chemical parameters in the laboratory at the treatment plant. For the first time of sample of the day taken at 7 a.m., the analysis of 36 parameters is defined. In addition, OSE is currently undertaking nationwide campaign to secure the quality of drinking water, so that sampling and analysis work are now underway in the laboratory of OSE headquarters. The total numbers of samples are supposed to be 700, of which 600 samples will be taken from the groundwater and the remaining 100 will be from the treatment plant. This campaign will last two years.

3.5.4 Water Quality Monitoring Status by Water Quality Parameter

In order to grasp the present status of the water quality monitoring by relevant organizations, water quality parameters monitored by each program or campaign are checked as shown in **Table 3.5.3**. From the table together with the present status as discussed above, the following are confirmed as the status of the present water quality monitoring.

Table 3.5.3 Identificaiton of Issues by Water Quality Parameter

Water Quality Management Approach and Organization / Analytical Parameters			Establishment of Policy and Strategies					Pollution Source Management						Ambient Water Quality Monitoring																								Dissemination/Education and Public Participation		
				Present Decree 253		Amendment of Decree 253		Monitoring of Wastewater						Previously/Presently Conducted Monitoring														Laboratory Capacity														
														DINAMA				OSE		IMM		IMC		IMSJ		IMF	IML			RENARE											
			Use in Policy Formulation	Environment Standard	Effluent Standard	Environment Standard	Effluent Standard	DINAMA	IMM	IMC	IMSJ	IMF	IML	ECOPLATA	FREPLATA	Beaches	Regular monitoring	Intake (Daily)	Upstream 9 sites (Monthly)	Creeks/Bay (Bi-monthly)	Beaches (Daily)	5 Creeks (Estuary)	Beaches (Weekly)	3 Creeks	Beaches (Weekly)	Creeks (Summer campaign)	Creeks (Summer campaign)	DINAMA	OSE	RENARE	Labo. of DGSA	SOHMA	LATU	IMM	IMC	IMSJ	IMF	IML	Information Sharing		
General, physicochemical and bacteriological		Flow Rate			○		All under study	○	○					○														○				○	○	○							
		Temperature			○			○	○					○	○	○		○										○	○	○		○	○	○	○	○	○	○			
		Odor		○		○		○	○						○			○										○	○	○		○	○								
		Color		○		○		○	○									○	○									○	○	○		○	○	○	○	○	○	○			
		Floating Substances		○		○									○													○	○			○	○								
		Turbidity		○		○								○				○	○									○	○			○	○	○							
		Conductivity												○	○	○												○				○	○	○							
		Salinity												○	○	○												○				○	○	○							
		pH	Basic parameter	○	○	○		○	○					○	○			○	○	○		○	○	○	○	○	○	○	○	○		○	○	○	○	○	○	○			
		DO		○		○								○	○				○	○		○	○					○	○	○		○	○	○	○						
		BOD		○	○	○		○	○					○	○				○	○		○	○	○				○	○	○		○	○	○	○						
		COD												○														○				○	○	○	○	○	○				
		Chloride				○																						○	○			○	○	○							
		Sulfide			○			○	○																			○				○	○	○							
		Fats and Oil		○	○	○		○	○											○								○	○	○		○	○	○							
		Detergent		○		○													△									○	○			○	○	○							
		Phenol		○	○	○																							○			○	○								
		Ammonia-N		○	○	○			○					●	○			○	○	○				○				○	○			○	○	○		○					
		Nitrate-N		○		○								○●	○			○										○	○			○	○	○							
		Nitrite-N				○									○													○				○	○	○		○					
		Phosphorus		○		○								○●	○					○								○	○			○	○	○							
		Suspended Solid		○	○	○		○	○					○	○													○	○			○	○	○			○				
		Solid Deposit			○																							○				○	○	○							
		Total Solid			○									○														○				○	○	○							
		Sodium Absorption Rate		○										○														○	○			○	○								
		Fecal Coliforms	Indicator for bathing	○	○	○		○	○					○	○	○				○	○	○	○	○	○	○	○	○	○	○		○	○	○	○	○	○	○	○		
		Total Coliforms														○												○	○	○		○	○	○	○	○					
	Heavy metals	Aluminum	Regular monitoring of heavy metals in ambient water is conducted only by IMM.			○	Heavy metals are case by case.																					○				○	○	○ *1							
		Arsenic		○	○	○								●														○	○			○	○	○ *1							
		Boron		○																									○			○	○								
		Cadmium		○	○	○								●	○●													○	○			○	○	○							
		Chromium	Representative of heavy metals	○	○	○		○	○					●	○●					○●								○	○			○	○	○							
		Hexavalent Chromium				○																						○				○	○	○							
		Copper		○	○	○								●	○●													○	○			○	○	○							
		Cyanide		○	○	○																						○	○			○	○								
		Lead	Representative of heavy metals	○	○	○			○					●	○●					○●								○	○			○	○	○							
		Mercury		○	○	○								●														○	○			○	○	○ *2							
		Nickel		○	○	○								●														○	○			○	○	○							
		Selenium				○																						○				○	○								
		Zinc		○	○	○									○													○	○			○	○	○							
		Other metals				under study																												Si *1								
	Pesticides		Few data exist and difficult to evaluate the present situation	○ Total 14-kind		under study								●	○●													They have G.C.	○ with G.C.-MS	8 parameter in Stockholm Convention with GC-HPLC		○	atracina simazinea								
Volume of available water quality data																																								
	Number of station													30-point	18-point	Sponta-neous	23	1-point	9-point	34-point	21-point	5-point	15-point	3-point	4-point	few	few														
	Monitoring frequency							Annually	Quarterly or Bi-annually or Annually by kind of industry	Rarely conducted.				1-time in 2000	1-time /year for 2003-	Sponta-neously in summer	2-5 time for 1990-2001	Daily	Monthly	Bi-monthly	Daily in summer	Monthly	5-week continu-ously in summer	3-time /year	Weekly in summer	Summer	Summer				Responsi-ble for agricultural food import/ export (residual pesticides)									
Others																																Private analytical organiza-tion								

Note ○: Applied/Applied for water, ●: Applied for sediment, △: To be conducted but not conducted actually *1: Equipment available but no actual implementation *2: Can be done but nobody want to do because of less safeness

IMM: Montevideo, IMC: Canelones, IML: Lavalleja, IMSJ: San Jose, IMF: Florida

3.6 Dissemination, Education and Public Participation

3.6.1 Overview for the Country

Overview

In Uruguay there is a number of accumulated environmental impacts and other environmental problems generated on a regular basis, due to the effects of human activities. There is, however, no national system of the proper environmental management in Uruguay. DINAMA is in charge of identifying the most critical environmental problems, prioritizing and selecting them.

There is no sufficient management system for industrial discharge. An appropriate disposal system for solid waste is also not provided in Uruguay and, thus, in many cities household residues are the main problem. The main problems dealt by some NGOs are pesticide overuse in soils, forest cultivation using species that use large volume of water, increasing water contamination and overuse of fertilizers.

Environmental Conflicts and Solution Practice

"The research of Santandreu and Gudynas" says that the environmental conflicts in Uruguay related to water quality reflects the general concept; the most of the conflicts with relation to water would be diluted along the time without any solution. For example, MVOTMA formed a commission with the basin management features for the Carrasco River's management under wide-range participation, but it has functioned no more since 2001.

Nevertheless, there were so many formulations of communities seeking participatory approaches. In 2000, several community organizations formed the Water and Sanitation Protection Commission of Costa de Oro and Pando, worried about the contamination of groundwater caused by malfunctioning of wastewater treatment plant in Costa de Oro and Pando (Canelones). Meanwhile, the National Water and Life Protection Commission (CNDAV) was formed in 2002 by the participation of diverse organizations: neighborhood councils, user groups, environmental NGOs like Redes, OSE trade union (FFOSE), Joanico Promotion Association (Canelones), Wine Producers Center of Uruguay, Agriculture Movement of Uruguay, Nationalist Commission on Water Protection, Manantiales Promotion League and Science Faculty and Engineering Faculty academics. The CNDAV promoted a ballot that would be voted on November 2004 and proposed the integrated and sustainable basin management with basin authorities and civil society involvement.

The problems in water resources resulted from the prolonged drought in Uruguay caused many conflicts in different natures involving many actors, namely:

- Availability of water resources is not enough to cope the needs of users with registration. Thus, the intervention by the Irrigation Councils is inevitable, and
- Some group use water for livestock but they are not obliged to be registered. This generates conflicts difficult to be solved and should be studied deeply for ultimate solution, promptly.

Another problem related to the priority in water allocation arose between hydropower generation and irrigation uses in the Rio Negro basin. In this case, the problems was faced and solved at basin planning method.

National Policies and DINAMA's Task

The national policy on environment in Uruguay states that DINAMA should actively participate in environmental education processes. Since 1997, however, DINAMA has not had directorate or division in charge of the development for actions on environmental education on regular basis. One of DINAMA's essential duties (according to the Decree 257/979) is to formulate, supervise and evaluate plans to prevent the environmental impacts of human activities or projects. They include the promotion of environmental awareness, prioritizing planning and execution of education, capacity building, information and dissemination activities that lead the adoption of behaviors consistent with the environmental protection and the sustainable development.

At present, there is no national policy on environmental education, as a programmatic proposal of environmental education promotion in all sectors of society that establish responsibilities and duties. A national policy on environmental education should give an institutional framework of environmental education, establishes their principles and be the basis for public policies.

Although DINAMA has produced some public campaigns on environmental issues, they are in a very limited extent for the elaboration and production of public campaigns on water quality problems. Also it has not been involved so much in the prevention of conflicts related to water quality problems.

3.6.2 Dissemination Activities on Environment

DINAMA has developed a bimonthly magazine the "Ambiente Uruguay" and the website. Some articles in these media have focused on underground water, the evaluation of industrial wastewater toxicity and industrial water pollution control. The page related to water quality evaluation is presently under construction without disseminating related data and information.

Meanwhile the OSE's website has sent information material on drinking water quality protection and water saving.

GEA in the Municipal Government of Montevideo has developed two websites for community monitoring system for education and communication on public participation in environmental issues. GEA has published various kinds of printed materials, videos, radio spots, CD-ROM, etc. on water quality issues. DINAMA has no activities in participating in these campaigns and activities. Though other municipal governments (in Canelones, Florida, Lavalleja and San José) have websites, special sections devoted to environmental issues are not provided.

While one of DINAMA's functions is to operate the Environmental Information System (including the Annual Environmental Report) related to air, water, soils and biota, the annual report has not been published in recent years.

OSE basically directs their information dissemination mainly to drinking water protection and appropriate use, not to water resource protection and recover. GEA directs the information dissemination mainly focusing on water contamination and watercourses monitoring and protection.

3.6.3 Activities on Environmental Education

OSE uses its website as a platform for an educative campaign directed to schoolchildren. Educative programs of the Government of Montevideo are: "Water for Life (Agua para la Vida)", "Montevideo Limpia", and AQUATOX and the programs are realized with the authorization (but not with the coordination) of the National Public Education Administration. DINAMA is not involved in these programs.

At primary education level some kind of educative work on water issues exist through MECAEP (Improvement of Quality of Primary Education) program with elaboration and distribution of educative materials, development of capacity building activities for teachers, an electronic bulletin, and promotion of projects on health and environment (PME). DINAMA is not involved in these programs, also.

OSE educative activities focuses on drinking water quality protection and water saving. The Government of Montevideo's educative programs on water quality are directed to involve communities on water quality problems of local rivers and apply a basin-based approach. MECAEP projects focuses on water saving and rational use.

3.6.4 Current Status of Public Participation in Water Quality Matters

On complains from the public, the website of the Government of Uruguay navigates how and where to convey environmental complaints and, there, DINAMA is designated as the window in this respect.

Meanwhile, the Government of Montevideo has set the phone numbers that receives complaints and questions on environmental issues. COMMAC (Montevideo Citizen Environmental Monitoring Commission) on citizen environmental monitoring system is attended by the representatives of NGOs and citizen environmental commissions. It is an institutional space for public participation on water quality monitoring but DINAMA is not involved in this.

The Government of Montevideo created GAM (Montevideo Environmental Group) to basically define the Montevideo Environmental Agenda (Montevideo Agenda 21). GAM provides the following activities: Plenary Conference that meets under a wide and diverse participation, Executive Board (consisting of the Government of Montevideo, DINAMA and NGOs); and five open-ended working groups (one on water resources) that allow the participation of experts and delegates of different organizations, neighborhood commissions, etc. DINAMA participates in discussions.

COTAMA has organized a working group that focuses on a proposal of updating the Decree 253/979 in the participation of public. DNH and RENARE set up a basin-based commission called Regional Irrigation Councils along with main objective to avoid the waste in water utilization.

CHAPTER 4. FIRST DRAFT INTEGRATED MASTER PLAN ON THE CAPACITY DEVELOPMENT FOR THE WATER QUALITY MANAGEMENT

In this chapter, the First Draft Integrated Master Plan on the capacity development for the water quality management has been studied and established. Principles for water quality management in Uruguay was discussed first, since it would be the basis of the overall planning. The study on the formulation of the First Draft Integrated Master Plan is followed by present conditions analysis, problem analysis, objectives analysis, proposal of the concrete direction of water quality management, and proposal of the capacity development plan. The First Draft Integrated Master Plan included pilot projects to be implemented in Phase II of the Project in the fiscal year 2004. The outcomes of the pilot projects implementation has been identified and given feedback to the master plan for the establishment of the Second Draft Integrated Master Plan in **Chapter 5**.

4.1 Principles for Water Quality Management in Uruguay

4.1.1 Principles for Water Quality Management

Principles of water quality management in Uruguay have been envisaged considering the present status of the country as well as the worldwide trend. Principles are proposed as: i) Water Quality Management for River Basins, ii) Systematic Water Quality Management, and, iii) Integrated Water Quality Management as follows.

Water Quality Management for River Basins

Water quality management should be conducted by river basin and not by administrative territory. This is needed for the adjustment of conflict between upstream and downstream areas, to grasp influence of water quality to river water utilization, and to grasp influence of pollution sources to river water quality.

Systematic Water Quality Management

In general, water quality management is defined as a series of activities to preserve and improve the quality of water. In many countries, diverse kinds of approaches have been applied to fulfill objectives of water quality management, depending on the characteristics of socio-economic, geographical, administrative and other conditions. Basic scheme for water quality management is, however, commonly comprised of basic elements: establishment of the target criteria, the control of pollution sources and the monitoring of water quality. In order to realize sustainable management, participation of the public is deemed important in the status in Uruguay.

In order to realize the systematic management, the following cycle of the water quality management has thus been proposed.

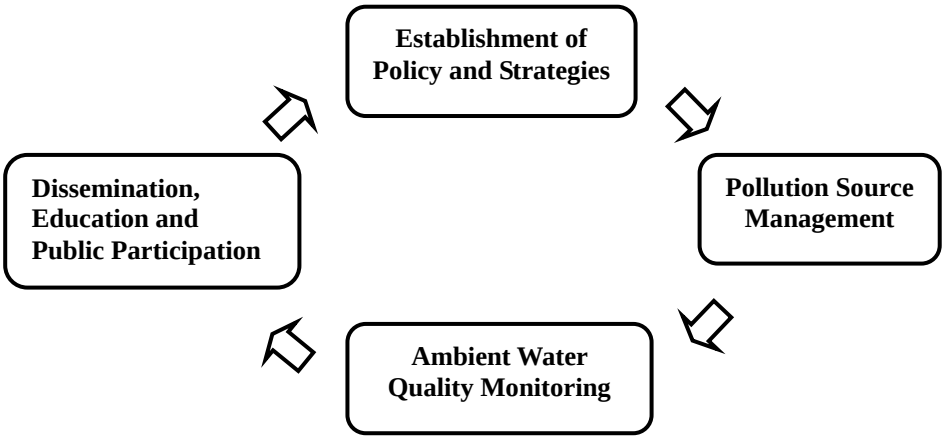


Figure 4.1.1 Proposed Cycle of Water Quality Management

Integrated Water Quality Management

It is declared in Decree No.253 that DINAMA should play the leading role in the various activities for water quality management. At the same time, however, the decree declares various organizations relating to the water quality management. In order to implement "water quality management in river basins" and "systematic water quality management" as discussed above, collaboration of all the relevant organizations is deemed important. As a result, involvement of relevant organizations to water quality management with the awareness of ownership is realized. Integrated management also avoids concentration of loads to DINAMA and thus realizes sustainability of water quality management in Uruguay. Relevant organizations include, DNH, RENARE, OSE, and Municipalities.

4.1.2 Specific Approaches for Water Quality Management

In order to secure the preservation and improvement of the water quality in the Project Area, specific activities corresponding to the four basic modules of water quality management as discussed in the previous section are suggested, as follows:

(1) Establishment of Policy and Strategies

"Establishment of Policies and Strategies" in the cycle of the water quality management is in the most upstream part. Principles of water quality management, namely, "Water Quality Management for River Basins", "Systematic Water Quality Management", and "Integrated Water Quality Management" should always be kept in mind in the activities under this component of the management cycle. DINAMA is exclusively responsible for these approaches. Necessary coordination with the relevant agencies should always be considered.

The approach includes initiation and amendment (when necessary) of laws, regulations, degrees, codes, regulatory standards like environment standards of water quality and effluent standards, etc. necessary for the enforcement of water quality management. Also included is the establishment of a system for integrated management.

Classification of water bodies is included in this approach to classify and set up particular quality targets for respective water bodies, applying graded quality classes. Thus, the water quality set by the classification become specific targets for respective water bodies in water quality management. The Decree 253/979 is now under the examination for amendment and the application methods of the environmental standard of water quality is likely to be changed from the present ones in the future. Even so, the aims of this approach handled by DINAMA will maintain substantially unchanged.

(2) Pollution Source Management

"Pollution Source Management" approach in the cycle of systematic water quality management covers various kinds of pollution sources, namely, industrial wastewater, domestic wastewater, solid waste, and non-point sources.

Industrial Wastewater Management

Industrial wastewater treatment facilities are constructed and operated by correspondent entities. The approach of industrial wastewater management is to regulate wastewater discharged from industrial entities through the authorization of discharge, inspection, effluent monitoring, etc. by means of the principle of "command and control". There is another principle, e.g. "market based instruments: MBI" as promoted by World Bank and others in order to achieve environmental targets by economic principle charging to entities by the volume of contamination in the discharge from the factory. Application of such a method is considered early for Uruguay, and strengthening of institutional systems should firstly be implemented.

In addition, this approach is to analyze and assess the influence of industrial wastewater for the water environment, aiming to establish integrated strategies for the conservation and improvement of the water environment over a long term. Besides, it is proposed that DINAMA enforces the activities relevant to industrial wastewater management with the assistance of Municipal governments.

Intervention in Domestic Wastewater Management

In Uruguay, sewerage development and management are implemented by OSE in Municipalities except for the Municipality of Montevideo where the Municipal Government implements them. DINAMA has competence to intervene in domestic wastewater management with the assistance of municipal governments. The approach of the intervention in domestic wastewater management is to coordinate and supervise the development projects of sewerage system.

In addition, this approach is to analyze and assess the influence of sewage for water environment, aiming to establish integrated strategies for the conservation and improvement of the water environment over a long term.

Intervention in Solid Waste Management

In Uruguay, municipal governments implement solid waste disposal development and management. DINAMA has competence to intervene in solid waste

management. The approach of the intervention is to coordinate and supervise the development projects of solid waste disposal projects. Another objective is to analyze and assess the influence of water pollution caused by solid waste dumping to water bodies and leachate from dumping sites, aiming to establish integrated strategies for the conservation and improvement of the water environment over a long term.

Intervention in Non-Point Source Pollution Management

Actual measures in non-point source pollution management are implemented mainly by MGAP, since typical pollutants such as nutrients (nitrogen and phosphorus) and pesticides are generated from agricultural lands. The intervention by DINAMA is to coordinate and assist the actual measures taken by MGAP. In addition, this approach is to analyze the pollution originated from non-point sources, aiming to establish integrated strategies for the conservation and improvement of the water environment over a long term.

(3) Ambient Water Quality Monitoring

DINAMA has the responsibilities for carrying out ambient water quality monitoring to scientifically clarify and assess the status of the water quality, concerning all water quality parameters specified in the environmental standard of water quality. This approach consists of a series of component works: design of monitoring networks, sampling and analysis of water, accumulation of data in a database, processing and interpreting of data, and providing information for decision-making and dissemination.

(4) Dissemination, Education and Public Participation

Approaches of dissemination, education and public participation in water quality management are aiming: to raise the awareness of community to the water environment through rendering the knowledge on water quality-related matters by means of dissemination and environmental education, and, to reflect stakeholders' opinions to the strengthening of water quality management through the participation of public.

4.2 Participation in Water Quality Management by Organization

Roles, present status of involvement, issues relate to water quality management for major organizations are identified in this Section. The study in this section is based on the present condition as discussed in **Chapter 3**, as well as referring to the results of participatory sessions held in the course of the Project. Summary of issues is presented first, and the discussion for each organization follows.

4.2.1 Summary of Issues

Based on the discussion for each organization as presented in the following sub-sections, characteristic issues are summarized by each approach of water quality management cycle as follows:

(1) Establishment of Policy and Strategies

- Decree 257/979 defines that DINAMA is responsible for the formulation, execution, supervision and evaluation of national plans of environmental protection and to propose the national policy taking into account a sustainable development. The necessity of basin-wide, systematic and integrated water quality management is less recognized by DINAMA, and present water quality management is partial and fragmentary.

(2) Pollution Source Management

- DINAMA is the leading agency for the pollution source management in Uruguay. Of the management by pollution sources, industrial wastewater management is conducted through DINAMA's leadership. Among others, industrial wastewater management is in a relatively advanced level in DINAMA. The industrial wastewater management is conducted through, application and approval (SADI), issuance of wastewater discharge license (ADI), compliance inspection including wastewater quality monitoring, etc.
- Emission Control Department with eight staff under Environmental Control Division is in charge of approval of industrial wastewater discharge in DINAMA. Staff of the Emission Control Department generally has enough technical level for industrial wastewater management. Due to the absence of procedural manuals and technical guidance, however, management work depends on the personal experience and knowledge. Compliance inspection and monitoring of wastewater are conducted approximately once a year to about the half of the registered enterprises (a total of 516 in the whole country).
- Each Municipality also is authorized for compliance inspection for industrial wastewater management. Municipality of Montevideo implement compliance inspection in an organized manner. The other four Municipalities in the Santa Lucía River Basin have not conducted systematic industrial wastewater management.
- Collaboration between DINAMA and relevant agencies for pollution source management is less. There is some collaboration for industrial wastewater management, almost no collaboration has, however, been conducted for domestic wastewater management, solid waste management, and non-point pollution source management.

(3) Ambient Water Quality Monitoring

- DINAMA is the leading agency for the ambient water quality monitoring in Uruguay, while Municipalities participate in this from the viewpoint of conservation of environmental hygiene condition in their territory.
- In the Santa Lucía River Basin and the basins of the La Plata River from Cufré to Pando, no periodical ambient water quality monitoring has been conducted except in the Municipality of Montevideo.
- The capacity (leadership, proposing ability, implementing capability, etc.) of the monitoring group of DINAMA is not sufficient.
- DINAMA laboratory, on the other hand, generally has higher organizational and personal capacity. The workload to the laboratory is full of capacity in some parts.

- Awareness of the participation to ambient water quality monitoring of Municipalities is generally low.
- The capacity of laboratory in the four Municipalities other than Montevideo is generally low although it is different by Municipality. There is a lack in basic capacity for grasping river water environment.
- Water quality data of DINAMA is not systematically utilized, and they are stored personally. Water quality data in the relevant agencies are stored, maintained and used in the individual organization.

(4) Dissemination, Education and Public Participation

- DINAMA periodically issues information through quarterly booklets "Ambient Uruguay" and through web pages, there, however, are no systematic activities for dissemination, education and public participation related to water quality management.
- Municipality of Montevideo established GAM (Montevideo Environmental Group) and conducting public participation programs. OSE also publicize information thorough web pages.

4.2.2 DINAMA

Present conditions and issues related to water quality management in DINAMA are summarized as follows: (The status is as of March 2004 unless otherwise described.)

(1) Capacity of Organization and Personnel

Overall DINAMA

Policy and strategy of water quality management should be examined and formulated by the decision-maker from the viewpoint of comprehensive considerations on the water environment. Information derived from the interpretation of respective approaches is not applied for feedback to the policy-maker layer, thus, decision-making is difficult to be made at present. Proper system for comprehensive interpretation and decision-making are not in place in DINAMA. As such, it can be concluded that the systematic cycle required for water quality management is not functioning in DINAMA for the time being.

Environmental Control Division

Of the management by pollution source, industrial wastewater management is conducted through DINAMA's leadership, and among others, industrial wastewater management is in a relatively advanced level in DINAMA. The industrial wastewater management is conducted through, application and approval (SADI), issuance of wastewater discharge license (ADI), compliance inspection including wastewater quality monitoring, registration of competent professional, evaluation of self-monitoring report, etc.

Staff of the Emission Control Department generally has enough technical level for industrial wastewater management. Due to the absence of procedural manuals and

technical guidance, however, management work depends on the personal experience and knowledge.

Compliance inspection and monitoring of wastewater are conducted approximately once a year to about the half of the registered enterprises (a total of 516 in the whole country).

Environmental Quality Evaluation Division

Environmental Quality Evaluation Division is in charge of ambient water quality monitoring in the country. Until now, river water quality monitoring in Uruguay has been conducted for specific purposes, for specific areas, and for specific periods through so-called "campaigns", thus, periodical monitoring for the purpose of water quality management for river basins has not been conducted. The reasons are as follows:

- The necessity of ambient water quality monitoring in the cycle of systematic water quality management is less recognized by DINAMA.
- The capacity (leadership, proposing ability, implementing capability. etc.) of the monitoring group of DINAMA is not sufficient.
- No collaboration exists between relevant organizations for water quality monitoring.

Sampling Work

- Water Quality Department, Environmental Quality Evaluation Division is in charge of sampling of water and sediment.
- The number of staff in the Department is two. One of them holds a boat operation license.
- The sampling using a boat requires at least three persons, thus assistance from the other Division is needed in this case.
- Available sampling equipment is: 1 rubber boat (4 person + equipment), 1 fiberglass boat (6 person + equipment), 3 water samplers, 3 sediment samplers.
- In DINAMA, only one vehicle is available for fieldwork. All the divisions are using this vehicle.

Laboratory

- Technical Normalization Department-Laboratory, Environmental Quality Evaluation Division is in charge of water, air, and soil analysis.
- The Laboratory is certified with ISO9001 in November 2003, and it is a comparatively capable and well-organized group in DINAMA.
- A total of 8 staff (2 for instrumental analysis and 6 for manual analysis) works.
- For water quality, various kinds of physico-chemical, heavy metal, bacteriological analysis are covered. Though the GC-HPLC is available, capability of pesticide analysis is not known.
- The capacity of the laboratory is 35-40 samples per week in BOD_5, thus, full capacity is used for BOD_5 analysis (including 20-25 samples for industrial compliance monitoring).

(2) Adequacy and Effectiveness of Relevant Work

- Activities of Environmental Quality Evaluation Division other than water quality are for air, soil and noise, and covered by one expert each. No distinguished problems exist in these environmental topics, and the activities are generally inactive.
- Dangerous Substances Department, EQED is conducting National Implementation Plan (NIP) in collaboration with MGAP, MSP, MRREE, etc. under the assistance of UNEP. NIP is to survey the status of pollution by hazardous organic toxics based on Stockholm convention. They are active. Collaboration with water quality management is less.
- Environmental Impact Division has eleven staff including division director and conducts evaluation and approval of environmental impact assessment study. It is said that the necessary work exceeds the capacity and it takes much time for evaluation and approval. There exists almost no collaboration with water quality management.
- Natural Protected Area Division has 14 staff. There exists almost no collaboration with water quality management.
- There exists no division for dissemination, education and pubic participation. Three staff directly under the National Director conducts such work mainly for the preparation of quarterly booklet named “Ambient Uruguay”.

(3) Adequacy of Data Analysis Method

General statistical analysis is conducted in pollution source management. For ambient water quality monitoring, there are no systematically introduced data analysis methods and evaluation methods.

(4) Utilization of Data and Publication of Information

Pollution Source Management

- A part of industrial wastewater registration (SADI) information is publicized through web page.
- Details of industrial wastewater registration information are provided to IMM upon request. There are no requests from the other Municipalities and information is thus not utilized in Municipalities other than IMM.
- Emission Control Department maintains the Excel database for the results of inspection monitoring, and the information is used only inside DINAMA.

Ambient Water Quality Monitoring

- Water quality data obtained through the past campaigns are maintained personally by staff of Water Quality Department in a Excel file, and no other people can access to the data.
- Water quality data (results of the analysis) obtained by the Laboratory are in paper base.
- Water quality data are not publicized.

(5) Budget and Financial Status

Actual expenditures of the whole DINAMA in million Pesos are 40.8 in 2001, 30.6 in 2002, 24.2 in 2003.

(6) Mechanism for Collaboration with the Relevant Organization

- Collaboration with the relevant organization is generally inactive except for the following cases.
- Collaboration for industrial wastewater management between DINAMA and IMM is realized case by case in provision of registration information from DINAMA to IMM and compliance inspection by IMM, though there is no established system.
- Collaboration between relevant agencies in monitoring is realized individually in campaigns, e.g. ECOPLATA and FREPLATA.
- There are cases of collaboration between DINAMA and Municipalities with the exchange of "Agreement" for specific purposes.

(7) Standards and Manuals

- Decree 253/979 is the water quality standards in Uruguay.
- River and ocean should be defined by one of the five categories (Class 1, 2a, 2b, 3 and 4), though the actual designation is not yet performed in any rivers and ocean.
- Working group of COTAMA is studying amendment of Decree 253, though the schedule for the final document submission is not known.

4.2.3 Municipality of Montevideo

Present conditions and issues related to water quality management in Municipality of Montevideo are summarized as follows: (The status is as of March 2004 unless otherwise described.)

(1) Capacity of Organization and Personnel

<u>Department of Environmental Development</u>

- Department of Environmental Development is the organization related to "Pollution Source Management" and "Ambient Water Quality Monitoring" in the cycle of systematic water quality management.
- Department of Environmental Development consists of three sub-organizations, namely, Division of Cleaning (in charge of solid waste management), Division of Sanitation (in charge of sewerage development and maintenance), and Laboratory of Environmental Hygiene.
- Of the total number of staff at 8,700, 1,800 belong to the Department of Environmental Development.
- Both for pollution source management and ambient water quality management, relatively well-organized and systematic work is being conducted.

Industrial Wastewater Management

- Number of staff of Industrial Effluent Unit is: Manager (chemist): 1, Biologist: 1, Oceanographer: 1, Chemist: 1, Administration: 1, intern: 4, total: 9.
- Department Decree was issued on 1996/02/26 for the regulation of industrial wastewater and is being applied. It is prepared basically based on the Decree 253/979.
- The total number of enterprise subject to industrial wastewater regulation in IMM is 150. IMM inspects and manages all the 150 enterprises. For these enterprises, DINAMA conducts only the approval of wastewater discharge based on SADI, and DINAMA never inspected and managed them.
- Against the enterprises that violated the decree, IMM gives recommendation for improvement and application of penalty after getting approval by an internal committee. In 2003, there were ten cases of actions against the violation and one case of ordering operation stoppage of the factory.
- For the purpose of industrial wastewater management, a database using Microsoft Access is used. One part of the data is registration information obtained from DINAMA, and the other part of the data covers the results of the compliance monitoring of each enterprise (flow rate, quality of treated water, person in charge, history of recommendation for improvement, etc.) Material of the industrial wastewater management part of the annual report is prepared using this database.
- Documents for the compliance inspection are orderly stored with indexes in a rack and looks properly maintained. Such system was established through the assistance of IDB from 1997, and well maintained by IMM itself presently.

Ambient Water Quality Monitoring

- IMM is conducting periodical ambient water and sediment quality monitoring for four creeks and Montevideo Bay from three year ago. The start of the monitoring three year ago was supported by IDB, and it presently is conducted by IMM solely.
- The results of the monitoring are evaluated and publicized by Annual Environmental Report.
- IMM considers great importance of the use of the data of IMM for the water quality management for the overall basin.
- Laboratory staff conducts sampling.
- Laboratory has two rubber boats.
- Number of staff is: University level biologist: 2, university level veterinarian: 3, university level of chemist: 6: university level of chemical engineer: 4: technician: 2, administration: 5, and intern 14.
- Laboratory is capable of various kind of analysis excluding pesticide.
- Capacity for water quality related analysis is about 12 samples/week.

(2) Utilization of Data and Publication of Information

IMM publicize Annual Environmental Report. Information on pollution source management and ambient water quality monitoring is included in the annual report.

(3) Mechanism for Collaboration with the Relevant Organization

- Collaboration with the relevant organization is generally inactive except for the following cases.
- Collaboration for industrial wastewater management with DINAMA is realized getting registration information from DINAMA. There is no regular collaboration for the pollution source management.
- There is no collaboration for the ambient water quality monitoring.

(4) Dissemination, Education and Public Participation

Montevideo Environmental Group (GAM) is acting for the promotion of dissemination, education and public participation.

4.2.4 Municipality of Canelones

Present conditions and issues related to water quality management in Municipality of Canelones are summarized as follows: (The status is as of March 2004 unless otherwise described.)

(1) Capacity of Organization and Personnel

Organizations in charge of water quality management in Municipality of Canelones are General Directorate of Health Attention and Environment Inspectorate; and General Directorate of Environment Management.

Industrial Wastewater Management

- There are approximately 100 enterprises subject to industrial wastewater management. Major activities of the Municipality in industrial wastewater management include approval for the establishment of enterprise; and actions against problems (complaints from residents).
- The Municipality is trying to participate in industrial wastewater management as much as possible. A municipal decree for industrial wastewater management was prepared based on Decree 253 and presently is active.
- There is only one person who is in charge of industrial wastewater management in IMC. Compliance inspection to the 100 enterprises is targeted once a year, it is, however, presently difficult due to the limited number of staff. Sampling of industrial wastewater is limited to several times a year due to the low capacity of both the industrial wastewater management unit and the laboratory.

Ambient Water Quality Monitoring

- IMC is conducting ambient water quality monitoring for the purpose of grasping environmental hygiene condition in the Municipality.
- Five rivers, namely, Carrasco, Pando, Tropa Vieja, Solis Chicos and Solis Grande are covered for this monitoring, and sampling and analysis are conducted in summer. Parameters covered are pH, Salinity, DO, BOD, and Fecal Coliform. Data are accumulated for the past 12 years and maintained in an Excel data sheet.
- Coast of the La Plata River is monitored in summer only for Fecal Coliform.

- Other than the above, water quality monitoring is conducted when necessary.
- IMC is very active for the plan to participate in the periodical ambient water quality monitoring for the Santa Lucía River Basin in collaboration with DINAMA.

(2) Utilization of Data and Publication of Information

The laboratory maintains water quality data by paper and in an Excel data sheet. Evaluation (historical change in water quality, etc.) is conducted. Use of data is limited for internal purpose.

(3) Mechanism for Collaboration with the Relevant Organization

Collaboration with the relevant organization is generally inactive. Compliance inspection for industrial wastewater is conducted under the collaboration with DINAMA case by case, though it is not periodical and systematic.

4.2.5 Municipality of San José

Present conditions and issues related to water quality management in the Municipality of San José are summarized as follows: (The status is as of March 2004 unless otherwise described.)

(1) Capacity of Organization and Personnel

Organizations in charge of water quality management in Municipality of San José are Department of Hygiene, and Territorial Ordering & Environmental Office.

Industrial Wastewater Management

- Department of Hygiene, and Territorial Ordering & Environment Office are in charge of all kinds of wastewater discharge in San José. There are a total of three inspectors for factory.
- There is no decree for the control of wastewater from factories, and the national decree is adopted. There are some decrees; but it is not specific and it is for wastewater discharge in general.
- Compliance monitoring is conducted in the following cases:
  - When application for approval is issued from factories.
  - When claims are raised from residents.
  - When the Municipality considered it necessary.
- Number of annual compliance monitoring is about 10 times.
- Industrial wastewater monitoring is conducted basically under the collaboration with DINAMA.

Ambient Water Quality Monitoring

- IMSJ is conducting water quality monitoring in order to grasp hygiene condition in the Municipality.

- Three rivers, namely, San José, Arroyo Mauricio and Arroyo del Tigre are monitored 3-4 times a year for the parameters of pH, BOD, Nitrite, and Coliform. The data are not well maintained in the form of a database.
- Along the beaches of La Plata River, fecal coliform is monitored only in summer.
- IMSJ is very active for the plan to participate in the periodical ambient water quality monitoring for the Santa Lucía River Basin in collaboration with DINAMA.
- There is only one staff in charge of sampling.
- The number of staff in the laboratory is three.
- Parameters to be covered are pH, Nitrite, BOD (without an incubator), Ammonia, Fecal Coliform. There is COD analyzer, though it is not used because of lack of accessories.

(2) Utilization of Data and Publication of Information

The laboratory maintains water quality data by paper and in an Excel data sheet. Use of data is limited for internal purpose.

(3) Mechanism for Collaboration with the Relevant Organization

Compliance inspection for industrial wastewater is conducted under the collaboration with DINAMA case by case, though it is not periodical and systematic. There is no collaboration for the ambient water quality monitoring.

4.2.6 Municipality of Florida

Present conditions and issues related to water quality management in the Municipality of Florida are summarized as follows: (The status is as of March 2004 unless otherwise described.)

(1) Capacity of Organization and Personnel

General Directorate of Hygiene is in charge of water quality management in the Municipality of Florida.

Industrial Wastewater Management

- There is no fulltime staff for industrial wastewater management in IMF, and staff of General Direction of Hygiene is in charge of this.
- The staff of the laboratory under General Direction of Hygiene covers both industrial wastewater monitoring and ambient water quality monitoring.
- There is no municipal decree on industrial wastewater management. The industrial wastewater management is conducted on the basis of Decree 253, and articles of No. 23 and 24 of Municipal Law No. 9515 that declares responsibility for environmental conservation in the Municipality.
- Enterprises subject to industrial wastewater control in the Municipality are 12 in total. IMF conducts no systematic or scheduled compliance monitoring of industrial wastewater because of the lack of staff with specific knowledge and of the lack of laboratory equipment for the analysis of industrial wastewater.

- Monitoring is conducted mainly upon receipt of complaints from residents.
- IMF does not have copy of registration information on industrial wastewater that is maintained by DINAMA.

Ambient Water Quality Monitoring

- IMF is conducting water quality monitoring in order to grasp hygiene condition in the Municipality.
- Major water quality monitoring is analysis for drinking water of groundwater well in villages. Rivers are monitored for fecal coliform at beaches only in summer.
- IMF is very active for the plan to participate in the periodical ambient water quality monitoring for the Santa Lucía River Basin in collaboration with DINAMA.
- The staff of laboratory is in charge of sampling.
- The number of staff in the laboratory is three.
- Parameters to be covered are pH, Fecal Coliform and Total Coliform. There is COD analyzer, though it is not used because of lack of accessories.

(2) Utilization of Data and Publication of Information

- The laboratory maintains water quality data by paper and in an Excel data sheet. Use of data is limited for internal purpose.

(3) Mechanism for Collaboration with the Relevant Organization

Compliance inspection for industrial wastewater is conducted under the collaboration with DINAMA case by case, though it is not periodical and systematic. There is no collaboration for the ambient water quality monitoring.

4.2.7 Municipality of Lavalleja

Present conditions and issues related to water quality management in the Municipality of Lavalleja are summarized as follows: (The status is as of March 2004 unless otherwise described.)

(1) Capacity of Organization and Personnel

General Direction of Hygiene and Life Style is in charge of water quality management in the Municipality of Lavalleja.

Industrial Wastewater Management

- The number of enterprise subject for industrial wastewater management in IML is 7.
- There is no full-time staff responsible for industrial wastewater inspection, and staff of laboratory for water quality under the General Direction of Hygiene and Life Style is in charge. They have less knowledge on industrial wastewater management. Water quality laboratory can analyze pH and coliform, and thus they have no enough capacity to analyze industrial wastewater.

- IML conducts no periodical and scheduled inspection for industrial wastewater. They conduct inspection based on the complaints raised from residents. Such inspection in the year 2003 was for 3 times.
- IML does not have Information of industrial registration of DINAMA. IML had ever requested DINAMA to provide with compliance monitoring results, though it took 3 months to get it.
- There is no municipal decree on industrial wastewater control and no plan for this.

Ambient Water Quality Monitoring

- IML is conducting water quality monitoring in order to grasp hygiene condition in the Municipality.
- Major water quality monitoring is analysis for drinking water of groundwater well in villages. Rivers are monitored for fecal coliform at beaches only in summer.
- IML is very active for the plan to participate in the periodical ambient water quality monitoring for the Santa Lucía River Basin in collaboration with DINAMA.
- There is one staff in charge of sampling.
- The number of staff in the laboratory is three.
- Parameters to be covered are pH, Fecal Coliform and Total Coliform. There is equipment for solid contents (SS and Total Solid), though it cannot be conducted because the scale is out of order.

(2) Utilization of Data and Publication of Information

The laboratory maintains water quality data by paper and in an Excel data sheet. Use of data is limited for internal purpose.

(3) Mechanism for Collaboration with the Relevant Organization

Compliance inspection for industrial wastewater is conducted under the collaboration with DINAMA case by case, though it is not periodical and systematic. There is no collaboration for the ambient water quality monitoring.

4.2.8 OSE

Present conditions and issues related to water quality management in OSE are summarized as follows: (The status is as of March 2004 unless otherwise described.)

(1) Capacity of Organization and Personnel

Pollution Source Management

OSE is responsible for pre-approval for the industrial wastewater discharged to sewer and compliance monitoring to wastewater discharging enterprises. Collaboration with DINAMA on this part of the work is not active.

Water Quality Monitoring for Water Sources

As a water supplier, OSE is conducting water quality monitoring for the source water. Number of staff in laboratory in headquarters is: university level chemist: 11, university level chemical engineer: 6, university level biologist: 3, technician: 7, administration: 2: intern: 9, total: 38. ISO certification has not been obtained.

Number of staff in the laboratory in Toma de Agua (Water Intake for Metropolitan Area) is: university level chemist: 3, university level biologist: 1, total 4. Daily sampling and analysis are conducted for law water at the intake point and treated water, and monthly sampling and analysis for source water in the upstream area of the intake point at 9 locations.

(2) Utilization of Data and Publication of Information

The use of data is generally limited inside each organizational unit and not effectively utilized outside the unit. Water quality monitoring data at Toma de Agua are not sent to the headquarters. Water quality data are not publicized.

(3) Mechanism for Collaboration with the Relevant Organization

Collaboration with the Municipalities for the development of sewerage system in each Municipality except IMM exists.

4.2.9 Participation in Water Quality Management by Organization

Present status of participation by organization to the water quality management is summarized in a matrix as shown in **Table 4.2.1**. The information as presented in the matrix shall be an input for the plan formulation.

Table 4.2.1 Matrix for Present Status of Participation to Water Quality Management by Organization

	DINAMA	RENARE／MGAP	DNH	OSE	IMM	IMC	IMSJ	IMF	IML	NGO, Residents
Establishment of Policy and Strategies										
Establishment of policy and action plans	- Decree 257 declares that Dinama should establish water quality management policy, though it has not been done.									
Water quality standards	- Decree 253 declares water quality and wastewater quality standards. Amendment of Decree 253 is in progress (COTAMA).									
Classification of rivers	- Classification of rivers is declared in Decree 253, though it has not been done.	-	-	-	-					
Water quality management for river basins	- Necessity of basin wide water quality management is less recognized.	-	-	-	-					
Pollution Source Management										
Water quality simulation for the basin	- Prediction of water quality change in the future is requested, though it has not been done.		-							
Industrial wastewater management	- Conducts approval for wastewater discharge. Registration information is provided to IMM upon request. - Controls wastewater discharge. - Carries out compliance inspection.			- Nothing conducted specially.	- Controls wastewater discharge. - Conducts compliance inspection	- No systematic or scheduled activities for wastewater control are conducted. Ad hoc compliance monitoring is conducted basically upon complaint from residents.				- Residents complain.
Domestic wastewater management	- Almost nothing is conducted for domestic wastewater management.			- Formulates sewerage development plan. - Implements sewerage development projects.	- Implements sewerage development projects	- Collaboration is conducted for sewerage development implemented by OSE.				- Residents give complaint.
Solid waste management	- Almost nothing is conducted for wastewater from solid waste and solid waste pollution.				- Conducts solid waste management. - Construction and operation of final dumping sites.					- Residents complain.
Non-point source pollution management	- Almost nothing is conducted for non-point pollution source management.	- Should manage non-point source pollution, though activities are inactive.								- Residents complain.
Ambient Water Quality Management										
Monitoring network design	- Water quality monitoring for specific purpose, area and periods is conducted through campaigns. - Monitoring network designing for river basins has not been conducted.	- Water quality analysis is conducted for their purpose.		- Conducts monitoring for water source.	- Conducts periodical ambient water quality monitoring for rivers and a bay.	- 5 rivers are monitored in summer. - La Plata Beach is monitored fecal coliform in summer.	- 3 rivers are monitored 3-4 times a year. - La Plata Beach is monitored fecal coliform in summer.	- Rivers are monitored fecal coliform in summer.	- Rivers are monitored fecal coliform in summer.	- There is a concern of water quality in residents.
Water and sediment sampling	- Water and Air Quality Department conducts sampling of water and sediments. - Capacity of the monitoring group is low due to lack of staff and other reasons.			- Conducts water sampling - Do not sample sediments.	- Conducts water and sediment sampling.	- Conducts water sampling, but sediment not.	- Conducts water sampling, but sediment not.	- Conducts water sampling, but sediment not.	- Conducts water sampling, but sediment not.	
Analysis	- Technical Normalization Department -Laboratory conducts analysis of water and sediments.			- Labo in HQ covers almost all parameters. - Parameters covered by intakes and local office is limited.	- Almost all parameter including a part of pesticide is covered.	- pH, Salinity, DO, BOD. Coliform are covered.	- pH, Nitrite, BOD (simple), Ammonia, Coliform are covered.	- pH, Coliform are covered. - COD cannot be analyzed due to lack of accessory.	- pH, Coliform are covered. - Solid cannot be analyzed (out-of-order of a scale)	-
Accumulation of water quality data and evaluation and analysis	- Water quality data are maintained personally and not effectively utilized.	- Water quality data is stored in Access database and used internally.		- Data is stored at each unit by Excel. - No effective use outside of each unit.	- Data is stored in Excel file. - Evaluates data every year for annual report.	- Data are stored in Excel file. - Historical change, etc. are evaluated.	- Data are stored in Excel file.	- Data are stored in Excel file.	- Data are stored in Excel file.	- Information to be checked by residents.
Publication of water quality data	- Water quality information is not publicized. - Environmental Annual Report is not published.	- No water quality data is publicized.	- Sells river flow data.	- Water quality data is not publicized.	- River water quality and wastewater related information is publicized by Environmental Annual Report.	- Water quality data are not publicized.	- Water quality data are not publicized.	- Water quality data are not publicized.	- Water quality data are not publicized.	
Dissemination, Education and Public Participation										
Dissemination and education	- Quarterly magazine “Ambient Uruguay” is published for dissemination			- Environmental education for drinking water is conducted.	- GAM conducts environmental education.	- Nothing specially conducted.				- Residents have concern
Public participation	- No activities.	-	-	-	-	- Nothing specially conducted.				- Have willingness to participate.

4.3 Identification of Issues by Water Quality Parameter

In this section, identification of issues by water quality parameter is conducted to confirm the present condition from the different point of view. From the **Table 3.5.3**, the following characteristics in the water quality management in Uruguay have been extracted.

- Fecal Coliform is widely monitored water quality parameter in Uruguay. Every Municipality can analyze fecal coliform. This is considered to be the result of higher concern about bathing in rivers and children' playing in rivers.
- The pH that is a basic parameter of water quality and measurement is easy also is commonly monitored and every Municipality is capable of this.
- Some Municipalities do not cover BOD_5 that is commonly used in the world for the evaluation of river water quality.
- Total Chromium and lead are the representative parameters for heavy metals.
- Monitoring of pesticide is limited to campaigns of ECOPLATA and FREPLATA. Present condition of pesticide pollution cannot be evaluated due to the lack of data.
- Amendment of Decree No.253 proposes new inclusion of Chloride, Hexavalent Chromium, etc. Excluded from the present Decree No. 253 is only Boron. Other heavy metals and pesticides are presently under study for the amendment. Amendment of wastewater discharge standards is presently under study.
- With regard to the ambient water quality monitoring by Municipality, the Municipality of Montevideo is quite different from the other Municipalities in implementing status and in monitoring capacity. Planning of the future monitoring should consider this status.
- The laboratory that belongs to DGSA (General Directorate of Agricultural Services), MGAP, does not conduct regular water quality analysis, and only conducts residual pesticide for agricultural crops. It accepts analysis upon request with approximately US$55 per sample.
- LATU is an organization that conducts analysis upon request. Tariff for 8-kind of heavy metals is US$170/sample and that for chloric pesticides is US$77/sample.
- Regarding number of sampling locations and frequency of sampling by each Municipality, the Municipality of Montevideo conducts sufficient periodical ambient water quality monitoring. Municipality of Canelones follows this with monitoring of relatively long period of river water quality including BOD_5. San José follows this with periodical river water quality monitoring and summer campaign for beaches. Municipalities of Florida and Lavalleja only conduct summer campaign analyzing fecal coliform.
- With regard to industrial wastewater monitoring, DINAMA conducts better monitoring when compared to river water quality monitoring. Of the Municipalities, the Municipality of Montevideo conducts better industrial wastewater monitoring rather than DINAMA. Industrial wastewater monitoring by other Municipalities is almost not conducted and also they do not have capacity for this.

4.4 Problem Analysis

The **Section 4.2** of this chapter discussed problems and issues based on the present status and capacity by each organization. In the **Section 4.3**, discussion was held by water quality parameter. In this section, an analysis focusing on cause and effect of the issues related to water quality management has been conducted referring to the results of analyses as presented in **Sections 4.2** and **4.3**.

Problem analyses on water quality management for the present project have been conducted at various occasions as follows:

- PCM Session 1 (stakeholder analysis) and PCM Session 2 (problem analysis and objective analysis)
- Simplified problem analysis and objective analysis in local workshop in each Municipality (IMM, IMC, IMSJ, IMF, IML).
- Summarization study by the project team based on the above analysis.

A problem tree obtained through the above work is presented in **Figure 4.4.1**. Problems in water quality management in Uruguay are summarized from the problem tree as follows:

Establishment of Policy and Strategies

- As a result of various problems, integrated water quality management upon adjustment between stakeholders is not implemented, and it causes absence of collaboration between relevant organizations.

Pollution Source Management

- Of the various kinds of pollution source management, industrial wastewater management is under the jurisdiction of DINAMA, though Municipalities have power for inspection, and DINAMA is acting as the leading agency for this. Other pollution source management, namely, domestic wastewater management, solid waste management, non-point pollution source management is under the jurisdiction of organizations other than DINAMA, and as a result, it is not under DINAMA's management.

Ambient Water Quality Monitoring

- Necessity of ambient water quality monitoring in the cycle of systematic water quality management is less recognized.
- Periodical ambient water quality monitoring network has not been established for the Santa Lucía River Basin.
- There is no collaboration between DINAMA and Municipalities.
- Capacity of monitoring group of DINAMA is low.
- Capacity of laboratory in the Municipalities except IMM is low.

Dissemination, Education and Public Participation

- Necessity of dissemination, education and public participation in the cycle of water quality management is less recognized.

- As a result, no material has been prepared and no system has been developed, and thus dissemination, education and public participation have not been conducted. Participatory analysis conducted in each Municipality identified a large concern on these matters.

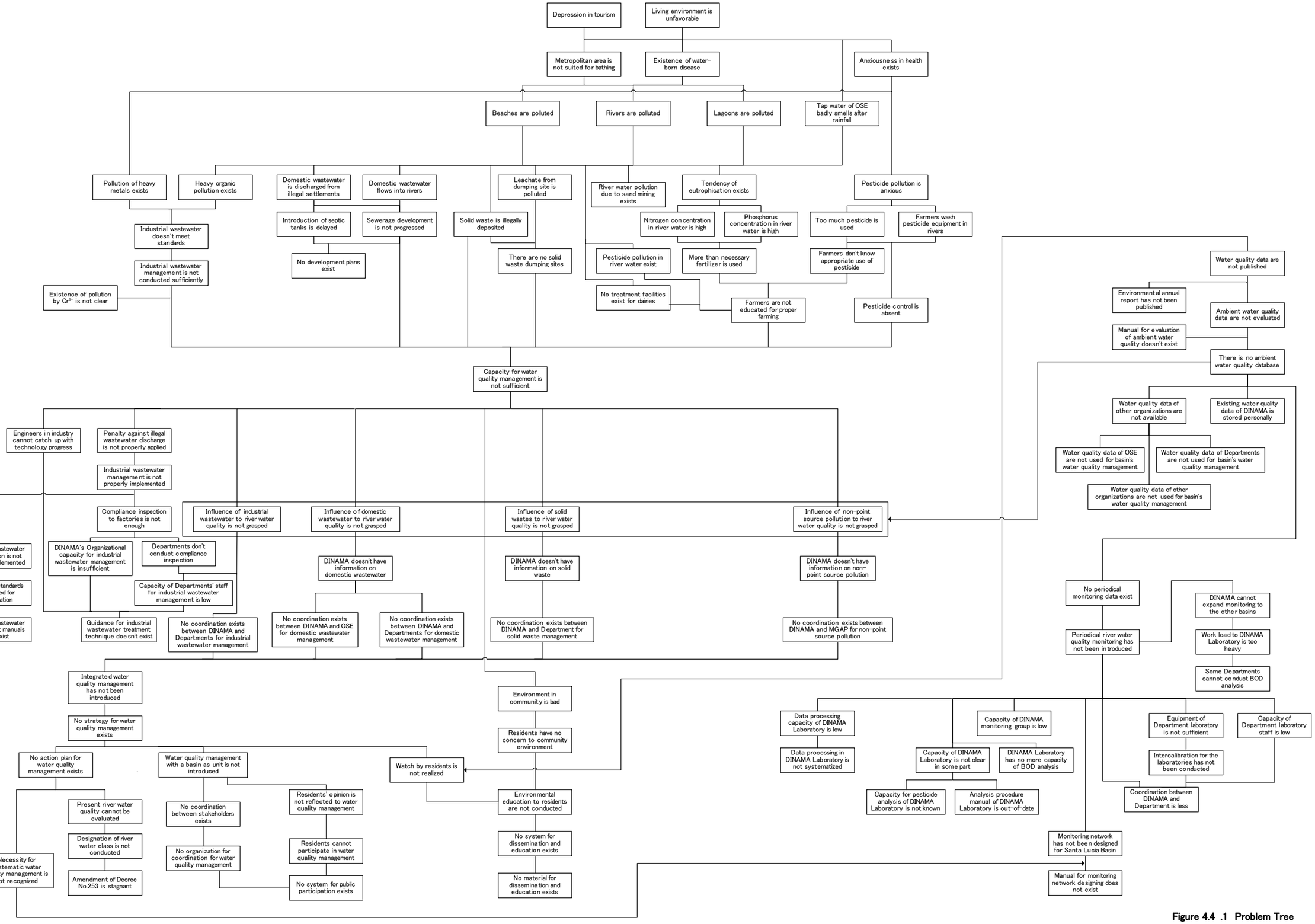


Figure 4.4 .1 Problem Tree

4.5 Objectives Analysis

4.5.1 Objective Tree

On the basis of the problem tree as developed in the Section **4.4 Problem Analysis** as shown in **Figure 4.4.1**, objectives analysis has been conducted in this section. The proposed direction for water quality management as discussed in the previous section is the input for conducting the objectives analysis.

As discussed in **Chapter 1 Introduction**, overall goal and project purpose of the present Project are as follows:

Overall Goal

- River water quality in Montevideo and Metropolitan Area is improved
- Public hygiene environment is improved
- Future water pollution is prevented

Project Purpose

- The capacity of water quality management of DINAMA and related organization in Montevideo and Metropolitan Area is improved

The established objectives tree is as presented in **Figure 4.5.1**.

4.5.2 Confirmation of Module of Water Quality Management

It has been confirmed that the proposed four modules in the systematic water quality management, one of the principles of the water quality management in Uruguay, appear as the four pillars of approaches in the objective tree in **Figure 4.5.1**.

- Strengthening of Strategic Part
- Strengthening of Pollution Source Control
- Strengthening of Ambient Water Quality Monitoring
- Promotion of Dissemination, Education and Public Participation

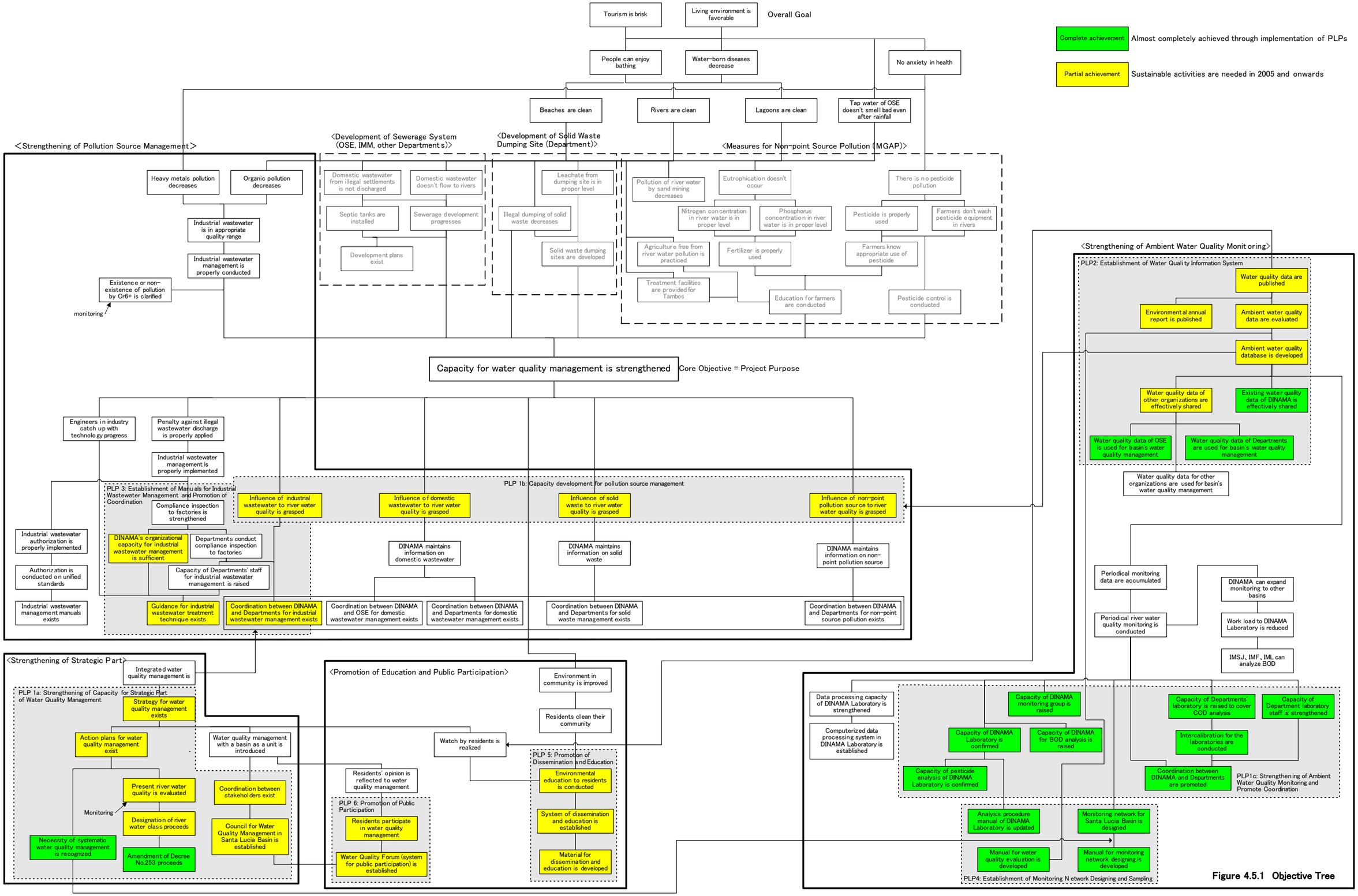


Figure 4.5.1 Objective Tree

4.6 Concrete Directions by Module of Water Quality Management

4.6.1 Establishment of Policies and Strategies

As discussed in **Section 4.1**, the basic policy for water quality management in Uruguay is proposed to consist of the following three principles:

- Water Quality Management for River Basins
- Systematic Water Quality Management
- Integrated Water Quality Management

DINAMA should play the leading role in the establishment of policy and strategies. COTAMA gives advice for the establishment and amendment of laws and decrees. In order to realize the above three piers, especially, water quality management for river basins, and integrated water quality management, establishment of a council for water quality management in the Santa Lucía River Basin is deemed urgent. The council shall have discussion and coordination on matters related to water quality in the Basin and shall advise to the National Director of DINAMA.

Policy of water quality management should be established firstly with strategies to realize the policy. Based on the policy and strategies, laws and regulations shall subsequently be prepared and amended. Action plan for each approach in the integrated water quality management cycle shall then be prepared. The direction for the preparation of the action plans is discussed for each approach. Action plans should be reviewed when necessary with the feedback information from approaches of the water quality management cycle.

4.6.2 Pollution Source Management

The objective of pollution source management is to analyze and evaluate quantity and quality of pollutants emerged from pollution sources, and to apply and conduct necessary measures against pollution sources so as to prevent negative impacts to water environment.

Administrative management on environment for pollution source management can be broadly divided into two. The first one is the “analysis and evaluation of pollutants” that analyzes and evaluates the impact of pollutants to the water environment in order to identify the basic direction of the measures to minimize the negative impact to water environment. The second one is the “control of wastewater” that directly manages pollution sources so as to conduct necessary measures.

Proposed direction of pollution source management is hereunder discussed for each pollution source.

(1) Industrial Wastewater Management

The objectives of industrial wastewater management are: i) to control industrial wastewater discharge through the activities, e.g. authorization of wastewater discharge, compliance inspection, monitoring of effluent water quality, and ii) to analyze and evaluate from the long term point of view the impact of industrial pollution sources to water environment.

The basic direction of industrial wastewater management in Uruguay is proposed on the basis of the command and control approach as is applied presently.

(a) Wastewater Discharge Control

Introduction of Strategic Compliance Inspection

Present compliance inspection is conducted once a year to approximately half number of registered enterprises. Viewing the fact that non-obedience of wastewater standards and various kind of violations occur frequently, the compliance inspection should be strengthened in quantity (frequency) and quality (contents of the inspection).

Frequency of compliance inspection, referring to practices in the world, is generally at least once a year to all the subject enterprises and furthermore two to four times a year to important enterprises. It is proposed to categorize the enterprise by the following standards, and to decide inspection frequency depending on the importance so as to increase the frequency.

- Location of the factory and wastewater receiving body: Water use (domestic, irrigation, scenery, etc.) of the receiving body shall be considered.
- Discharging pollution load: Degree of impact of the pollution load to the acceptable pollution load of the receiving body.
- Type of industry: Whether the constituent parts of the pollution have toxicity.
- Installed wastewater treatment plant: The installed treatment plant is adequate for the subject wastewater or not.
- Record of operation, maintenance, and historical violation of wastewater quality standard: The factory is operated properly or not.

With regard to the parameter for wastewater quality inspection, it is not necessary to cover all the parameters at every factory. Compliance inspection should be categorized for the covering parameters considering the following factors:

- Necessity of wastewater quality inspection: Necessity should first be evaluated, and when necessary, required frequency is decided and it is judged that the testing could be done in situ or laboratory analysis is needed.
- Selection of the parameter: General parameters are enough, or inspection of toxic material and eutrophication material is needed.
- Necessity of the measurement of quantity of discharge and the method.
- Necessity of the inspection of treatment plant and operation and maintenance records.
- Necessity of the inspection of facilities that generate wastewater.

On the basis of the necessary inspection frequency and parameters to be determined as discussed above, compliance inspection plan should be established considering the capacity of the relevant staff in DINAMA and possible collaboration with Municipalities.

Implementation of Examination for Authorization of Wastewater Discharge based on Clear Standards

There are no clear standards for the examination for the authorization of wastewater discharge. This is one of the reasons of that the examination for the authorization of wastewater discharge in DINAMA is presently stagnated, and authorization (ADI) is issued only to the 10% of the registered enterprises. It has weakened the overall system of the industrial wastewater management based on the Decree No. 253. Establishment of the system for the examination for the authorization of wastewater discharge based on the clear standard is deemed urgent.

Industrial Wastewater Management based on the Collaboration between DINAMA and Municipalities

It is proposed that industrial wastewater management is the unified one as much as possible considering the present laws and the scale of the country with a total registration number at around 600, thus DINAMA should play the leading role. Collaboration of the Municipalities, however, is also important to support the work of DINAMA in each Municipality and to raise the ownership of the Municipality for the hygiene environment in their area. For the collaboration, Municipalities are proposed to conduct work as the liaison and site office as shown below.

- Collaborate to compliance inspection work to be conducted by DINAMA including assistance to sampling and grasping the status
- Conduct simplified compliance inspection apart from the DINAMA's inspection.
- Follow up of compliance inspection to be conducted by DINAMA.

In order to realize efficient collaboration between DINAMA and Municipalities, the following should be conducted: i) DINAMA provides Municipalities with the information of registration of industrial wastewater discharge, ii) DINAMA provides Municipalities with the record of past inspection, iii) DINAMA conducts technical transfer to Municipalities on laws and regulations regarding wastewater discharge and on basic knowledge for wastewater treatment.

Actual collaboration plan for each Municipality should be studied and prepared independently for each Municipality, since the conditions, e.g. number of subject enterprises, staff and organization system are quite different by Municipality. Among others, Municipality of Montevideo already established compliance inspection system, and thus it is proposed that the Municipality conducts the compliance inspection in IMM and collaboration with DINAMA is realized through exchange of information. In Municipality of Canelones, since more than 100 numbers of factories are situated, it is thus proposed to establish a system like IMM to conduct the compliance inspection by the Municipality in the future in view of reducing the load to DINAMA.

(b) Analysis and Evaluation of Industrial Wastewater

Basic information on industrial wastewater discharge, e.g. industrial trend, industrial distribution, unit pollution load, should be accumulated, analyzed and evaluated. The evaluation should grasp the trend of pollution in the water environment to be caused by industrial wastewater from the long-term viewpoint, and finally used for the basis of the establishment of basic policies.

(2) Domestic Wastewater and Solid Waste Management

Domestic wastewater and solid waste originated water pollution management covers analysis and evaluation of the impacts to water environment caused by these pollution sources, grasping of the trend of pollution in the water environment from the long-term viewpoint. They should be used for the basic input for the establishment of strategies of management for domestic wastewater and solid waste management.

Based on the analysis and evaluation, necessary measures to minimize the negative impact to water environment are studied and discussed with the implementing agency, and implementation of the measures should follow through collaborative management by DINAMA and the implementation body. DINAMA should play the leading role in this management as declared by Decree No.253. The strong collaboration with OSE and Municipalities is indispensable, since the implementation bodies of the measures are OSE and Municipalities.

(c) Analysis and Evaluation on Domestic Wastewater and Solid Waste Originated Pollution

Basic information on the occurrence of domestic wastewater and solid waste originated pollution to be accumulated includes the following:

- Population distribution and trend
- Present condition of wastewater treatment (domestic wastewater treatment plant, treatment of leachate at solid waste dumping site, etc.)
- Capacity, function and condition of treatment facilities
- Unit pollution load
- Urban plan and land use plan
- Plan for social infrastructure development

The accumulated basic information is analyzed and evaluated to grasp the trend of pollution in water environment, and finally used for the establishment of strategies of this part.

(d) Collaborated Management for the Implementation

DINAMA, OSE and Municipalities consult for the appropriate and effective implementation of the measures for domestic wastewater treatment and to reduce pollution originated from solid waste, and collaboratively manage the implementation of the measures.

(3) Non-point Source Pollution Management

Non-point source pollution management covers analysis and evaluation of the impacts to water environment caused by non-point pollution source, e.g. agricultural lands, grasping of the trend of pollution in the water environment from the long-term viewpoint. They should be used for the basic input for the establishment of strategies of non-point pollution source management.

Based on the analysis and evaluation, necessary measures to minimize the negative impact to water environment are studied and discussed with the implementing agency, and implementation of the measures should follow through collaborative management by DINAMA and the implementation body. Major non-point pollution sources in the Santa Lucía Basin are nutrient (Nitrogen and Phosphorus) of fertilizer and pesticide from the agricultural lands. MGAP is authorized for the control of use, production, sales of fertilizer and pesticide. DINAMA should play the leading role in this management as declared by Decree No.253, though the strong collaboration with MGAP and Municipalities is indispensable, since the implementation bodies of the measures are MGAP and Municipalities.

(e) Analysis and Evaluation on Non-point Pollution Source

Basic information on the occurrence of non-point source pollution to be accumulated includes the following:

- Distribution of agricultural lands
- Present condition of fertilizer use
- Present condition of pesticide use

The accumulated basic information is analyzed and evaluated to grasp the trend of pollution in water environment, and finally used for the establishment of strategies of this part.

(f) Collaborated Management for the Implementation

DINAMA, MGAP and Municipalities consult for the appropriate and effective implementation of the measures for non-point source pollution, and collaboratively manage the implementation of the measures.

4.6.3 Ambient Water Quality Monitoring

Basic direction of ambient water quality monitoring is discussed hereunder dividing the components into two, namely, i) measurement of ambient water quality (monitoring network designing, sampling and analysis), and ii) maintenance and use of ambient water quality data (data processing and evaluation, provision of data to policy makers, publication of water environment status).

(1) Measurement of Ambient Water Quality

(a) Implementation of Strategic Ambient Water Quality Measurement

The following should be considered for the proposed periodical and continuous ambient water quality monitoring, referring to the cases generally applied in the other countries.

(i) Selection of Sampling Points

Points that represent the characteristics of water environment in the subject river basin shall be included. Points should be selected for rivers and creeks in order to assess the river quality condition in the future

- Stretch where the pollution is a present concern, e.g. urban rivers and creeks
- Tributaries from sub-basins that presently have pollution sources or expect future citing
- Reservoirs
- Beaches

Sampling is to be conducted basically at the center of the river section. When the sampling from the bank is difficult, sampling from bridges is considered, thus location of bridges should be taken into consideration for the determination of the sampling point. Sampling by boat is also taken into consideration. Easy access is an important factor for the sustainable implementation of the sampling.

(ii) Frequency of Sampling

Though the annual flow regime should be referred, it shall be at least once a month.

(iii) Sampling

Sampling covers not only water but also sediment for micro substances.

(iv) Parameter for Analysis

All the parameters included in the water quality standards shall basically be covered, e.g. general parameters, nutrients (nitrogen and phosphorus), toxic substances, and micro substances including pesticides. In addition, depending on the water body condition, the following shall be taken into consideration. Observation of microorganism; quantification of bacteria and microorganism; measurement of plankton concentration; and toxicity assessment in the future.

Decree No. 253 declares that DINAMA is responsible for the measurement of environment. DINAMA should prepare strategic action plans for the periodical and sustainable ambient water quality measurement to realize the above basic

directions as much as possible considering the available implementation capacity at every stage.

(b) Organizational Framework for Ambient Water Quality Measurement

The monitoring work should be carried out based on the clear work sharing by the relevant unit of organization, since the ambient water quality monitoring work consists of a series of work to be conducted by different unit.

Organizational framework of the ambient water quality monitoring in Uruguay is proposed as follows on the basis of the present status and considering the sustainable implementation system.

(i) Water Quality Department, Environmental Quality Evaluation Division, DINAMA

This unit of DINAMA should play the leading role for the monitoring work, e.g. monitoring network designing; sampling; data storing, analysis and evaluation. Present capacity of the unit is low and it resulted in the present condition.

(ii) Technical Normalization Department-Laboratory, Environmental Quality Evaluation Division, DINAMA

This unit is responsible for the analysis of water and sediment in the laboratory. The laboratory covers almost all the parameter declared in the water quality standards except pesticide (capability of pesticide analysis is not known). The quantitative capacity for the analysis (number of samples to be analyzed per week) is presently almost enough, though some analysis is in full operation and future strengthening is needed.

In the future corresponding to the expected amendment of Decree No.253, strengthening of analysis required for toxicity assessment and quantitative capacity shall be needed.

(iii) Municipality

As proposed in the next article “Collaborate Work”, Municipalities are proposed to collaborate with DINAMA for the ambient water quality monitoring. Municipalities are proposed to participate in the basic work of the ambient water quality monitoring, namely, water sampling, in situ analysis, and laboratory analysis for the basic parameters.

Capacity for the water quality monitoring is different by Municipality. Strengthening of the capacity is needed.

(c) Collaborated Work between DINAMA, DNH, OSE and Municipalities

Implementation of all the proposed ambient water quality monitoring for the whole country solely by DINAMA is not realistic even though the capacity of DINAMA is raised. Municipalities, on the one hand, are declared to conserve

the hygiene environment condition in their territory, thus it is expected that Municipalities have the basic capacity for ambient water quality monitoring. OSE has been conducting water quality monitoring for source water of drinking, and the data could be utilized for ambient water quality evaluation. DNH is in charge of water quantity part of the water management in the river basin and conducting hydrological observation and maintains data.

Thus the collaborated work between DINAMA, DNH, OSE and Municipalities is proposed in order to realize the reduction of workload concentration to DINAMA, effective utilization of data and information maintained by DNH and OSE as well as to raise the ownership of Municipalities for the conservation of hygiene environment condition in their territory. The work to be conducted by each organization is as follows.

- DINAMA: Acts as the leading agency for the overall ambient water quality monitoring work, conducts monitoring network designing, sediment sampling, laboratory analysis that could not be covered by Municipalities, data storing, analysis and evaluation.
- DNH: Provides river flow data.
- OSE: Provides water quality data conducted for source water monitoring.
- Municipalities: Conduct sampling of water and laboratory analysis of basic parameter

(2) Maintenance and Use of Ambient Water Quality Data

(d) Establishment of Water Quality Information System

Obtained water quality data should be stored properly for the effective use. Proposed water quality information system is as follows:

- Water quality information system should be developed as a tool for the maintenance and utilization of ambient water quality data. The system should be designed for the effective use of water quality data maintained by relevant organization.
- DINAMA should analyze and evaluate water quality data maintained in the system, and use the results for feedback to strategic part and to pollution source management.

(e) Publication of Annual Environment Report

DINAMA is responsible for the publication of Annual Environment Report. Status of water quality in the basin should be publicized using the Annual Environment Report.

4.6.4 Dissemination, Education and Public Participation

Due to the long-lasting economic stagnation in Uruguay, the budget and manpower have been reduced in DINAMA and other organizations related to water quality management, and thus they have hardly conducted systematic water quality management. DINAMA has conducted some particle work, e.g. water quality monitoring for limited purposes through so called campaigns with the international assistance, and industrial wastewater

management, it was, however, not sustainable. In order to realize sustainable water quality management system, reestablishment of the system that can be managed by DINAMA and relevant organizations by themselves is indispensable.

To enhance the improvement of their management capacity in such situations, it is important to employ an approach of the promotion of public participation with their raised awareness on water quality management (people's comprehension and spontaneous cooperation) as well as the improvement of the capacity of staff in charge and related organizations.

On the other hand, the PCM workshops and discussions with participatory approach of the local workshops held in the related five Municipalities have collected the following comments from the participants:

- Communities and their residents are ones of the important stakeholders on water quality management;
- Residents should be given proper information on water quality;
- Opportunities of environmental education to the residents are inadequate; and,
- Each resident group, however, has its own stakes in water quality, which means that some coordination is required in pursuing the promotion of public participation.

Further, "Education" was selected one of the projects in the project selection based on the problem analysis and the objective analysis of the PCM workshop.

The Study so far has clarified, however, that there is no adequate mechanism actually working for absorbing compelling opinions of the people on water quality and coordinating them except the Municipality of Montevideo. Additionally, education and dissemination activities for water quality conservation necessary for raising the community's awareness are being performed not by schools nor municipal Governments on a regular basis but by NGOs on a project basis, except Montevideo. The most significant obstacle to the former education and dissemination activities is the scarcity of adequate materials for environmental education, to which the allotment of the governmental budget should be deemed very difficult, considering the recent severe financial situation of Uruguay.

On the basis of the above background, the basic direction of the dissemination, education and public participation is proposed as follows:

- The dissemination and education is to be conducted to raise the awareness of the local citizens on environmental water quality, and to motivate for the water quality conservation.
- To formulate a basis for the wider understanding for the establishment of the policy for water quality management.
- To promote the participation of the local citizens for the implementation of policies on the water quality management, and to promote the integration of the stakeholders for the effective implementation of the activities, and realize reduction in the load to the governmental organization through the spontaneous cooperation of the people.
- To motivate the relevant government agencies for the effective implementation of water quality management policy through the watching of the government by the residents.

4.6.5 Proposed Participation by Organization to the Water Quality Management

On the basis of the concrete directions for the modules of the water quality management, proposed participation of the relevant organization to the water quality management has been summarized in a matrix as shown in **Table 4.6.1**. This matrix has been developed based on the matrix for the present participation to the water quality management by organization.

Table 4.6.1 Matrix for Proposed Participation to Water Quality Management by Organization

	DINAMA	DINASA	RENARE／MGAP	DNH	OSE	IMM	IMC	IMSJ	IMF	IML	NGO, Residents
Establishment of Policy and Strategies											
Establishment of policy and action plans	- Establish policy and action plans making use of Council for Water Quality Management in the Santa Lucia River Basin	- Coordination									
Water quality standards	- Amend Decree 253 (COTAMA)										
Classification of rivers	- Designate “Water Bodies for Specific Use”		- Coordination for designation of water bodies for specific use	- Coordination for designation of water bodies for specific use	- Coordination for designation of water bodies for specific use	- Coordination for designation of water bodies for specific use					
Water quality management for river basins	- Preside Council for Water Quality Management for Santa Lucia River Basin	- Coordination	- Participate to the Council	- Participate to the Council	- Participate to the Council	- Participate to the Council					
Pollution Source Management											
Water quality simulation for the basin	- Prediction of water quality change in the future based on information of present water quality, present pollution sources, and future prediction of pollution sources.			- Provision of river flow data							
Industrial wastewater management	- Conducts approval for wastewater discharge - Provision of registration information to Departments and OSE - Controls wastewater discharge - Preparation of compliance inspection plan - Provision of compliance inspection data to Departments and OSE - Accumulation, evaluation and analysis of various basic information on industrial wastewater				- Control of wastewater discharge to sewer	- Controls wastewater discharge - Preparation of compliance inspection plan - Provision of compliance inspection data to Dinama	- Work as liaison office for industrial wastewater management (-Receive complaints from residents, -Collaborate to compliance inspection work to be conducted by Dinama including assistance to sampling and grasping the status, -Conduct simple compliance inspection apart from Dinama’s inspection, -Follow up of compliance inspection to be conducted by Dinama.				- Issue opinion
Domestic wastewater management	- Collaborated management of sewerage development - Accumulation, evaluation and analysis of various basic information on domestic wastewater				- Collaborated management of sewerage development - Development of sewerage	- Collaborated management of sewerage development - Development of sewerage	- Collaborated management of sewerage development - Collaboration to sewerage management to be conducted by OSE				- Issue opinion
Solid waste management	- Collaborated management of water pollution by solid waste - Accumulation, evaluation and analysis of various basic information on solid waste originated wastewater					- Solid waste management - Provision of information on solid waste originated wastewater to Dinama					- Issue opinion
Non-point source pollution management	- Collaborated management of water pollution by non-point source pollution - Accumulation, evaluation and analysis of various basic information on non-point source pollution	-	- Implementation of measures against non-point source pollution				-				- Issue opinion
Ambient Water Quality Management											
Monitoring network design	- Design monitoring network	-	- Collaboration to monitoring network design	- Collaboration to monitoring network design	- Collaboration to monitoring network design	- Collaboration to monitoring network design	- Collaboration to monitoring network design				
Water and sediment sampling	- Sampling by boat at the estuary of the Santa Lucia River - Sediment sampling				- Water sampling, site test, and sample transport	- Water and sediment sampling, site test, and sample transport	- Water sampling, site test, and sample transport				
Analysis	- Water quality analysis that is not covered by Departments and OSE - Analysis for sediments				- Analysis of water	- Analysis of water and sediment	- Analysis of basic parameter (Temperature, pH, EC, DO, BOD, COD, Fecal Coli, Total Coli)				- Participation of NGO and residents
Accumulation of water quality data and evaluation and analysis	- Establishment of water quality information system in Dinama - Establishment of integrated water quality information system - Promotion of utilization of water quality information system	-	- Establishment of water quality information in RENARE - Promotion of utilization of water quality information system	- Promotion of utilization of water quality information system	- Establishment of water quality information in OSE - Promotion of utilization of water quality information system	- Establishment of water quality information in IMM - Promotion of utilization of water quality information system	- Establishment of water quality information in IMC - Promotion of utilization of w.q. information system	- Establishment of water quality information in IMSJ - Promotion of utilization of w.q. information system	- Establishment of water quality information in IMF - Promotion of utilization of w.q. information system	- Establishment of water quality information in IML - Promotion of utilization of w.q. information system	- Check of water quality information
Publication of water quality data	- Issue of Environmental Annual Report (incl. water quality)										
Dissemination, Education and Public Participation											
Dissemination and education	- Preparation of education material - Planning for environmental education - Implementation of environmental education				- Planning of environmental education on domestic water - Implementation of environmental education on domestic water	- Planning of Departmental environmental education - Implementation of Departmental environmental education	- Planning of Departmental environmental education - Implementation of Departmental environmental education	- Planning of Departmental environmental education - Implementation of Departmental environmental education	- Planning of Departmental environmental education - Implementation of Departmental environmental education	- Planning of Departmental environmental education - Implementation of Departmental environmental education	- Participation of NGO and residents to environmental education
Public participation	- Support for establishment of water quality forum in each Department	-	- Support for establishment of water quality forum in each Department	- Support for establishment of water quality forum in each Department	- Support for establishment of water quality forum in each Department	- Establishment of Departmental water quality forum - Operation of forum	- Establishment of Dep. water quality forum - Operation of forum	- Establishment of Dep. water quality forum - Operation of forum	- Establishment of Dep. water quality forum - Operation of forum	- Establishment of Dep. water quality forum - Operation of forum	- Participation of NGO and residents to water quality forum

4.7 Capacity Development Plan by Module for the Water Quality Management

On the basis of the analysis from the various kinds of viewpoints and the proposed water quality management in Uruguay, capacity development plan, the theme of the present Project, has been identified in this section of the report. The capacity development plan has been discussed by module for the water quality management. Background, purposes and output of each module for capacity development are explained as follow and are summarized in **Table 4.7.1**.

4.7.1 Module No.1: Strengthening of Strategic Part

Background

DINAMA has the responsibility for the implementation of water quality management (planning, implementation, supervision and collaboration with relevant agencies) as declared by Decree No.257/979. The proposed water quality management in Uruguay consists of the three piers, namely, water quality management for river basins; systematic water quality management; and, integrated water quality management.

In order to realize the systematic water quality management, the establishment of the cycle of management, namely, establishment of policy and strategies; pollution source management; ambient water quality monitoring; and dissemination, education and public participation is deemed necessary. In order to realize the integrated management, strengthening of collaboration between relevant organizations is urgent. Since there exists no such system, strengthening of the strategic part is proposed as follows:

Purpose

The purposes of the module are proposed as follows:

- Water quality management for river basins is introduced
- Systematic water quality management is implemented
- Integrated water quality management is implemented

Output

The following output is expected as a result of the implementation of the module.

- Water quality management strategies and specific action plans of respective water quality approaches are established
- Decree No.253 is amended
- Water bodies' specific use is declared based on the amended Decree No.253
- Present river water quality is evaluated
- Council for water quality management in the Santa Lucía River Basin is established

4.7.2 Module No.2: Strengthening of Pollution Source Management

Background

DINAMA is declared the leading role for pollution source management as a part of water quality management by Decree No.253. Major pollution sources are, industrial wastewater, domestic wastewater, solid waste, and non-point pollution sources. Besides DINAMA, Municipalities are also in charge of industrial wastewater management from the viewpoint of conserving hygiene environment in their territory. OSE is in charge of domestic wastewater development in Municipalities except Montevideo. Implementation of collaborated pollution source management is presently absent, and thus the strengthening of pollution source management is proposed.

Purpose

The purposes of the module are proposed as follows:

- Pollution source management is properly implemented

Output

The following output is expected as a result of the implementation of the module.

- Collaboration system among relevant agencies on pollution source management is established
- Capacity of relevant organization on pollution source management is strengthened
- Industrial wastewater management system is re-established under the collaboration of DINAMA and Municipalities
- Industrial wastewater related manuals are prepared
- Capacity of DINAMA and relevant agencies on industrial wastewater management is developed
- River water quantity observation system is established
- DINAMA shares all the pollution source information with relevant agencies
- Influence of pollution sources to river water is grasped

4.7.3 Module No.3: Strengthening of Ambient Water Quality Monitoring

Background

DINAMA is declared the leading role for the ambient water quality monitoring by the Decree No. 253. The ambient water quality monitoring consists of a series of work, e.g. monitoring network designing, sampling and analysis, data processing and evaluation, provision of data to the policy maker, publication of present status of ambient water quality. Due to the lack of the capacity of the responsible unit of DINAMA, appropriate ambient water quality monitoring has, however, not been conducted up to today.

On the one hand, Municipalities also conduct water quality monitoring from the viewpoint of conserving hygiene environment, though it is not sufficient except in the Municipality of Montevideo. OSE conducts water quality monitoring for the source water, though the results are not effectively utilized for the ambient water quality

monitoring. In order to realize sustainable ambient water quality monitoring, the strengthening of ambient water quality monitoring is proposed as follows:

Purpose

The purposes of the module are proposed as follows:

- Periodical ambient water quality monitoring in the Santa Lucía River Basin is implemented
- Water quality data of the whole nation is stored, evaluated, utilized, and publicized

Output

The following output is expected as a result of the implementation of the module.

- Manuals related to monitoring are prepared
- Ambient water quality monitoring plan for the Santa Lucía River Basin is established
- Collaborated implementation system for sampling, analysis and evaluation is established
- Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened
- Water quality information system is established
- Water quality data are properly evaluated
- Environmental Annual Report is publicized

4.7.4 Module No.4: Promotion of Dissemination, Education and Public Participation

Background

In order to realize the sustainable improvement of the capacity for water quality management, the subjects should cover not only the levels of personnel and organization but also the higher level, namely, local society level. In addition, the participatory approach should be applied for the realization of, i) participation of stakeholders from the initial steps of the formulation of the master plan for the capacity development for the water quality management, ii) raising of awareness of each stakeholder and promotion of participation to the capacity development activities, iii) transparency in the plan formulation process through the periodical report to the stakeholders, and iv) establishment of acceptable plan for local society.

Material needed for the promotion of dissemination and education, however, has not been developed and hampers the promotion activities. There also exists no system for the realization of the public participation, thus the promotion of education and public participation is proposed as follows:

Purpose

The purposes of the module are proposed as follows:

- Dissemination, education and public participation is promoted in the Santa Lucía River Basin

- People's opinion is reflected to water quality management in the Santa Lucía River Basin

Output

The following output is expected as a result of the implementation of the module.

- Awareness of stakeholders for water quality is raised
- A system for formulation of agreement on water quality management is created and public participation is promoted
- Awareness for water quality management in the relevant organizations is raised

Table 4.7.1 Output by Module of Capacity Development

Item	Overall Project	Module No.1: Strengthening of Strategic Part	Module No.2: Strengthening of Pollution Source Management	Module No.3: Strengthening of Ambient Water Quality Monitoring	Module No.4: Promotion of Education and Public Participation
Objectives/ Purpose	Overall Goal - River water quality in Montevideo and Metropolitan area is improved; public hygiene is improved; and, future water pollution is prevented. Project Purpose - The capacity of water quality management of DINAMA and related organization in Montevideo and Metropolitan Area is improved.	Purpose 1. Water quality management for river basins is introduced 2. Systematic water quality management is implemented 3. Integrated water quality management is implemented	Purpose 1. Pollution source management is properly implemented	Purpose 1. Periodical ambient water quality monitoring in the Santa Lucía River Basin is implemented 2. Water quality data of the whole nation is stored, evaluated, utilized, and publicized	Purpose 1. Dissemination, education and public participation is promoted in the Santa Lucía River Basin 2. People's opinion is reflected to water quality management in the Santa Lucía River Basin
Output	1. An integrated master plan for strengthening of water quality management of rivers in Montevideo and Metropolitan Area is formulated. 2. Capacity of DINAMA and related agencies is developed paying attention to their ownership	1.1 Water quality management strategies and specific action plans of respective water quality approaches are established 1.2 Decree No.253 is amended 1.3 Water bodies' specific use is declared based on the "Decree No.253/79 and Amendments" 1.4 Present river water qualtiy is evaluated. 1.5 Necessity of council for water quality management in the Santa Lucía River Basin is discussed	2.1 Collaboration system among relevant agencies on pollution source management is maintained 2.2 Capacity of relevant organization on pollution source management is strengthened 2.3 Industrial wastewater management is conducted under the collaboration of DINAMA and Municipalities 2.4 Industrial wastewater related manuals are prepared 2.5 Capacity of DINAMA and relevant agencies on industrial wastewater management is developed 2.6 River water quantity observation system is established 2.7 An integrated information system on pollution sources is established 2.8 Influence of pollution sources to river water is grasped	3.1 Manuals related to monitoring are prepared 3.2 Ambient water quality monitoring plan for the Santa Lucía River Basin is established 3.3 Collaborated implementation system for sampling, analisys and evaluation is established 3.4 Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened 3.5 Water quality information system is established 3.6 Water quality data are properly evaluated 3.7 Water Quality Annual Report is publicized	4.1 Awareness of stakeholders for water quality is raised 4.2 A system for the formulation of agreement on water quality management is created and public participation is promoted. 4.3 Awareness for water quality management in the relevant organizations is raised.

4.8 First Draft Integrated Master Plan on the Capacity Development for Water Quality Management

4.8.1 Identification of Activities by Module

In the previous section, capacity development plan by module for the water quality management has been identified establishing outputs to be achieved in each module. In this section, concrete activities to attain the output have been proposed. The following schemes were taken into consideration for the implementation of concrete activities:

- Implementation of joint work (DINAMA and the Project Team) through Pilot Projects under the present Project
- Holding of seminars under the present Project
- Holding of workshops under the present Project
- Training in Japan through the JICA training scheme
- Implementation of sustainable program by DINAMA
- Implementation of sustainable program by relevant agencies
- Implementation of coordinated program through joint work of DINAMA and relevant agencies

For each "output" as discussed in **Section 4.7**, activities have been identified by implementation phase as shown in **Table 4.8.1**.

For the implementation phase, the following three phases have been considered; namely, the period for pilot projects implementation (April 2004 to March 2005); the period from April 2005 until 2008 (mid-term: five years from the start of the Project); and the period until 2013 (long-term: ten years from the start of the Project) have been considered.

4.8.2 Identification of Pilot Projects

Implementation of the pilot projects was considered in the present project for the following purposes.

- To discuss between DINAMA, relevant organizations and JICA Project Team through the implementation of various pilot projects, and confirm the basic policy and the proposed direction for water quality management as proposed in this report;
- To conduct technical transfer for items basically needed for the implementation of each module;
- To establish the basic system, mechanism, structure, etc. and to produce basic material necessary for the implementation of each Module;
- To conduct capacity development through the implementation of the pilot projects;
- To carry out activities that shall be the reference to those to be conducted by DINAMA and relevant organizations in the middle and long term; and,
- To carry out activities in a sample area for the reference of implementation in the overall area.

Composition of pilot projects is proposed considering the above purposes, and the five key aspects of capacity development, namely, capacity of organization and personnel;

coordination between organizations; effective use of information; establishment of manuals; and, promotion of dissemination and public participation as follows:

PLP 1: Capacity Development and Strengthening of Coordination

PLP 1a: Development of Capacity for Strategic Part of Water Quality Management

PLP 1b: Development of Capacity for Pollution Source Management

PLP 1c: Development of Capacity for Ambient Water Quality Monitoring and Strengthening of Coordination between Relevant Agencies

PLP 2: Establishment of Water Quality Information System

PLP 3: Establishment of Industrial Wastewater Management Manual and Strengthening of Coordination

PLP 4: Establishment of Manual for Monitoring Network Designing and Sampling

PLP 5: Promotion of Dissemination and Education

PLP 6: Promotion of Public Participation

The results of the pilot projects implementation have been reflected in **Table 4.8.1** for convenience in the column under "activities and outputs of pilot projects". Detailed discussion on the implementation of the pilot projects is discussed in the next chapter.

Table 4.8.1 First Draft Integrated Master Plan on Capacity Development for Water Quality Management

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔ " for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
Module No.1: Strengthening of Strategic Part			
1.1: Water quality management strategies and specific action plans of respective water quality approaches are established.	• DINAMA establishes proper committee for the coordination for water quality management inside DINAMA.➔Established. • JICA provides necessary technical transfer through the technical training in Japan. ➔ Technical transfer was implemented through Group Training Course "Environmental Management of Regional Drainage Basin II", Individual Training Course "Strengthening of Water Quality Management System (1)", and Individual Training Course "Strengthening of Water Quality Management System (2)".	• DINAMA reviews the strategy of water quality management and the action plan established in the course of the Project, and modifies them (if necessary). • DINAMA sets the Work Plan for respective development modules, based on the action plan mentioned above.	• DINAMA continues annually to review strategies and specific action plans of respective water quality approaches.
1.2: Decree No.253 is amended.	• GESTA Agua (Grupo de Estandares Agua = Group for Water Standards), COTAMA prepares a technical draft for "the Decree No.253/79 and Amendments" (not included in the work of Pilot Projects) ➔ Technical draft is being prepared, but not yet completed. • JICA Project Team provides technical advice on the "the Decree No.253/79 and Amendments" upon confirmation of the basic direction of the amendment. ➔ Provided.	• DINAMA plays the leadership in the GESTA Water of COTAMA in making "Decree No.253/79 and Amendments" from the technical aspect. • Legal procedure for the "Decree No.253/79 and Amendments" proceeds.	
1.3: Water bodies' specific use is declared based on the "Decree No.253/79 and Amendments". (All the activities depend		• DINAMA designates proper unit for the task of declaration of water bodies' specific use. • DINAMA coordinates with Council for Water Quality Management in River Basins (with the Steering Committee during the period of the	• DINAMA coordinates with Council for Water Quality Management in River Basins for the declaration of water bodies' specific use. • DINAMA coordinates with relevant organizations for the declaration of "water

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
upon the contents of the "Decree No. 253/79 and Amendments")		JICA Project) for the declaration of water bodies' specific use. • DINAMA coordinates with relevant organizations for the declaration of "water bodies of high quality", and issues declaration. • DINAMA coordinates with OSE, Municipalities, MGAP, INAPE, MSP, and relevant organizations for the declaration of "water bodies for specific use", and issues declaration. • DINAMA coordinates with relevant organizations for the declaration of "water bodies under recovery", and issues declaration. • DINAMA continues to review the declaration of water bodies' specific use.	bodies of high quality", and issues declaration. • DINAMA coordinates with OSE, Municipalities, MGAP, INAPE, MSP, and relevant organizations for the declaration of "water bodies for specific use", and issues declaration. • DINAMA coordinates with relevant organizations for the declaration of "water bodies under recovery", and issues declaration. • DINAMA continues to review the declaration of water bodies' specific use.
1.4: Present river water quality is evaluated		• DINAMA evaluates present river water quality utilizing SISICA referring to the water bodies' specific use.	• DINAMA evaluates present river water quality utilizing SISICA referring to the water bodies' specific use.
1.5: Necessity of Council for Water Quality Management in the Santa Lucía River Basin is discussed.	• Ad Hoc Council for the Water Quality Management in the Santa Lucía River Basin is established. ➔ The Steering Committee conducts the role during the period of the JICA Project.	• Necessity of the establishment of Council for the Water Quality Management in River Basins is discussed in the meeting of Steering Committee under the new government organization. • DINAMA conducts necessary procedure for the legalization of the Council when the new government decides to establish the Council. • Council for the Water Quality Management in the Santa Lucía River Basin is established when the new government decides to establish	

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
		the Council.	
Module No.2: Strengthening of Pollution Source Management			
2.1: Collaboration system among relevant agencies on pollution source management is maintained.	• Various discussions are held for the pollution source management attended by relevant organizations. ➔ Not conducted	• Periodical meetings take place to exchange information and opinion on pollution source management; attended by DINAMA, OSE, RENARE, Municipalities and other relevant organization ("Steering Committee" shall be utilized). • DINAMA collects the information on sewerage development and vacuum vehicle domestic wastewater system in a sustainable manner. • DINAMA collects the information on solid waste management. • DINAMA collects the information on non-point source pollution management.	• Periodical meetings take place to exchange information and opinion on pollution source management; attended by DINAMA, OSE, RENARE, Municipalities and other relevant organization ("Steering Committee" shall be utilized). • DINAMA collects the information on sewerage development in a sustainable manner. • DINAMA collects the information on solid waste management. • DINAMA collects the information on non-point source pollution management.
2.2: Capacity of relevant organization on pollution source management is maintained	• JICA provides necessary technical transfer through the technical training in Japan. ➔ Technical level has been raised through Group Training Course "Industrial Wastewater Treatment Technique II" and Group Training Course "Domestic Wastewater Treatment Technique". • DINAMA holds a workshop to share the output of training in Japan by the relevant personnel. ➔ Conducted.	• JICA provides necessary technical transfer through the technical training in Japan.	
2.3: Industrial wastewater management is conducted under the collaboration of DINAMA and	• The consensus between DINAMA and Municipalities for sharing a certain part of the industrial wastewater management is reached, and agreements are concluded. ➔ Basic	• Agreement between DINAMA and Municipalities for the collaboration on industrial wastewater management is concluded.	• DINAMA plays a leading role in the industrial wastewater management. • Municipalities work as so-called "Liaison Office" in the industrial wastewater

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
Municipalities	direction has been agreed but agreement has not been concluded.	• DINAMA continues providing Municipalities with information of SADI and engineering data of industry. • DINAMA and Municipalities coordinate for the compliance inspection. • DINAMA and Municipalities mutually exchange the inspection results of industrial wastewater facilities in a sustainable manner.	management. • DINAMA provides Municipalities with information of SADI and engineering data of industry. • DINAMA maintains to keep the sharing of the inspection of industrial wastewater facilities in a sustainable manner.
2.4: Industrial wastewater related manuals are prepared	• DINAMA and JICA Project Team jointly prepare procedural manuals of industrial wastewater management. ➔ The following manuals are almost ready. - Industrial User Inspection Manual - Industrial Wastewater Sampling Manual - Guidance for Industrial Wastewater Flow Rate Measurement - Guidance for Sampling, Preservation and Transportation of Underground Water • DINAMA and JICA Project Team jointly prepare technical guidance for industrial wastewater management. ➔ Technical Guidance for Industrial Wastewater Treatment Technologies has been prepared.	• DINAMA develops procedural and management manuals for industrial wastewater. • DINAMA amends established manuals, when necessary.	• DINAMA review and modify the manuals of industrial waste management, if necessary.
2.5: Capacity of DINAMA and relevant agencies on industrial wastewater management is developed	• JICA Project Team provides technical transfer of industrial wastewater management to DINAMA's staff, using Manuals to be established in <Output 2.4>. ➔ Implement collaborated work for the preparation of the manual and conduct explanation of manuals in March 2005. • JICA provides necessary technology transfer	• JICA provides necessary technical transfer through the technical training in Japan. • DINAMA provides technology transfer of industrial wastewater management to staff of Municipalities, using Manuals to be established in <Output2.4>.	

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
	through the technical training in Japan. ➔ Technical level has been raised through Group Training Course "Industrial Wastewater Treatment Technique II"		
2.6:River water quantity observation system is established		• DNH under the collaboration with DINAMA and relevant organizations establishes a system for observation of water quantity (river flow) in the Santa Lucía River Basin that is required for the simulation of the future water quality prediction.	• DNH under the collaboration with DINAMA and relevant organizations establishes a system for observation of water quantity (river flow) in the Santa Lucía River Basin that is required for the simulation of the future water quality prediction.
2.7: An integrated information system for pollution sources is established	• DINAMA already maintains some of relevant information on pollution sources.	• DINAMA constructs an integrated information system with GIS database on pollution sources. • DINAMA inputs data and information of various pollution sources to the integrated information system.	• DINAMA continues to collect and file data and information for domestic wastewater management, solid waste management, and non-point source pollution management in order to update them.
2.8: Influence of pollution sources to river water is grasped	• JICA provides necessary technical transfer through the technical training in Japan. ➔ Technical level has been raised in some parts through Group Training Course "Industrial Wastewater Treatment Technique II" and Group Training Course "Domestic Wastewater Treatment Technique".	• DINAMA allocates proper staff assigned to the task of water quality assessment. • DINAMA makes preliminary survey on the pollution loads from various kind of wastewater. • DINAMA develops a simulation model for the assessment of the influence of pollution sources to the water environment.	• DINAMA assesses the influence of various kinds of pollution sources to the water environment in a sustainable manner.
Module No.3: Strengthening of Ambient Water Quality Monitoring			
3.1 Manuals related to monitoring are prepared	• DINAMA and JICA Project Team jointly prepare a manual of monitoring network designing and sampling. ➔ A manual consisting of the following part has already been prepared.	• DINAMA amends established manuals, when necessary.	• DINAMA amends established manuals, when necessary.

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
	- Designing of Water Quality Monitoring Network - Methods of Field Work and Sampling - Field Testing Methods - Processing and Interpretation of Water Quality Data • DINAMA Laboratory updates the manual of laboratory measurement and analysis. ➔ Almost completed.		
3.2: Ambient water quality monitoring plan for the Santa Lucía River Basin is established	• DINAMA and JICA Project Team jointly design executive plan of trial water quality monitoring in the Santa Lucía River Basin, using the Manual of <Output 3.1>. ➔ Already designed.	• DINAMA updates water quality monitoring plan in the Santa Lucía River Basin based on the outcome of pilot projects for ambient water quality monitoring.	• DINAMA updates water quality monitoring plan in the Santa Lucía River Basin based on the strategies and specific action plans.
3.3: Collaborated implementation system for sampling, analysis and evaluation is established	• Consensus with DINAMA, DNH, OSE and Municipalities on a certain part of ambient water quality monitoring is reached, concluding the Agreement. ➔ Draft of the Agreement has already been approved, but the agreement has not yet been concluded. • DINAMA and Municipalities jointly carry out sampling and analysis of water and sediment for the ambient water quality monitoring. ➔ Started joint work in December 2004.	• Agreement for the collaborated ambient water quality monitoring is concluded. • DINAMA and Municipalities jointly carry out sampling and analysis of water and sediment for the ambient water quality monitoring.	• DINAMA and Municipalities jointly carry out sampling and analysis of water and sediment for the ambient water quality monitoring.
3.4: Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened	• DINAMA reinforces Water Quality Department for the implementation of sustainable ambient water quality monitoring. ➔ The Department has been strengthened from two staff to three staff, and in addition, is scheduled to strengthen with about four interns.	• JICA provides technical training for the sampling and analysis. • DINAMA provides technical transfer for sampling and analysis of water for Municipalities in a sustainable manner. • DINAMA conducts pesticide monitoring.	• DINAMA provides technical transfer for sampling and analysis of water for Municipalities in a sustainable manner. • DINAMA conducts pesticide monitoring. • DINAMA maintains laboratory equipment and skills properly.

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
	• JICA provides equipment necessary for the basic analysis in the laboratories of DINAMA and Municipalities. ➔ JICA provided laboratory equipment in order to realize at least COD observation at each Municipality. • DINAMA checks the capability of pesticide analysis of DINAMA Laboratory. ➔ Under implementation. • DINAMA provides technical transfer for sampling of water for Municipalities. ➔ Already successfully implemented. • DINAMA provides technical transfer for analysis at the laboratory to Municipalities. ➔ Already successfully implemented.	• Municipalities raise the capacity of laboratory in order to cover BOD_5 analysis at every laboratory. • Branch laboratory of OSE in each Municipality raise the capacity in order to cover BOD_5 analysis. • DINAMA Laboratory obtains ISO/IEC 17025 Certificate for necessary items (This activity will be made by DINAMA itself separately from the JICA Project) • DINAMA maintains laboratory equipment and skills properly. • DINAMA raise the capacity of laboratory in order to meet the strategies and action plans. • DINAMA maintains proper numbers of staff for ambient water quality monitoring.	• DINAMA raise the capacity of laboratory in order to meet the strategies and action plans. • DINAMA maintains proper numbers of staff for ambient water quality monitoring.
3.5: Water quality information system is established	• DINAMA, upon collaboration with relevant organizations through Technical Committee, jointly with JICA Project Team establishes computerized water quality information system inside DINAMA (SISICA DINAMA). ➔ Developed.	• DINAMA promotes to develop SISICA in the relevant organizations, e.g. OSE, RENARE, IMM, IMC, IMSJ, IMF, IML. • DINAMA establishes integrated SISICA • DINAMA continues to manage integrated SISICA	• DINAMA continues to manage integrated SISICA
3.6: Water quality data are properly evaluated	• DINAMA and JICA Project Team jointly work for processing and interpreting water quality data, by using currently available water quality data. ➔ To be conducted in February-March 2005.	• DINAMA processes and interprets water quality data in a sustainable manner.	• DINAMA process and interpret water quality data in a sustainable manner.
3.7: Water Quality Annual Report is	• DINAMA and JICA Project Team jointly prepare the chapter of water environment for	• DINAMA annually publicizes Water Quality Annual Report, interpreting and compiling	• DINAMA annually publicizes Water Quality Annual Report, interpreting and compiling

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
publicized.	Annual Environment Report using currently available data, and open through the DINAMA's homepage. ➔ To be conducted in February-March 2005.	diverse information like DINAMA's policy/strategies, water quality data, and others.	diverse information like DINAMA's policy/strategies, water quality data, and others.
Module No.4: Promotion of Education and Public Participation			
4.1: Awareness of stakeholders for water quality is raised	• DINAMA issues News Letter on water quality and deliver it to stakeholders. ➔ Started issuance for every four months. • National and local medias (TV, newspaper, radio) report various activities of the present JICA Project. ➔ Mainly local medias reported various activities. • DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and prepare materials for dissemination for the use of campaigns and effectively utilize them. ➔ Posters, pamphlets, and stickers have been prepared and utilized. • Water Quality Forum (as discussed below) as a main actor holds local workshops. ➔ Local workshops "Workshop on Effluent Management" and "Workshop on Pesticides Management" have been held. • DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and prepare materials for education for water quality and effectively utilize them. ➔ Videos for	• DINAMA issues in a sustainable manner News Letter on water quality and deliver it to stakeholders. • DINAMA maintains a web page on water quality management • National and Local Educational Authorities, Florida Water Quality Forum and DINAMA continue dissemination and education for water quality in Florida Municipality in a sustainable manner.	• DINAMA issues in a sustainable manner News Letter on water quality and deliver it to stakeholders. • DINAMA and Florida Water Quality Forum support water quality related activities in various areas.

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
	common people and children, illustrated story, and booklet have been under preparation. • DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and conduct training sessions utilizing the above developed materials. ➔ Training sessions were conducted for four times. • DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and conduct education sessions for teachers utilizing the above developed materials. ➔ Education sessions were conducted for about eleven times. • DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and have meeting for the evaluation of education materials. ➔ Already conducted. • Environmental education for children is conducted through the implementation of various campaigns. ➔ Already conducted.		
4.2: A system for the formulation of agreement on water quality management is created and public participation is promoted.	• Florida Water Quality Forum is established in Florida Municipality as a model area. ➔ Already established. • Residents exchange their opinion on water quality in the established Florida Water	• Florida Water Quality Forum and DINAMA continue leading and implementing public participation campaigns. • DINAMA and Florida Water Quality Forum assist the establishment of Water Quality	• DINAMA and Florida Water Quality Forum support establishment of water quality forum in the other areas.

Output	Activities and Output of Pilot Projects *(Results of the pilot projects implementation has been shown with "➔" for convenience though it is discussed in the next Chapter)*	Activities to be implemented in the mid-term (until 2008)	Activities to be implemented in the long-term (until 2013)
	Quality Forum. ➔ More than 70 residents attended to the First Plenary Meeting. • The Coordinating Body of Florida Water Quality Forum holds periodical meeting and discuss on the activities. ➔ Held four meetings by December 2004. • Florida Water Quality Forum leads and implements public participation campaigns. ➔ "Flora Preservation Campaign" and "Santa Lucía Chico River Cleaning Campaign" have been implemented and more than 100 people (students) attended.	Forums in other Municipalities and the federation of Water Quality Forum • Other Municipalities of the Project's Area establishes their own Water Quality Forum	
4.3: Awareness for water quality management in the relevant organizations is raised.	• A working group for dissemination, education and public participation is created in DINAMA. ➔ A working group has been created and actively worked. • Staff of DINAMA participates in the various campaigns, training and education sessions. ➔ Implemented. • Municipality of Florida plays leading role for the establishment of Florida Water Quality Forum. ➔ Conducted. • Staff of OSE participates to the campaigns. ➔ Conducted. • Florida education authority promotes training and education sessions to schoolteachers. ➔ Conducted. • Teachers of the Municipality of Florida actively participate to the preparation of education materials. ➔ Conducted.	• DINAMA organize an internal unit to be responsible for education and public participation activities • DINAMA plays a leading role to raise awareness on water quality under the collaboration with relevant organizations.	• DINAMA plays a leading role to raise awareness on water quality under the collaboration with relevant organizations.

CHAPTER 5. IMPLEMENTATION OF PILOT PROJECTS

5.1 Composition of Pilot Projects

The following pilot projects have been identified and implemented in Phase II of the Project in the fiscal year 2004 in order to start the actual implementation of the capacity development on the water quality management. The results and lessons learned from the implementation of the pilot projects are described hereafter. Evaluation has been summarized in Evaluation Sheet as attaché in Annex 5.1.1.

PLP 1: Capacity Development and Strengthening of Coordination

PLP 1a: Development of Capacity for Strategic Part of Water Quality Management

PLP 1b: Development of Capacity for Pollution Source Management

PLP 1c: Development of Capacity for Ambient Water Quality Monitoring and Strengthening of Coordination between Relevant Agencies

PLP 2: Establishment of Water Quality Information System

PLP 3: Establishment of Industrial Wastewater Management Manual and Strengthening of Coordination

PLP 4: Establishment of Manual for Monitoring Network Designing and Sampling

PLP 5: Promotion of Dissemination and Education

PLP 6: Promotion of Public Participation

5.2 PLP 1a: Development of Capacity for Strategic Part of Water Quality Management

In order to implement the **Module No.1: Strengthening of Strategic Part**, establishment of a basic system and strengthening of the capacity have been targeted, and PLP 1a has been formulated. The objective of PLP 1a was to realize the capacity development for the strategic part of the systematic water quality management, namely, "Establishment of Policy and Strategies".

Expected output was the following:

- Capacity is developed for the establishment of strategies and specific action plans of respective water quality approach
- Amendment to Decree No. 253 proceeds accordingly
- Water bodies' specific use is declared based on the amended Decree No. 253

5.2.1 Capacity Development of Strategic Part

Activities were to create a system for the integrated water quality management and conduct capacity development for the personnel with the schedule from the beginning of July in 2004 to the middle of March in 2005

(1) Establishment of Water Quality Management Committee in DINAMA

Since there was no system for the horizontal coordination inside DINAMA for the implementation of systematic water quality management, Water Quality Management Committee (WQMC) has been established in DINAMA and a notification letter was issued on November 1st, 2004 by the National Director. The structure of WQMC is as follows:

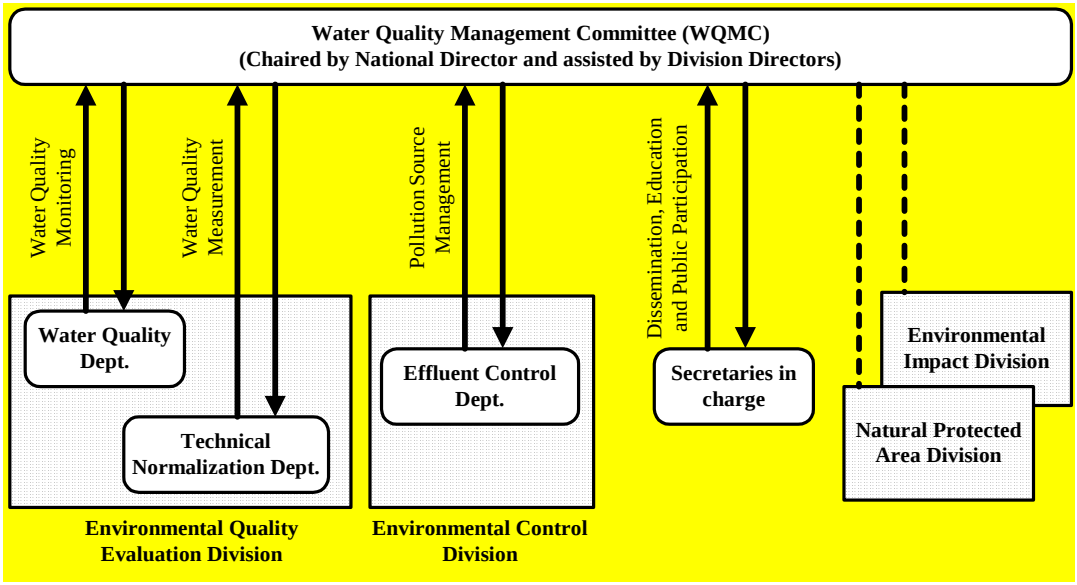


Figure 5.2.1 Water Quality Management Committee

Meeting was held three times in Phase II of the Project; 1st meeting on July 30, 2nd meeting on November 4 and 3rd meeting on March 9, 2005.

The Water Quality Management Committee shall work as the headquarters in DINAMA for the strategic part of water quality management.

(2) Establishment of Council for the Water Quality Management in the Santa Lucía River Basin

Necessity, method of creation, etc. for the Council for the Water Quality Management in the Santa Lucía River Basin have been discussed in the meeting with the Steering Committee in December 2004. It was concluded that the Steering Committee for the present Project was providing the same function to that of the Council and thus the Council would not be established when the JICA Project is on going. Discussion on the establishment of the Council for the water quality management in river basins should be conducted in Phase IV of the Project, the last phase of the Project.

(3) Capacity Development of Personnel

The following counterpart training in Japan has been conducted for the purpose of strengthening for the strategic part of water quality management.

- Group Course "Environmental Management of Regional Drainage Basin II, May 9 to July 25, 2004", Mr. Gabriel Yorda, Water Quality Department, Environmental Quality Evaluation Division, DINAMA attended.
- Individual Course "Strengthening of Water Quality Management System (1), August 27 to September 11, 2004", Mr. Esteban Garino, Professional Director, Environmental Development Department, IMM attended.
- Individual Course "Strengthening of Water Quality Management System (2), August 27 to September 19, 2004", Ms. Yanet Hagopian, Bromathology Department, IMF attended.

5.2.2 Technical Support to the Amendment of Decree No.253

JICA Project Team gave technical support for the amendment of Decree No. 253 with the schedule from the beginning of July in 2004 to the middle of March in 2005. According to the information in July 2004, amendment to Decree No. 253 was scheduled for completion at an earliest stage in around September 2004. Updated information as of the beginning of March 2005 was as follows:

- On December 8, 2004, GESTA Agua reported to COTAMA the status of amendment work. It was reported that the technical review work should be continued until March 2005. As of the beginning of March 2005, technical review has not been finalized.
- This issue should be discussed with the new National Director of Environment.
- After completing the technical review, it shall be sent to legal process.

The JICA Project Team has rendered the referential document titled "Regulations and Standards on Water Quality in Japan" to DINAMA. This document contained the current regulations and standards in Japan, including their backgrounds and justifications, so that DINAMA could refer to it in raising the reviews of the Decree.

5.2.3 Declaration of Water Bodies' Specific Use

DINAMA under the collaboration with the relevant organizations should declare "Water Bodies Specific Use". It should be started after the amendment to Decree No. 253 has been completed. Water bodies' specific use should be started after the completion of the amendment to Decree No. 253. There was no progress so far.

5.2.4 Evaluation

Establishment of Water Quality Management Committee (WQMC) in DINAMA is considered very effective if the function is fully utilized. WQMC meeting should not always be the formal one, any meeting for the horizontal collaboration for water quality management in DINAMA could be considered as the activity of WQMC.

Council for the Water Quality Management in the Santa Lucía River Basin is important to realize "Water Quality Management by River Basin" and "Integrated Water Quality

Management". Necessity, method of creation, etc. for the Council have been discussed in the meeting with the Steering Committee in December 2004. It was concluded that the Steering Committee for the present Project was providing the same function to that of the Council and thus the Council would not be established when the JICA Project is on going. Discussion on the establishment of the Council for the water quality management in river basins should be conducted in Phase IV of the Project, the last phase of the Project.

Although, the real effect of capacity development by the training in Japan is difficult to evaluate, it appears in the various aspects of the activities in the present Project.

5.3 PLP 1b: Development of Capacity for Pollution Source Management

In order to implement the **Module No.2: Strengthening of Pollution Source Management**, strengthening of the personnel capacity has been targeted, and PLP 1b has been proposed. The objective of PLP 1b was to realize the capacity development for the pollution source management of the systematic water quality management.

Expected output was the following: Capacity is developed for the industrial wastewater management and domestic wastewater management, and analysis and assessment of pollution source to river water environment.

5.3.1 Training in Japan

The following counterpart training in Japan has been conducted for the purpose of strengthening for the pollution source management of the systematic water quality management.

- Group Course "Industrial Wastewater Treatment Technique II, July 12 to November 14, 2004", Mr. Angel Zeileniec, General Directorate of Health Attention and Environmental Inspectorate, IMC attended.
- Group Course "Domestic Wastewater Treatment Technique, August 16 to November 28, 2004", Mr. Eduardo Liard, Northeastern Regional Office, OSE attended.

5.3.2 Workshop

Workshop for the sharing of the outcome of the training in Japan by the relevant personnel was held in March 2005.

5.3.3 Evaluation

One of participants in the group training has attended the work of the manual preparation in the PLP 3, aiming to utilize the effect of the training in Japan. From now on it is expected that the outcomes of the technical training should be utilized in participants' daily activities.

5.4 PLP 1c: Development of Capacity for Ambient Water Quality Monitoring and Strengthening of Coordination with Relevant Agencies

In order to implement the **Module No.3: Strengthening of Ambient Water Quality Monitoring**, strengthening of the organizational capacity, personnel capacity and

establishment of collaboration system have been targeted, and PLP 1c has been formulated.

The Project has identified a number of issues in water quality monitoring in Uruguay. They are:

- Periodical and systematic water quality monitoring should be established in Uruguay and be continued in a sustainable way.
- While the Water Quality Department (WQD) of DINAMA is in the position to lead and control the whole activities of water quality monitoring, its assigned staff is too few. Thus, the immediate reinforcement of the WQD is essentially required to initiate the water quality monitoring.
- The capacity strengthening of laboratories especially in the municipalities is required to handle more sample and more water quality parameters.
- A good coordination work in water quality monitoring between DINAMA and the municipalities is essential to ensure sustainable activities.

The issues mentioned above required a step-wise capacity building under a long-term scheme. As such, the PLP 1c has been initiated as the first step measure to commence periodical and systematic water quality monitoring.

The direct objective of the PLP 1c was to build the implementing regime for periodical and systematic water quality monitoring, initiating the trial water quality monitoring. In the long-term, the PLP 1c aimed to establish the capacity enabling the implementation of sustainable monitoring for assessing the water environment.

As a result of the PLP 1c, the following specific outputs were expected.

- The organizational capacity of the WQD of DINAMA that leads and controls the monitoring activities is reinforced.
- The capacities of water quality laboratories in the municipalities and DINAMA are strengthened.
- The Joint Work Agreement for water quality monitoring is concluded between DINAMA and the municipalities concerned.
- The trial water quality monitoring is started actually and the lessons learned from this trial monitoring are reflected in the subsequent monitoring.

5.4.1 Strengthening of Water Quality Department, Environmental Quality Evaluation Division, DINAMA

DINAMA took an action to increase the staff of the WQD with the schedule to be completed at the end of October 2004. As a result of the actions made by DINAMA, two new staff have transferred to WQD from the other division of DINAMA, though one of the original two members left. Besides, other 4 staff (interns from the Engineering Faculty of the University of the Oriental Republic of Uruguay) have been contracted to work in WQD, thereby, the WQD expected for reinforcement from 2 staff in the past to 7 staff in terms of assigned staff numbers. Dispatch of interns, however, has not been realized by this time due to the suspension of the Governmental approval.

5.4.2 Strengthening of Laboratories

After the survey on the existing municipal laboratories, JICA supplied necessary equipment and materials, and the technology transfer thereon took place. In addition, the DINAMA laboratory's ability for pesticide analysis was evaluated. It has been scheduled to complete by the end of November 2004.

(1) Equipment and Materials for Laboratories

According to the "Execution Plan of Trial Water Quality Monitoring", it has been proposed that general and basic parameters (temperature, pH, electrical conductivity, COD, fecal coliform and total coliform) should be covered by the measurement made by the municipalities. Based on the survey results on the present availability of equipment and materials in the municipal laboratories, equipment and materials necessary for the measurement mentioned above have been provided. These are listed in **Table 5.4.1**.

The technology transfer related with the supplemented equipment and materials has been carried out by DINAMA, before the start of actual sampling and measurement, through the inter-calibration and the technical training of fieldwork.

Meanwhile, it has been identified that the capacity of DINAMA laboratory in the BOD analysis required the strengthening to handle the sample numbers assumed in the trial monitoring. Thus, component equipment for BOD analysis has been supplied to the DINAMA laboratory.

Table 5.4.1 Provided Equipment and Materials for Laboratories

Items	Quantities	Users
pH meter in Lab.	1	IMSJ
Digester with digital display for COD	1	IML
BOD analysis equipment	1	DINAMA
Field equipment (pH, temp.)	4	IMC, IMSJ, IMF, IML
Field equipment (TDS, EC, salinity)	4	IMC, IMSJ, IMF, IML
Consumables	1 lot	Each Municipality

(2) Evaluation of DINAMA Laboratory's Ability in Pesticide Analysis

In Uruguay, data and information for pesticide pollution were too few to clarify the present situations, because the measurement of pesticides in water has little been carried out. For this reason, the DINAMA laboratory's skill in pesticide analysis was evaluated to clarify the enforcement ability for the monitoring network in the future.

Generally, the DINAMA laboratory was endowed with adequate skills in the equipment analysis, but in the analysis of pesticides, the following points should be verified its proficiency:

- The accurate functions of gas-chromatography (that has not been operated for a long time)
- The detectable limit and quantitative limit of related equipment

Three kinds of standard chemicals (mirex, methyl parathion and ethyl parathion) necessary for trial measurement and analysis have been ordered. The DINAMA laboratory was conducting trial measurement and analysis at the end of Phase II, it, however, finally succeeded the measurement of the three chemicals in Phase III.

5.4.3 Conclusion of Agreement on Joint Work

DINAMA and JICA, upon discussion with the Steering Committee, jointly discuss and formulate the "Joint Work Agreement", and DINAMA and the municipalities conclude the Agreement. The draft was to be completed at the end of June 2004 and the conclusion was to be made by the end of February 2005.

The draft of the Joint Work Agreement (its full name is "Agreement of Joint Work on Ambient Water Quality Monitoring between MVOTMA and Municipal Government") has been prepared. Its primary purpose was to settle periodical and systematic monitoring in Uruguay.

It contains the articles: objectives of joint work, scope of cooperation, specific scheme of monitoring activities, etc. Respective work in accordance with the Joint Work Agreement was based on the "Executive Plan of Trial Water Quality Monitoring".

The draft of the Joint Work Agreement has already been basically agreed by DINAMA and the municipalities concerned. The conclusion of the final agreement was scheduled in the beginning of 2005, after incorporating lessons learned from the trial monitoring and more precise prescriptions, and after the appointment of the new local governments upon the election in May 2005. It was finally concluded in September 11, 2006 with a ceremony attended by Environment Minister and Mayors of the five municipalities witnessed by Ambassador of Japan and the JICA Project Team.

5.4.4 Implementation of Trial Water Quality Monitoring

DINAMA and the municipalities jointly carry out the trial water quality monitoring according to the "Executive Plan of Water Quality Monitoring" established in the PLP 4. Prior to the commencement of the trial monitoring, DINAMA rendered the technology transfer to the municipalities, concerning field and laboratory work. The preparatory work (technical training and inter-calibration) was to be completed by the end of November 2004, and the trial monitoring was from December 2004 to March 2005.

The trial water quality monitoring started at the 3rd week of December. The trial monitoring has been carried out in accordance with the "Executive Plan of Trial Water Quality Monitoring" that was the final product of the PLP 4.

The trial monitoring commenced as follows, including the related technology transfer.

- Inter-calibration for 4 municipalities: Held from October 26 to November 16 to secure the accuracies of measurement results.
- Technical training for 4 municipalities: Held from November to December to enhance the skills in sampling and field-testing.

- The first sampling: Started in December, based on the rotation schedule: the Wednesday and Thursday of the 3rd week in IMC, and the Tuesday, Wednesday and Thursday of the 4th week in IMSJ, IMF and IML.

5.4.5 Evaluation

The PLP 1c was evaluated based on the result and process of the implementation, below:

(1) Strengthening of WQD's Function

The WQD of DINAMA has been reinforced as the outcome of DINAMA's efforts during the period of the PLP 1c with the increase to a total of 3 staff. It is expected that the role of the WQD will become increasingly important, as the network of water quality monitoring is extended in the future. Its task in water quality monitoring includes not only the overall control in monitoring activities but also the management, process and interpretation of collected water quality data. To respond to such increasing tasks, the individual ability of staff, especially the ability of new comers of the WQD should be strengthened in monitoring-related specialty.

(2) Sustainable Execution of Monitoring and Extension of Monitoring Network

It is a significant achievement that the periodical water quality monitoring has been actually commenced in Uruguay. In the subsequent stage, the most important thing is to continue this monitoring activity by maintaining the established collaboration system under the Joint Work Agreement. In the meantime, it is extremely important for the municipal laboratories to develop their capacity with proper budget allocation.

The trial monitoring has taken place at a total of 32 monitoring locations with a total of 26 parameters (as the maximum including sediments). This scheme of network was decided under the consideration for the present maximum capacity of both DINAMA and the municipal laboratories. Because this scheme is still not enough to completely clarify the water quality in the Project Area, the review to extend the network at each stage is necessary. Together, to support the extended network, further efforts are definitely necessary to develop laboratories' capacity for both the municipalities and DINAMA, based on a long-term strategy.

(3) Technology Transfer through PLP 1c

The technology transfer from the JICA Project Team to the staff of DINAMA and the municipalities took place along the implementation of the PLP 1c. This has been conducted through various activities of the PLP 1c based on OJT in terms of the design of monitoring network, the selection of sampling stations, etc. The outcomes of this technology transfer were practically used in the subsequent Phase III (Master Plan Trial) in 2005.

5.5 PLP 2: Establishment of Water Quality Information System

In order to implement the **Module No.3: Strengthening of Ambient Water Quality Monitoring**, establishment of a basic system for water quality data storage and effective

utilization have been targeted, and PLP 2 has thus been formulated. Water Quality Information System has been designed for the use in the whole Uruguay, not only for the Santa Lucía River Basin. The objective of PLP 2 was to realize sharing and effective utilization of water quality data obtained in the ambient water quality monitoring.

Expected output was the following:

- Water Quality Information System is established
- Environmental Annual Report is publicized

5.5.1 Establishment of Water Quality Information System

DINAMA and JICA Team jointly established a computerized Water Quality Information System in DINAMA considering the full use of the Internet environment for the use of various kinds of users. Relevant agencies joined to discussions held in technical committee level. It was scheduled between the beginning of July in 2004 to the end of December in 2005.

Water Quality Information System (SISICA: Sistema de Informacion de Calidad de Agua) has been established as follows:

(1) Subject Data

- Surface water quality data

(2) Major Functions

- Data input and maintenance
- Monitoring and evaluation
- Dissemination of the water quality data to the public by annual report

(3) Users

- Level 1: Administration
- Level 2: Data Evaluation
- Level 3: Maintenance
- Level 4: Evaluation in general
- Level 5: General public

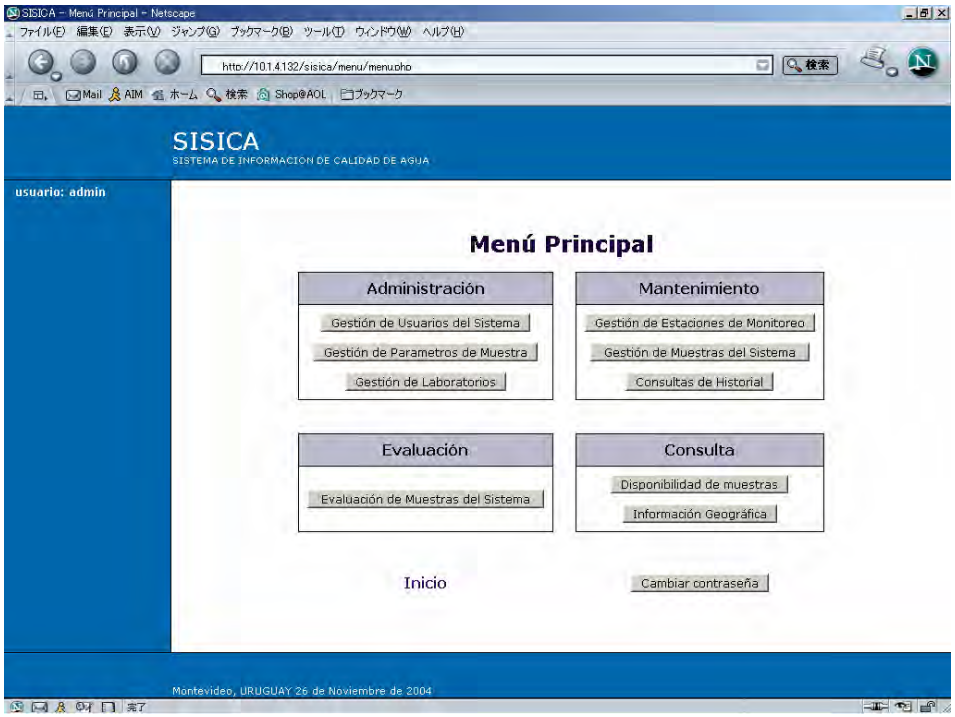
(4) Basic Structure

The established information system was the decentralized one. PLP 2 targeted to establish SISICA DINAMA and water quality data of DINAMA were firstly be stored and opened to use for the above five levels. In the future, the other SISICA, e.g. SISICA OSE, SISICA IMM should be established based on the SISICA DINAMA and connected by Internet.

(5) System

- Operating system: Linux
- Database services: Postgre SQL

- Web service: Apache
- Interfaces of entrance access, changes, enquiries: via web navigator
- System of geographical information: PostGIS



(6) Specification

Specification is shown in **Sector C** of the **Supporting Report** as **Annex (2) SISICA related Product**, i.e. “Especificación de Requerimientos de Software para el Sistema, Versión 5.2”, “Arquitectura del Sistema Versión 1.1”, and “Especificación de interfaces gráficas de usuario, Versión 2.0”.

5.5.2 Publication of Environmental Annual Report

Water chapter of Environmental Annual Report was to be publicized in the period from the beginning of July in 2004 to the middle of March in 2005.

The tentative version of the Annual Report 2005 of Water Quality has been drafted by the JICA Project Team in March 2005. Currently available data and information and water quality data have been used in this draft. This is a prototype of the comprehensive environmental report in Uruguay. The Water Quality Report for the Santa Lucía Basin has first been prepared in web version in Phase III. The publication version has finally been produced in November 2006, though the system of sustainable publication deemed not yet established.

5.5.3 Evaluation

(1) Establishment of Water Quality Information System

SISICA DINAMA has almost been completed and presented in the Seminar on December 1. The condition before the start of the Project was that DINAMA’s historical water quality data was maintained personally and no other people could use

them. The establishment of SISICA DINAMA provides a significant change in the system of ambient water quality management. A good system has been developed. From now on, promotion of the effective use of SISICA DINAMA is the important work.

(2) Publication of Environmental Annual Report

The created version of the Water Quality Report is the product as one of components of a comprehensive environmental report to be publicized by DINAMA. It is expected that DINAMA start other parts of the comprehensive environmental report, such as air quality, solid waste, natural environment, etc, in earliest stage.

5.6 PLP 3: Establishment of Industrial Wastewater Management Manual and Strengthening of Coordination

In order to implement the **Module No.2: Strengthening of Pollution Source Management**, establishment of manuals and strengthening of coordination have been targeted, and PLP 3 has thus been formulated. As the result of the problem analysis, the following issues for the capacity strengthening of industrial wastewater management in Uruguay have been identified:

- The strengthening of abilities in wastewater management technologies are necessary for both DINAMA and municipal staff;
- The analysis and assessment of the influences caused by industrial wastewater should be started and continue to facilitate the basic scheme planning for industrial wastewater measurement for a long-term;
- Unified standards and practices are necessary to enhance rigorous wastewater regulations; and,
- The establishment of good coordination system between DINAMA and the municipalities are necessary to promote effective industrial wastewater inspection.

For the above-mentioned issues, a long-term scheme of capacity development should be arranged. Among the issues identified, the PLP 3 addressed the upgrading of abilities in wastewater management technologies, the establishment of unified standards and practices, and the establishment of good coordination system.

The direct objectives of the PLP 3 were to realize industrial wastewater regulations under unified standards and practices, and to build a basis for good coordination between DINAMA and the municipalities by exchanging the Joint Work Agreement. The long-term objective is to realize rigorous regulation for industrial wastewater by establishing a strong implementation regime.

As a result of the PLP 3, the following specific outputs were expected.

- Procedural and management manuals for industrial wastewater regulations are established,
- Technical guidance related with wastewater treatment technologies is established, and
- The Joint Work Agreement for the coordination in industrial wastewater management between DINAMA and the municipalities is prepared and exchanged.

5.6.1 Elaboration of Procedural and Management Manuals

DINAMA and the JICA Project Team jointly formulated a series of manuals necessary for industrial wastewater regulations. The drafts were completed in the middle of November 2004, and final products at the end of February 2005.

First, DINAMA prepared the drafts of the following manuals:

- Industrial User Inspection Manual (A1)
- Industrial Wastewater Sampling Manual (A2)
- Guidance for Industrial Wastewater Flow rate measurement (A3)
- Guidance for Sampling, Preservation and Transportation of Underground Water (A4)
- Registration Manual of Competent Professional (A5)
- Self-monitoring Report Manual (A6)

Besides the above-mentioned, the preparation scheme of "Authorization Manual of Industrial Wastewater Discharge (A7)" was discussed.

The drafts of manuals of A1, A2, A3 and A4 have been made, and DINAMA and the JICA Team have jointly discussed the contents of them. Of these, A3 and A4 have been completely finished in both English and Spanish. A1 and A2 have been completed but they need more deep examinations from the legal aspects. Therefore, they were titled "tentative version" and are scheduled to undergo further discussion in the Phase III.

The manual of A5 was started by DINAMA but it could not be completed and the manual of A6 has not been started in the phase of the PLP. They would be addressed in the Phase III. The purposes, contents and detailed status of respective manuals are detailed in **Table 5.6.1**.

With respect to the "Authorization Manual of Industrial Wastewater Discharge", basic scheme for the preparation has been discussed. It has been confirmed that this manual should be furnished in an early stage because unified criteria for the processing of SADI (application for authorization of industrial discharge) and ADI (authorization of industrial discharge) system need to be examined carefully. At the same time, referential documents being used by US-EPA were being studied. As a result, it has become clear that this manual preparation requires much of work including the examination on related standards and specifications. Thus, it has been concluded that this manual would be addressed in the Phase III.

Table 5.6.1 Progress Status of Industrial Wastewater Manuals

Line No.	Titles	Purposes of Manuals	Forms of Products	Contents	Progress Status as of Now
1	Industrial User Inspection Manual	This is a guideline to be used for DINAMA inspectors (and possibly municipal inspectors) to enforce the inspection of industrial wastewater.	Paper document (total about 115 pages)	General instructive document describing on how to carry out the inspection of industrial wastewater facilities.	The tentative versions in Spanish and English have been completed, referring to EPA manual. Further examination from the legal viewpoint has been raised by the legal adviser.
2	Industrial Wastewater Sampling Manual	This is a guideline to be used for DINAMA inspectors (and possibly municipal inspectors) to carry out the sampling of industrial wastewater.	Paper document (total about 80 pages)	Instructive document describing on how to carry out sampling of industrial wastewater.	The tentative versions in Spanish and English have been completed, referring to EPA manual. Further examination from the legal viewpoint has been raised by the legal adviser.
3	Guidance for Industrial Wastewater Flow Rate Measurement	This is a technical guideline to enforce the resolution of the effluent measurement (to be issued October 2004)	Paper document (total 26 pages)	Technical descriptions of flow rate measurement (methodologies, constructions, calculations, etc.) by means of open channel weir, Detail explanation of triangular, rectangular, and other type.	The documents (both in Spanish and English) have been completed in the middle of November 2004.
4	Guidance for Sampling, Preservation and Transportation of Underground Water	This is a technical guideline to be used for sampling underground water.	Paper document (total 21 pages)	Instructive document describing on how to preserve and transport underground water.	The documents (both in Spanish and English) have been completed in the middle of November 2004.
5	Registration Manual of Competent Professional	This is a program to be used for registering the competent professional with digitized information, aiming to realize a computerized registration procedure.	Programmed input format and paper document	Programmed electric format for the input of information on the competent professional, Instructive documents on how to use the input format.	This work has been not started yet.
6	Self-Monitoring Report Manual	This is a program to be used for receiving the self-monitoring report from industries with digitized information, aiming to realize a computerized procedure.	Programmed input format and paper document	Programmed electric format for the input of information on the self-reporting, Instructive documents on how to use the input format, Instruction on the selection of water quality laboratory, etc.	This work has been started by DINAMA but is just at the beginning stage.

5.6.2 Elaboration of Guideline of Industrial Wastewater Treatment Techniques

DINAMA and the JICA Project Team jointly formulated this guidance. First, the JICA Project Team prepared the draft. The draft was completed in the middle of January 2005 and the final product at the end of February 2005.

DINAMA and the JICA Project Team discussed what data and information should be contained in this guidance, considering actual activities of industrial wastewater management. As a result, the following items were extracted:

- Water pollution sources,
- Wastewater volume,
- Water quality parameters and their significances,
- General description of industrial wastewater treatment technologies, and
- Actual application of wastewater treatment technologies for selected industries.

First, the draft has been prepared by the JICA Project Team. After the discussion between DINAMA and the JICA Project Team, both English and Spanish version comprised of about 250 pages have been completed, including additional data and information available in Uruguay.

5.6.3 Implementation of Coordinated Work

DINAMA and the JICA Project Team jointly formulated the draft of the Joint Work Agreement for the coordination and then the Agreement was proposed for conclusion between DINAMA and the municipalities. The draft was completed in the middle of July 2004 and the conclusion was scheduled at the end of February 2005.

DINAMA has the overall competence for industrial wastewater management in Uruguay according to the Decree 253, and meanwhile, municipalities are in a position to supervise the wastewater discharge in their territories. It has been confirmed through the interview that the municipalities harbor strong expectations for some coordinated activities with DINAMA regarding industrial wastewater management. In light of such situation, the JICA Project Team has suggested that a good coordination between DINAMA and the municipalities be furnished under the Joint Work Agreement.

Main objective of the coordination was to strengthen the capacity in the municipalities for realizing secure inspections by municipalities. To do so, DINAMA would provide the technology transfer in terms of industrial wastewater management to the municipalities. Under the planned coordination system, DINAMA stayed at the authorization unit as it is, and the municipalities work as so-called a “Liaison Office” which could be mobilized rapidly in contacting industrial users. As a result of the municipalities’ strengthened capacity, the implementation regime of industrial wastewater management by DINAMA would be enhanced.

To substantiate this, the Joint Work Agreement included the following actions:

- MVOTMA (the upper ministry of DINAMA) provides the municipalities with technology transfer with industrial wastewater management,

- MVOTMA discloses administrative and technical data/information related with the authorization of industrial discharge to the municipalities,
- MVOTMA and the municipalities mutually share data/information of the inspection results, and
- Close cooperation is made between MVOTMA and the municipalities in carrying out industrial user inspections.

The draft of the Joint Work Agreement has been prepared. This has been already discussed and largely approved by the Steering Committee. The actual Joint Work will take place in 2006, as proposed in the Action Plan, considering some delays in the manual preparation work in the PLP 3. Consequently, it was suggested that the Agreement be concluded at the beginning of 2006, after being added by some more detail prescription (if necessary).

5.6.4 Evaluation

The PLP 3 was evaluated based on the result and process of the implementation, below:

(1) Practical Use of Established Manuals and Guidance

The completion of a series of manuals and guidelines is a significant outcome, considering the conventional and current situation that many practices are depending on mainly individual knowledge of staff. It is important that these documents be practically used through actual jobs and utilized as useful tools of the technology transfer in DINAMA and the municipalities.

Of the completed documents, the industrial user inspection manual is of the nature to instruct mainly basic conceptions and things in inspections. Therefore, it is expected that supplemental manuals that are more practical and specific for actual inspection be produced based on this manual in the future.

(2) Continuing of Manual Preparation

Of the manuals scheduled in the PLP 3, some of them need more continuing work. They are:

- Industrial User Inspection Manual (A1) (The tentative version is finished)
- Industrial Wastewater Sampling Manual (A2) (The tentative version is finished)
- Registration Manual of Competent Professional (A5)
- Self-monitoring Report Manual (A6)

These manuals are important for the strengthening of industrial wastewater management. Besides, they are supposed to utilize as material documents for the technology transfer from DINAMA to municipalities. Therefore, it is proposed that these manual works be continued in the Phase III.

(3) Continuous Work for Preparation of Authorization Manuals

With respect to the authorization manual, referential documents being used by US-EPA are being studied in the PLP 3. As a result, it has become clear that this manual preparation requires much of work including the examination on related

standards and specifications in connection with the present SADI and ADI system. For that reason, the preparation of this manual is conceived to take a long time, requiring the comprehensive review of SADI and ADI system.

Therefore, it has been confirmed that this manual preparation will be carried out by DINAMA, as one of components in the period of the Phase III.

(4) Implementation of Joint Work

The Joint Work Agreement was supposed for conclusion in the beginning of 2006. Following the essence of this Agreement, actual joint work between DINAMA and the municipalities expected to take place in 2005.

Along the context of this Agreement, the following coordination activities would take place during this period:

- Opening of the workshop for industrial wastewater management in the four municipalities (IMC, IMSJ, IMF and IML),
- Providing of administrative and technical data/information concerned with the authorization to the four municipalities, (Remark: Parts of this work have already started in the period of the PLP3.)
- Mutually exchanging of inspection results, and
- Actual coordinated activities along the Agreement in industrial user inspection.

Detail contents and their procedures should be discussed between DINAMA and municipalities prior to the actual implementation.

(5) Technology Transfer throughout PLP 3

The technology transfer from the JICA Project Team to the staff of DINAMA and the municipalities concerned took place along the implementation of the PLP 3. This has been conducted through various activities of the PLP 3 based on on-the-job training in terms of the design of administrative procedures, law-enforcement procedures, wastewater treatment technologies, etc. It is expected that the outcomes of this technology transfer be practically used in the subsequent Phase III.

(6) DINAMA Members' Involvement in PLP 3

Of the total of 8 members currently engaged in industrial wastewater management in the Environmental Control Division, only 3 members have been involved in the activities of the PLP 3. Besides, the responsible persons of industrial discharge matters did not participate in the last part of the PLP 3.

To ensure the quality of manuals and to diffuse widely the outcomes of the PLP 3, it was requested that more staff be involved in various kinds of activities under the firm commitment of responsible persons.

5.7 PLP 4: Establishment of Manual for Monitoring Network Designing and Sampling

In order to implement the **Module No.3: Strengthening of Ambient Water Quality Monitoring**, establishment of manuals has been targeted, and PLP 4 has thus been formulated. One of issues identified is the fact that unified standards and practices for water quality monitoring have not been in place without necessary manuals. The PLP 4 is concerned with planning of trial monitoring to start periodical and systematic monitoring and furnishing of manuals necessary for secure QA/QC (quality assurance and quality control) in monitoring planning and actual monitoring activities.

Direct objectives of the PLP 4 were to establish manuals covering a series of monitoring activities and to formulate an executive plan of trial water quality monitoring. In a long-term, the PLP 4 aimed to settle periodical and systematic ambient water quality monitoring in Uruguay, supported by reliable water quality data and information.

As a result of the PLP 4, the following specific outputs were expected.

- The executive plan of trial water quality monitoring is furnished,
- Manuals necessary for a series of monitoring activities are established, and
- Existing manuals for laboratory measurement and analysis are updated.

5.7.1 Implementation of Trial Monitoring

DINAMA and the JICA Project Team jointly prepared the executive plan of the trial water quality monitoring. Draft was to be completed at the end of July 2004 and final products at the end of October 2004.

The executive plan has been prepared for the trial water quality monitoring as the first step of periodical and systematic monitoring. This plan covered selected sampling points, measured parameters, sampling frequencies, demarcation of measurement work and preparatory work for monitoring, etc. as shown in **Sector C, Supporting Report**. The summarized information is as follows:

(1) Selection of Sampling Points

DINAMA and the JICA Project Team have surveyed thoroughly candidate sampling points that have been used in the past. As a result, a total of 32 locations (except for 33 locations in IMM) have been selected as sampling points in the trial monitoring, considering opinions of the municipalities.

(2) Sampling Work and Frequency

Sampling frequency (once a month, as a rule) has been set, taking into account the present capacity of measurement in DINAMA and the municipalities. Together, the demarcation of sampling work between DINAMA and the municipalities has been arranged, based on the accessibility to the respective sampling points and the availability of equipment in the municipalities.

(3) Demarcation of Measurement Work

Based on the evaluation on the present capacity of the laboratories in both DINAMA and the municipalities, the work sharing in water quality measurement has been arranged. This demarcation was subject to the review for the subsequent work after the trial monitoring, depending on the laboratories' capacity.

(4) Preparatory Work

Basic schemes have been arranged in the executive plan to secure QA/QC in monitoring activities. These were comprised of the technical training for sampling work, field-testing and the inter-calibration of laboratory measurement, which were oriented for municipalities' staff.

5.7.2 Elaboration of Monitoring Manual

DINAMA and the JICA Project Team jointly prepared manuals for monitoring activities. Tentative version was to be completed at the end of October 2004 and final products at the end of February 2005.

QA/QC to secure the accuracy of collected water quality data was the most important throughout a series of monitoring activities. As a result of the discussion to realize so, it has been decided that DINAMA and the JICA Project Team jointly prepare a series of manuals necessary for water quality monitoring. The contents are summarized in **Table 5.7.1**.

Table 5.7.1 Manuals to be Prepared in PLP 4

No.	Titles	Contents	Remarks
1	Designing of Water Quality Monitoring Network	To design a proper monitoring network, practical approach and ways for selection of sampling stations, parameters to be monitored, sampling schedule, etc. are described.	This is used mainly by the WQD of DINAMA that leads the whole monitoring activities.
2	Methods of Field Work and Sampling	To secure a good practice and QA/QC in field working and sampling, relevant explanations are given for water containers and samplers to be used, sampling procedures, preservation method, and transportation, etc.	This is used by both the municipalities and the WQD of DINAMA assigned to field work.
3	Field Testing Methods	To secure a good practice and QA/QC in the field-testing, relevant explanations are given for pH, conductivity, DO and fecal coliform measurement.	This is used mainly by the municipalities assigned to field-testing.
4	Processing and Interpretation of Water Quality Data	Explanations relevant for data processing, interpretation of data, reporting, etc are addressed as guidance along with necessary data and information concerned.	This is used mainly by the WQD of DINAMA that leads the whole monitoring activities and interprets collected data.

As of the middle of November 2004, these manuals have been completed as tentative versions (in both English and Spanish) and were used as textbooks in the technical training for the municipalities on sampling and fieldwork. Final products of these monitoring manuals have been completed after necessary reviews by March 2006.

5.7.3 Updating of Manuals for Laboratory Measurement and Analysis

DINAMA updated existing manuals for laboratory measurement and analysis (*Manual de Procedimientos Analíticos para Muestras Ambientales*). This was to be completed by the end of November 2004.

The Technical Normalization Department of DINAMA (shortly called DINAMA Laboratory) is in a position to lead the measurement and analysis related with the environment in Uruguay. One of its tasks is to set up and maintain measurement and analysis manuals that are commonly used in Uruguay.

The existing manual contains a total of 58 items for the measurement and analysis covering water, sludge, soil, air and oil. It is mainly based on the 1995 version of the Standard Methods for the Examination of Water and Waster established by APHA (American Public Health Association). DINAMA Laboratory is updating this manual in response to mainly the 1999 version of APHA and the latest version of EPA. The Second Version of the manual was completed by December 2004.

5.7.4 Evaluation

(1) Review and Updating of Water Quality Monitoring Plan

It is a significant outcome that the water quality monitoring plan has been established through a series of site surveys and the mutual agreement between DINAMA and the municipalities. It is important that this plan be continuously reviewed and updated, reflecting lessons learnt from actual implementation and the monitoring network to be extended in the future.

It has been concluded as a result of the implementation of PLP 1c that DINAMA would not be able to follow the originally proposed executive plan of trial monitoring judging from the present capacity of DINAMA Laboratory and the logistic problem in the WQD. In order to alleviate heavy load, the plan has been modified in such a way that sample collections be conducted on bi-monthly basis (two-month intervals) and the number of samples and analysis parameters be as minimum as possible to meet the requirement of the ambient water quality monitoring in the Santa Lucía River Basin. The updated monitoring plan is as attached in **Sector C** of the **Supporting Report**.

The sampling frequency will further need to be adjusted with DINAMA's national water quality monitoring program, which covers six major river basins of the country. This program has been suspended since 1995, but is likely to resume in June or July of the current year.

(2) Practical Uses of Monitoring Manuals

The data and information in ambient water quality monitoring should be collected and generated in a scientifically justifiable way. Accordingly, all practices should be conducted by means of methodologies secured by QA/QC. For this reason, it is important that a series of monitoring manuals should be used practically throughout every activity and be modified timely, reflecting lessons learned.

(3) Technology Transfer throughout PLP 4

The technology transfer from the JICA Project Team to the staff of DINAMA took place in the PLP 4. This has been conducted through various activities of the PLP 4 based on on-the-job training in terms of the design of monitoring network, methodologies relevant to QA/QC, etc. It is expected that the outcomes of this technology transfer be practically used in the subsequent Phase III (Master Plan Trial).

5.8 PLP 5/6: Promotion of Dissemination, Education and Public Participation

In order to implement the **Module No.4: Promotion of Education and Public Participation**, various pilot projects were proposed, and PLP 5&6 has thus been formulated.

The necessity of the promotion of education, dissemination and public participation for water quality were confirmed and the Pilot Project 5/6 (PLP 5/6) has been proceeding through the consultations with DINAMA, related organizations (Florida Municipality and Primary Education Supervising Office of Florida) and the Steering Committee as well as related residents.

5.8.1 Objective and Strategies of the Activities

(1) Objectives

Based on the background mentioned in the previous section, PLP 5/6 were accomplished with the following objectives:

- To improve awareness of the people and their motivation to conserve water quality;
- To formulate wider basis for the consensus of the people on drawing up water quality policies;
- To promote public participation in the contribution of water quality policies as well as integrate the community for the effective implementation of them; and
- To improve the motivation of the related agencies in charge of water quality to implement the water quality policies efficiently (Surveillance of the public sector by the people).

(2) Strategies

In order to attain the above objectives firmly, the following strategies were employed in the course of PLP 5/6 activities:

- To put importance on the establishment of the framework where DINAMA and other related agencies can implement water quality management with independence and sustainability. The Working Group for PLP 5/6 has been established in DINAMA. Activities were decided by the leadership of DINAMA in the periodical meetings of the Working Group;
- To put importance on the public relations in order to improve the public acknowledgement of DINAMA accomplishment and other institutions with Japanese technical cooperation. Publicity specialists of DINAMA are included in the members of the Working Group for effective improvement of communication to the people;
- To input resources (time, manpower and budget) in a concentrated manner as a campaign in order to utilize them effectively and efficiently. So, a model area (Florida Municipality) was selected and such resources were input intensively into a campaign of the model area. (The reasons why Florida Municipality was selected are shown later subsection.) Results of the activities were reported to the other related Municipalities to encourage them to start such activities;
- To perform environmental education/training mainly for teachers of elementary schools with expecting that they would educate children after the their training; and
- To put importance on the cooperation with the other international aid agencies. UNESCO has started the water education program targeted to Latin American countries ("Agua y Educación: Para las Americas") and was carrying out in Argentine and Chile from 2004. The following collaboration was being consulted:
  - To exchange information about programs,
  - To carry out education activities in the areas other than Florida Municipality, and
  - To dispatch DINAMA staffs to the training program held in Argentine by UNESCO.

(3) Expected Output

The following outcomes were expected after the accomplishment of PLP 5/6 activities:

- Water Quality Forum is established in Florida;
- Education materials are produced and distributed. Education materials for the campaign (posters, pamphlets and stickers) are distributed to Florida only and other education materials (video programs, kamishibai and booklets) are distributed all the schools in the Project Area;
- Education and training for water quality conservation are performed in Florida with utilizing education materials;
- Campaign activities for water quality conservation are performed in Florida with utilizing education materials;
- Newsletters on water quality are published;
- Web pages on water quality project are located in DINAMA site and updated periodically; and
- Activities of all Pilot Projects are documented with videotapes.

The effects of expected outcomes were structured to support and enhance the incentives on the water quality management of the staff, institutions and communities as follows:

- *Incentive* is the key to the capacity development for the water quality management. Wrong application of incentive would deteriorate the moral all the more;
- Transparency supports the incentive of the staffs and institutions by exposing their behavior to the community. Government officials have to keep in mind that their performance is always watched by the communities. On the other hand, releasing government information arouses the people and promotes their participation by increasing their awareness through environmental education;
- The Web Page of Water Quality Management can bear multiple functions such as a low cost infrastructure of public relations, information collection/supply, and coordinating network for related institutions.
- Participatory procedure guarantees the incentive. The people can participate in a kind of decision-making process, which checks government activities. At the same time, people have to be provided with enough government information for proper decision-making by transparency.
- Public relations help awareness of the people to the government activities as well as promotion of its transparency. The Web Page and Newsletters provide a proper platform for public relations and transparency; and
- Establishment of the Water Quality Forum is also a platform of promoting transparency and *awareness* with *public participation*.

The structure of the effects of expected outcomes is illustrated below.

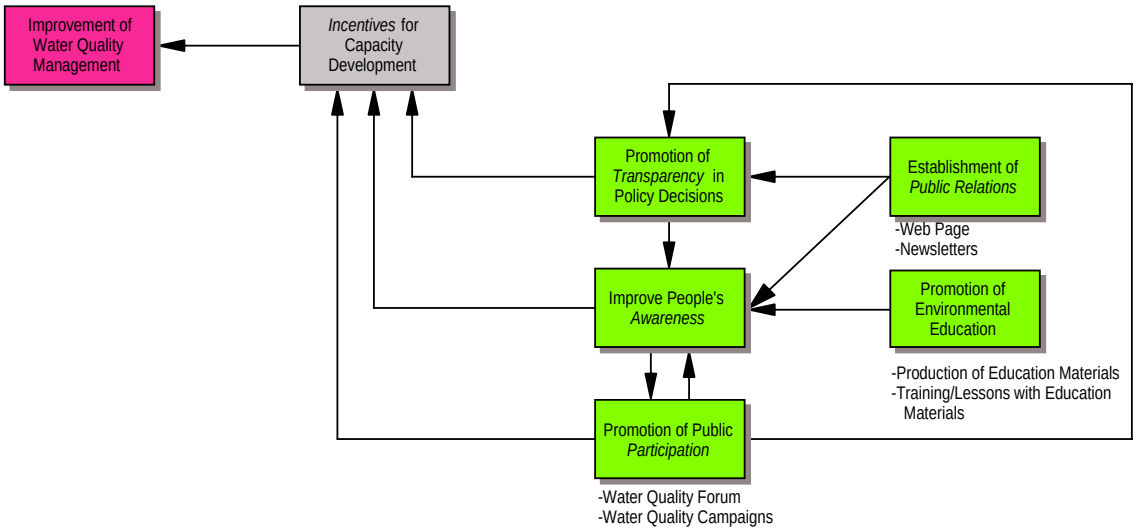


Figure 5.8.1 Structure of Effects of PLP 5&6

(4) Measures for Constructing Framework for Sustainability

In order that the activities of PLP 5/6 themselves are carried out with sustainability, the following measures were employed:

- Implementation plans of the activities are drafted under the leadership and agreement by the Working Group including DINAMA staffs (Group Leader: Mr.

Agustín Giannoni, Environmental Education Advisor), which is expected to improve their ownership;

- Two publicity specialists of DINAMA (Mr. Jorge Barcala and Ms. Claudia Mongiardino) join the Work Group and they produce news letters on water quality, which is planned to be published as a part of DINAMA quarterly magazine;
- Establishment of an organization specialized for environmental education and public participation in DINAMA which is based on the Working Group has been proposed to the National Director by the JICA Project Team and a positive response that he would consider the establishment was given by the National Director;
- Web page on water quality is inserted to the DINAMA site. Rules for the contents, information collection and management are made in order to keep periodical updates by DINAMA;
- A working group has been set-up also in Florida (Group Leader: Dr. Nestor Pereira, General Director of Hygiene) and members work for explanation of the activities to related persons and media in the model area. The Working Group in DINAMA supports them. It is also a good opportunity to develop the ownership in the model area;
- Environmental education is mainly performed for teachers of elementary schools with expecting that they will in turn teach their children after their training. The program of their training includes how to use the videos and kamishibai produced in PLP 5/6 in order to be used for long time in the future;
- It has been agreed by Primary Education Supervising Office of Florida to examine the possibility that the teachers of primary schools give lessons of water quality conservation to their children in the classrooms;
- Education materials are made through the consultations with DINAMA staff, schoolteachers and NGOs from the draft version. It helps to develop their ownership of environmental education;
- The Coordination Body of the Water Quality Forum of Florida decides the contents of water quality campaigns and the members of the Forum also participate in the activities. It is also expected to develop their ownership; and
- Training/lessons on water quality (activities of PLP 5) and water quality campaigns (activities of PLP 6) are synchronized to enhance the effects of both activities with synergy. With this synchronization, the credibility of the people to the Pilot Projects is improved and it can be a step to their self-sustaining activities.

(5) Reasons Why Florida Municipality was Selected as the Model Area

Florida Municipality was selected as the model area with the following reasons:

- The upstream of the Santa Lucía River in Minas and Chamizo, present a lower concentration of nitrogen compared with the middle stream where the nitrogen concentration is increasing. The increasing of concentration of nitrogen in the water is a possible threat for raw water sources. With the implementation of the pilot projects at Florida will increase the people's awareness about the water quality and can help to lower the water pollution in the middle stream of Santa Lucía River;

- The Municipal Governor and his Directors are willing to improve the environmental quality, especially water quality that is affecting the productive capability of the agricultural producers in the Municipality; and
- The former public participation mechanisms put in place during the last years (Local Dialog Commission) permit to anticipate the good predisposition of the local stakeholders to integrate the pilot projects.

The selection was approved in the Steering Committee Meeting on July 1, 2004, and agreed by the Governor of Florida Municipality and other related persons in the meeting for explanation on July 7 in 2004.

5.8.2 PLP 5: Promotion of Dissemination and Education

Figure 5.8.2 shows the summary of activities and schedule.

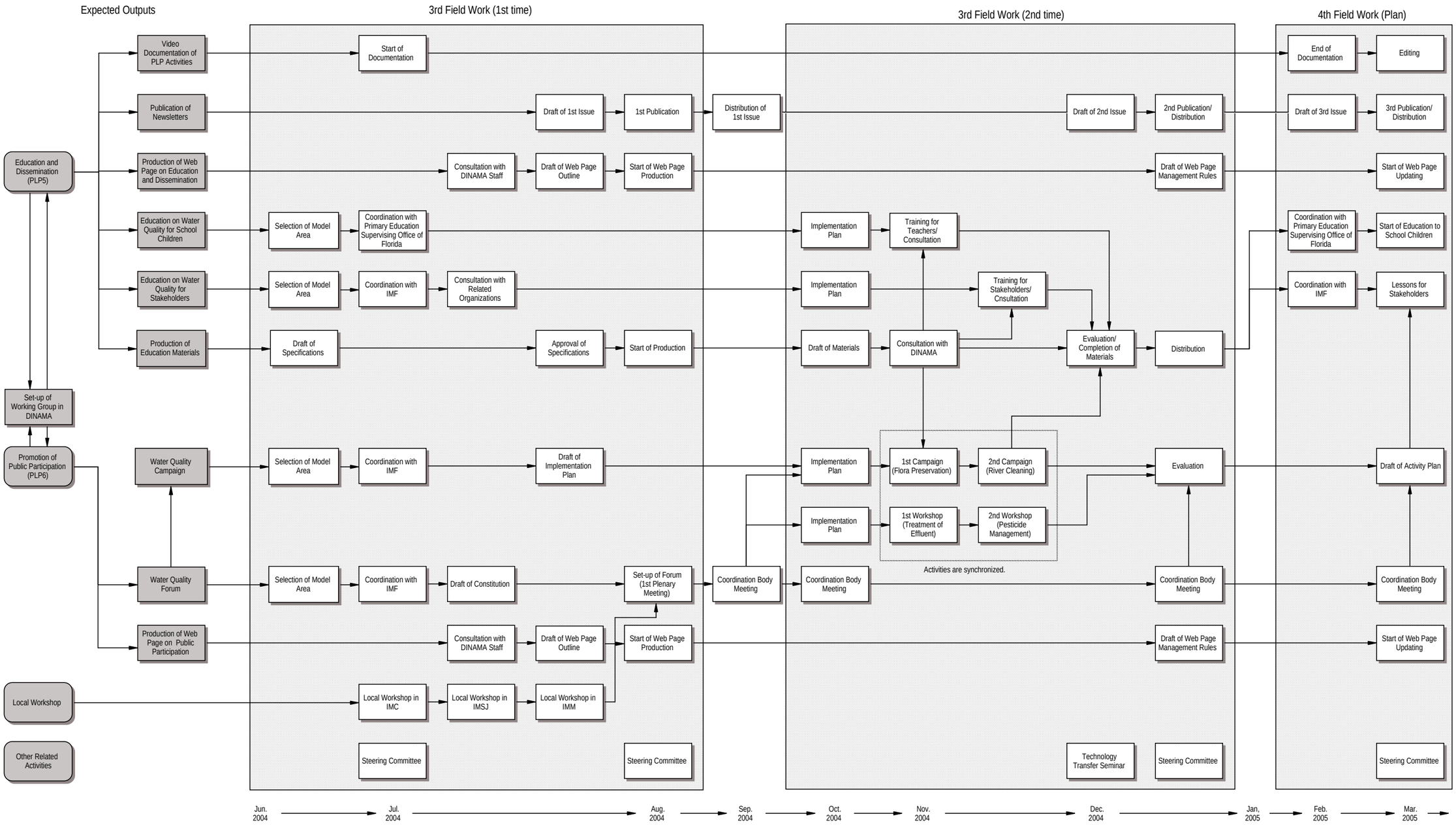


Figure 5.8.2 Summary of Activities and Schedules

(1) Education Materials

DINAMA and JICA had designed the production of educative materials to be used by teachers to teach students of primary education. It was agreed between DINAMA, JICA and Florida Education authorities the realization of an evaluation of the draft of these materials. The components of the educative tools kit are as follows: video for children, illustrated story (kamishibai) and booklet. The numbers of education materials produced are as follows:

- Video for stakeholders, digital format (20), VHS (420)
- Video for children - digital format (50), VHS (1,000)
- Illustrated story (kamishibai) – 1,000 units
- Booklet – 1,000 units

(2) Training of Teachers and Evaluation of Materials

DINAMA and JICA agreed with Florida education authorities the implementation of capacity building activities with teachers and students for teachers. In this sense, it was carried out a training session on water quality management addressed to principals and teachers of primary education school of Florida Municipality. For the session were invited to participate all schools located in the Municipality of Florida. In this session were presented the draft of education materials to get comments and recommendations for its finalization by December 2004. The number of trained teachers was 21.

(3) Design of Educative Activities for Children

DINAMA and JICA implemented a workshop on water quality management and educative approaches addressed to principals and teachers of primary level of Florida Municipality. The workshop was aimed to develop and coordinate approaches to water quality activities in schools during 2005. The coordination included the exploration of insertion of the materials elaborated by the project in the normal curricula of primary school. The workshop was held on March 10 in 2005.

(4) Education of Primary Students on Water Quality by Trained Teachers

Trained teachers will teach students of primary schools on water quality management (from March 2005) using the agreed approaches defined and if possible the educative materials elaborated by the project. In addition, this activity is evaluated.

5.8.3 PLP 6: Promotion of Public Participation

Figure 5.8.2 shows the summary of activities and schedule.

(1) Water Quality Forum

DINAMA and JICA with the close participation of the Municipality of Florida had established a Water Quality Forum in Florida Municipality to be served as an instance of public participation in the water management.

(2) Campaign Materials

DINAMA and JICA had designed the production of these materials to be used in the framework of the Water Quality Forum of Florida in principle to organize campaigns of awareness on water quality management in the Municipality of Florida. The numbers of campaign materials produced were as follows:

- Posters (1,100 for children, 800 for stakeholders)
- Triptychs (2,200 for children, 500 for stakeholders)
- Stickers (2,200 for children, 500 for stakeholders)

(3) Implementation of Activities for Public Participation

The Coordination Body of the Water Quality Forum had decided and organized many activities that were conducted during the month of November to raise the awareness of the population of Florida Municipality in the water quality management. The JICA Team, DINAMA and the Municipality of Florida had assisted to the Forum to design and implement these activities that are described here down:

(a) Flora Preservation Campaign

This campaign was to raise the awareness of the people on flora preservation around the Lake of Paso Severino in the city named 25 de Mayo. The existence of forest and shrubs around the dam helps to avoid the erosion and the entrance of sediments to the Lake that could affect the water quality.

The campaign included training sessions on the subject addressed separately to students, teachers and the general public. Schools and participants who attended the sessions are as follows:

Table 5.8.1 Flora Preservation Campaign

Session	Participants (Number)
Primary School No. 5	Students (180), Principal, Teachers(7)
Secondary School No. 3	Students (110), Principal, Teachers (14), Administrative Officers (4)
25 de Mayo City	General People (50), Municipal Officers (2)

(b) Santa Lucía Chico River Cleaning Campaign

This campaign was to raise awareness of the people on the current situation of solid waste discharging by the people in the watercourses. The campaign included training sessions on the subject addressed to the following levels:

Table 5.8.2 River Cleaning Campaign

Session	Participants (Number)
Primary School No. 51	Students (70), Principal, Teachers (2)
Primary School No. 108	Students (60), Principal, Teachers (5)
Primary School No. 102	Students (70), Principal, Teachers (3)
Primary School No. 37	Students (80), Principal, Teachers (4)
Primary School No. 2	Students (120), Principal, Teachers (5)
Primary School No. 109	Students (70), Teachers (5)
Primary School No. 76	Students (65), Teachers (4)
Secondary School No. 3	Students (120), Principal, Teachers (23)
Secondary School Universidad del Trabajo de Uruguay	Students (80), Principal, Teachers (15), Administrative Officers (6)
Florida City	Municipal Officers (6), NGO: Florida Natural (12), General People (50)
Organizers and others	DINAMA (6), Embassy of Japan (6), JICA Project Team (6)

After the training, a solid waste collection from the coastal zone of the Santa Lucía Chico River was carried out by approximately 100 persons including teachers, students, members of NGO, Municipal employees and the general public.

(c) Workshop on Effluent Management

One of the concerns of the community of Florida is how the wastewater is treated by the local industries and by OSE. In response to this concern, the coordination body of the Water Quality Forum had decided to carry out this workshop. Managers of sewerage services (OSE), Wool Industry, Milk Industry and Tannery Industry located at Florida Municipality had presented their current wastewater treatment systems. In addition, the JICA Team presented the wastewater system applied in Japan and the current water quality management improvement. In this way, the people of Florida had the opportunity to know and understand the present situation of the wastewater management in Florida. In total of 29 persons attended the workshop.

(d) Workshop on Pesticides Management

Other concern of the community of Florida is the current impact that could have on the human health and the environment the handling of pesticides and other chemical products used by rural producers. In response to this concern, the coordination body of the Water Quality Forum had decided to carry out this workshop. Officers from DINAMA, Ministry of Public Health (MSP) and Ministry of Livestock, Agriculture and Fisheries (MGAP) had presented their current plan of action and updated information. In this way, the people of Florida had the opportunity to know and understand the present situation of pesticides in Uruguay. In total 43 attended the workshop.

5.8.4 Evaluation

The PLP 5/6 are evaluated based on the results and progress of implementation of the activities by each objective as follows:

Table 5.8.3 Evaluation of PLP 5&6

Objective	Results/Progress	Evaluation
To improve awareness	• Newsletters on water quality were issued and distributed to stakeholders. • National and local media (TVs, newspapers and radios) reported most of the activities. • Posters, pamphlets and stickers are distributed for the campaigns. • Two workshops ("Effluent Treatment" and "Pesticide Management") were held in Florida. • Four training sessions were held in Florida for stakeholders using the education materials. • Eleven education sessions were held in primary and secondary school of Florida using the education materials. • Meetings with principals and teachers of Florida were held to assess the education materials.	• Materials and occasions were provided enough for the objective. It is not easy to measure actual effects of the activities in a short time. • Many activities related to water quality campaigns were planned and executed in a half month (two campaigns and two workshops, and other many education sessions). Its impact is fairly enough but the impression of each activity seems weak as a result. • Although the number of participants varies by activity, enough people joined the sessions in general.
To formulate wider basis for consensus To promote public participation	• Water Quality Forum (FWQF) was setup. • More than 70 people joined FWQF and discussed the water quality issues. • Coordination Body of FWQF had meeting regularly and promoted two water quality campaigns and workshops. • Approximately 100 people participated in the river cleaning campaign. (Walking Tour of Flora Conservation Campaign was postponed to December 3.)	• Many people participated in FWQF and its preparatory sessions and Coordination Body meeting, and discussed the water quality issues ardently until late night. Members seem to develop ownership of the water quality. • The schedule had to be arranged in order to avoid the negative affects from presidential and local elections held in October 2004 and in May 2005, respectively.
To improve the motivation of the related agencies	• Working Group was established in DINAMA and had a meeting regularly. • DINAMA staffs promoted and joined campaign activities and education/training sessions for teachers. • Florida Municipality actively promoted campaign activities. • OSE staff joined the campaign activities. • Florida primary education supervising office promoted education/training sessions for teachers. • Teachers in Florida gave comments on the education materials.	• DINAMA staffs promote and joined the activities ardently. • In Florida, especially staffs of Hygiene Department and Public Relations Office promoted and joined the campaigns actively and ardently. They seem to develop ownership of the activities.

CHAPTER 6. ESTABLISHMENT OF SECOND DRAFT INTEGRATED MASTER PLAN ON CAPACITY DEVELOPMENT FOR THE WATER QUALITY MANAGEMENT AND TRIAL IMPLEMENTATION

As discussed in **Chapter 4**, the Draft Integrated Master Plan on Capacity Development for Water Quality Management has been proposed for implementation in three stages, namely, pilot project implementation stage from April 2004 to March 2005; mid-term stage from April 2005 to 2008 (approximately 5-year period from the start of the Project); and, long-term stage from 2008 to 2013 (approximately 10-year period from the start of the Project).

The First Draft Integrated Master Plan has been formulated and the pilot projects composing the initial activities of the Master Plan were implemented as presented in Chapter 4. The Second Draft Integrated Master Plan has been formulated for the period of 2005-2008 getting feedback of the results of the pilot project implementation. The Second Draft Integrated Master Plan was for the trial implementation by only the Uruguayan side in the Phase III of the Project in the fiscal year 2005 in order to check the appropriateness of the plan for the future implementation by the Uruguayan side.

6.1 Second Draft Integrated Master Plan

The Second Draft Integrated Master Plan has been established as presented in **Figure 6.1.1**. The master plan includes the following items:

- Output of Each Module
- Activities to be implemented in the mid-term stage for 2005-2008
- Responsible agency for the implementation of the activity
- Related agency for the implementation of the activity
- Schedule for the implementation of the activity
- Input required for the implementation of the activity
- Degree of easiness/difficulty for implementation of activities

The implementation of the activities could be divided into two from the viewpoint of necessary input as follows:

- Activities to be conducted as a part of normal work utilizing the human resources of the relevant agencies within the normal budget (though increase of human resources and budget might be required in some part)
- Activities to be conducted with a new input including those of assistance from outside of the country, e.g. foreign aid and technical assistance

Either case requires the promotion of the activities implementation by the Uruguayan Government.

Figure 6.1.1 Second Draft Integrated Master Plan on Capacity Development for Water Quality Mangement

Output	Activities in the Mid-Term Stage (-2008)	Responsible Agency	Relevant Agencies	Schedule 2005 I II III IV	2006 I II III IV	2007 I II III IV	2008 I II III IV	Input	Degree of Easiness / Difficulty for Implementation of Activities
Module No.1: Strengthening of Strategic Part									
1.1: Water quality management strategies and specific action plans of respective water quality approaches are established.	• DINAMA reviews the strategy of water quality management and the action plan established in the course of the Project, and modifies them (if necessary). - WQMC (Water Quality Management Committee in DINAMA) reviews the strategy of water quality management	DINAMA	---					• Human resources of DINAMA • WQMC	• Human resources: less required • Budget: less required • Technical level: standard • Relevant agencies: inside DINAMA • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~
	• DINAMA sets the Work Plan for respective development modules, based on the action plan mentioned above. - WQMC establishes a work plan for the strengthening of water quality management capacity for next year	DINAMA	---						
1.2: Decree No.253 is amended.	• DINAMA plays the leadership in the GESTA Water of COTAMA in making “Decree No.253/79 and Amendments” from the technical aspect.	DINAMA	COTAMA					• Human resources of DINAMA (related to legal aspects) and COTAMA, MVOTMA	• Human resources: less required • Budget: less required • Technical level: standard • Relevant agencies: inside MVOTMA • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~
	• Legal procedure for the “Decree No.253/79 and Amendments” proceeds. - MVOTMA prepares “Decree No.253/79 and Amendments”, and send it for the signature of all the relevant Ministers, and send it to Executive Power for approval (schedule is tentative)	MVOTMA	COTAMA						
1.3: Water bodies’ specific use is declared based on the “Decree No.253/79 and Amendments”. (All the activities depend upon the contents of the “Decree No. 253/79 and Amendments”)	• DINAMA designates proper unit for the task of declaration of water bodies’ specific use. - Unit for declaration of water bodies’ specific use shall be under WQMC	DINAMA	---					• Human resources of DINAMA (Environmental Quality Evaluation Division: EQED) • Human resources of OSE, MGAP, INAPE, MSP and other relevant agencies	• Human resources: need assignment of personnel to the Unit • Budget: required for man-power • Technical level: standard • Relevant agencies: all the agencies related to water quality • Work intensity: intense work is required for identification of river stretch for each specific use • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA coordinates with Council for Water Quality Management in River Basins (with the Steering Committee during the period of the JICA Project) for the declaration of water bodies’ specific use. - The Unit prepares a draft for declaration - Periodical meeting shall be held	DINAMA	OSE, MGAP, INAPE, MSP and relevant agencies						
	• DINAMA coordinates with relevant organizations for the declaration of “water bodies of high quality”, and issues declaration.	DINAMA	Relevant agencies						
	• DINAMA coordinates with OSE, Municipalities, MGAP, INAPE, MSP, and relevant organizations for the declaration of “water bodies for specific use”, and issues declaration.	DINAMA	OSE, MGAP, INAPE, MSP and relevant agencies						
	• DINAMA coordinates with relevant organizations for the declaration of “water bodies under recovery”, and issues declaration.	DINAMA	Relevant agencies						
	• DINAMA continues to review the declaration of water bodies’ specific use.	DINAMA	Relevant agencies						
1.4: Present river water quality is evaluated	• DINAMA evaluates present river water quality utilizing SISICA referring to the water bodies’ specific use.	DINAMA	---					• Human resources of EQED, DINAMA	• Human resources: less required • Budget: less required • Technical level: standard (compare monitored value to the declared class) • Relevant agencies: inside DINAMA • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~

Output	Activities in the Mid-Term Stage (-2008)	Responsible Agency	Relevant Agencies	Schedule 2005 I II III IV	Schedule 2006 I II III IV	Schedule 2007 I II III IV	Schedule 2008 I II III IV	Input	Degree of Easiness / Difficulty for Implementation of Activities
1.5: Necessity of Council for Water Quality Management in the Santa Lucía River Basin is discussed.	• Necessity of the establishment of Council for the Water Quality Management in River Basins is discussed in the meeting of the Steering Committee under the new government organization.	MVOTMA/DINAMA	DNH, OSE, RENARE, Municipalities and W.Q. Forum		▬			• Human resources of MVOTMA and DINAMA • Human resources of OSE, MGAP, INAPE, MSP and other relevant agencies	• Human resources: less required • Budget: less required • Technical level: no specific problem • Relevant agencies: all the agencies related to water quality • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~
	• DINAMA conducts necessary procedure for the legalization of the Council when the new government decides to establish the Council.	MVOTMA	---		▬	▬			
	• Council for the Water Quality Management in the Santa Lucía River Basin is established when the new government decides to establish the Council. - Ad Hoc Council shall be established when the necessity is recognized in the Steering Committee - Official Council shall be established when it has been legalized.	MVOTMA/DINAMA	DNH, OSE, RENARE, Municipalities and W.Q. Forum		Ad Hoc ▲	▲			
Module No.2: Strengthening of Pollution Source Management									
2.1: Collaboration system among relevant agencies on pollution source management is maintained.	• Periodical meetings take place to exchange information on pollution source management; attended by DINAMA, OSE, RENARE, Municipalities and other relevant organization (“Steering Committee” shall be utilized.) - Evaluated the capacity of EnCD of DINAMA for the necessary work for this activity by the end of 2005. - DINAMA already maintains some information. - Establish a system for the systematic work - Exchange agreement if necessary	DINAMA	OSE, RENARE, Municipalities	▬	▬			• Human resources of EnCD • Human resources of relevant agencies	• Human resources: personnel of EnCD should be carefully examined and increased accordingly • Budget: should be carefully examined for required for personnel • Technical level: standard • Relevant agencies: all the agencies related to water quality. • Work intensity: sporadic • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA would collect the information on sewerage development in a sustainable manner. - Features of sewerage as GIS information (refer to Table 3.2.3) - Information on vacuum vehicle domestic wastewater system	DINAMA	OSE, Municipalities		▬	▬	▬		
	• DINAMA would collect the information on solid waste management. - Features of solid waste dumping site (GIS information) and general information on solid waste management in each Municipality	DINAMA	Municipalities		▬	▬	▬		
	• DINAMA would collect the information on non-point source pollution management. - Information on the use of fertilizer and pesticide.	DINAMA	RENARE, Municipalities		▬	▬	▬		
2.2: Capacity of relevant organization on pollution source management is strengthened	• JICA provides necessary technical transfer through the technical training in Japan. - Group training course “Industrial Wastewater Treatment Technique II”	DINAMA or relevant agencies		▬				• JICA Scheme: Training in Japan	• Overall: easy / ~~medium~~ / ~~difficult~~
2.3: Industrial wastewater management is conducted under the collaboration of DINAMA and Municipalities	• Agreement between DINAMA and Municipalities for the collaboration on industrial wastewater management is concluded. - Draft agreement has already been prepared. - After the completion of procedural and management manual as prepared in **2.4** below, collaborated work shall be discussed.	DINAMA Municipalities	---		▲			• Human resources of EnCD, DINAMA • Human resources of industrial wastewater management in Municipalities	• Human resources: personnel of EnCD should be examined carefully and increased accordingly • Budget: should be carefully examined for required for personnel • Technical level: standard • Relevant agencies: Municipalities in the basin. • Work intensity: part of normal work • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA continues providing Municipalities with information of SADI and engineering data of industry.	DINAMA	Municipalities	▬	▬	▬	▬		
	• DINAMA and Municipalities coordinate for the compliance inspection.	DINAMA	Municipalities		▬	▬	▬		
	• DINAMA and Municipalities mutually exchange the inspection results of industrial wastewater facilities in a sustainable manner.	DINAMA	Municipalities		▬	▬	▬		

Output	Activities in the Mid-Term Stage (-2008)	Responsible Agency	Relevant Agencies	Schedule 2005 I	2005 II	2005 III	2005 IV	2006 I	2006 II	2006 III	2006 IV	2007 I	2007 II	2007 III	2007 IV	2008 I	2008 II	2008 III	2008 IV	Input	Degree of Easiness / Difficulty for Implementation of Activities
2.4: Industrial wastewater related manuals are prepared	• DINAMA develops procedural and management manuals for industrial wastewater. - Self-monitoring Report Manual - Authorization Manual of Industrial Wastewater Discharge - Industrial User Inspection Manual - Industrial Wastewater Sampling Manual - Registration Manual of Competent Professional	DINAMA	---	■	■	■	■	■	■	■	■									• Human resources of EnCD	• Human resources: difficult: some staff of EnCD should concentrate to the work • Budget: standard (part of normal work) • Technical level: standard • Relevant agencies: inside DINAMA • Work intensity: intense work by staff of EnCD is needed • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA amends established manuals, when necessary. - EnCD shall amendment when necessary	DINAMA	---					▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪	▪		
2.5: Capacity of DINAMA and relevant agencies on industrial wastewater management is developed	• JICA provides necessary technical transfer through the technical training in Japan. - Group training course “Industrial Wastewater Treatment Technique II”	DINAMA or Municipalities	---			■														• JICA Scheme: Training in Japan	• Overall: easy / ~~medium~~ / ~~difficult~~
	• DINAMA provides technical transfer of industrial wastewater management to staff of Municipalities, using Manuals to be established in <Output2.4>.	DINAMA Municipalities	---						■	■										• Human resources of EnCD	• Human resources: existing staff of EnCD and Municipalities • Budget: standard (part of normal work) • Technical level: standard • Relevant agencies: Municipalities • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~
2.6: River water quantity observation system is established	• DNH under the collaboration with DINAMA and relevant organizations establishes a system for observation of water quantity (river flow) in the Santa Lucía River Basin that is required for the simulation of the future water quality prediction. - DNH identifies necessary work including equipment for the establishment of proper system for observation of water quantity in the Santa Lucía River Basin. - DNH strengthen the system for observation of water quantity in the Santa Lucía River Basin.	DNH	DINAMA							■	■	■	■	■	■					• International technical assistance Experts - River management planner - Hydrological observation • Structure and equipment - for water level and flow measurement	• Human resources: staff of DNH and foreign assistance shall be needed • Budget: much required (Technical assistance from abroad shall be considered) • Technical level: high: needs the study on the river management • Relevant agencies: DINAMA • Work intensity: intense work with technical assistance from abroad is necessary • Overall: ~~easy~~ / ~~medium~~ / difficult
2.7: An integrated information system for pollution sources is established	• DINAMA constructs an integrated information system with GIS database on pollution sources. - EnCD under the collaboration with EQED studies and proposes necessary system specification - EnCD creates a GIS database system for various pollution sources. - Technical committee consisting of members from the relevant agencies shall be formulated for the creation of the system	DINAMA	OSE, RENARE, Municipalities						■	■	■									• Human resources of DINAMA • Human resources of relevant agencies • International technical assistance Input of the following experts. - Pollution source management - Hydrology and meteorology - Water quality	• Human resources: much required: should be carefully examined and staff of EQCD should be increased for this purpose and foreign assistance shall be needed • Budget: much required (Technical assistance from abroad shall be considered) and should be carefully examined for local budget • Technical level: high: simulation of water quality requires high technique. • Relevant agencies: all the relevant
	• DINAMA inputs data and information of various pollution sources to the integrated information system.	DINAMA	OSE, RENARE, Municipalities										▪	▪	▪	▪	▪	▪	▪		
2.8: Influence of pollution sources to river water is grasped	• DINAMA allocates proper staff assigned to the task of water quality assessment. - A unit shall be formulated preferably under EQED with collaboration from EnCD.	DINAMA	---										■								

Output	Activities in the Mid-Term Stage (-2008)	Responsible Agency	Relevant Agencies	Schedule 2005 I II III IV	2006 I II III IV	2007 I II III IV	2008 I II III IV	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• DINAMA makes preliminary survey on the pollution loads from various kind of wastewater. - Information stored in the GIS database for pollution sources shall firstly be evaluated. - The Unit assigned to the task of water quality assessment makes a plan for the preliminary survey on the pollution loads. - Preliminary survey on the pollution loads shall be conducted.	DINAMA	OSE, RENARE, Municipalities			▬	▬	simulation - GIS system • Equipment - Personal computers - Software for pollution simulation	agencies. • Work intensity: intense work with technical assistance from abroad is necessary • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA develops a simulation model for the assessment of the influence of pollution sources to the water environment. - The Unit assigned to the task of water quality assessment shall study for the necessary system for water quality assessment - Water quality assessment system shall be developed - Water quality shall be assessed for the possible future change in the basin	DINAMA	DNH, OSE, RENARE, Municipalities			▬	▬		
Module No.3: Strengthening of Ambient Water Quality Monitoring									
3.1: Manuals related to monitoring are prepared	• DINAMA amends established manuals, when necessary. - EQED should make necessary amendment.	DINAMA	---	▪▪▪▪	▪▪▪▪	▪▪▪▪	▪▪▪▪	• Human resources of DINAMA	• Human resources: less required and to be covered by staff of EQED • Budget: less required • Technical level: normal. Utilize the established manual in PLP 4 for updating of monitoring plan. • Relevant agencies: inside DINAMA • Work intensity: sporadic • Overall: ~~easy~~ / medium / ~~difficult~~
3.2: Ambient water quality monitoring plan for the Santa Lucía River Basin is established	• DINAMA updates water quality monitoring plan in the Santa Lucía River Basin based on the outcome of ambient water quality monitoring. - EQED updates water quality monitoring plan in the Santa Lucía River Basin through discussion with relevant agencies for water quality monitoring	DINAMA	OSE, Municipalities and DNH	▪▪▪▪	▪▪▪▪	▪▪▪▪	▪▪▪▪	• Human resources of DINAMA and relevant agencies	
3.3: Collaborated implementation system for sampling, analysis and evaluation is established	• Agreement for the collaborated ambient water quality monitoring is concluded. - Discussion on the collaborated ambient water quality monitoring is carried out after the election of Municipal mayors and with the new local government personnel - Agreement shall be concluded	DINAMA, OSE, Municipalities	---	▬ ▲				• Human resources of EQED • Human resources of relevant agencies • Budget for monitoring and analysis in DINAMA and relevant agencies	• Human resources: staff of EQED and Municipalities • Budget: required for personnel and equipment and supplies for monitoring and laboratory analysis • Technical level: normal. • Relevant agencies: relevant agencies • Work intensity: periodic • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA and Municipalities jointly carry out sampling and analysis of water and sediment for the ambient water quality monitoring.	DINAMA, OSE, Municipalities	---	▬▬▬▬	▬▬▬▬	▬▬▬▬	▬▬▬▬		
3.4: Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened	• JICA provides technical training for the sampling and laboratory analysis. - Training in Japan shall be considered. - Horizontal cooperation shall be considered including Japan Chile Partnership Program and other schemes	DINAMA or relevant agencies	---	▪▪▪▪	▪▪▪▪			• JICA Scheme: Training in Japan • Horizontal cooperation (JCPP, etc.)	• Overall: easy / ~~medium~~ / ~~difficult~~
	• DINAMA provides technical transfer for sampling and analysis of water for Municipalities in a sustainable manner (incl. inter-calibration). - EQED conducts technical transfer for sampling when necessary - Laboratories of DINAMA and Municipalities conduct inter-calibration	DINAMA	Municipalities	▪▪▪▪	▪▪▪▪	▪▪▪▪	▪▪▪▪	• Human resources of DINAMA • Human resources of OSE and Municipalities	• Human resources: staff of laboratory in DINAMA, OSE and Municipalities should be increased for this purpose and foreign assistance shall be needed • Budget: much required (Technical

Output	Activities in the Mid-Term Stage (-2008)	Responsible Agency	Relevant Agencies	Schedule 2005 I II III IV	2006 I II III IV	2007 I II III IV	2008 I II III IV	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• DINAMA conducts pesticide monitoring. - Laboratory of DINAMA identify necessary work including upgrading of equipment for the pesticide monitoring - Laboratory of DINAMA strengthen the capacity for pesticide analysis	DINAMA	MGAP					• International technical assistance Experts - Pesticide analysis Equipment for Water Quality Analysis - for Pesticide - for BOD (Municipalities and OSE branch Office)	assistance from abroad shall be considered) • Technical level: high: pesticide analysis requires high technique. • Relevant agencies: OSE and Municipalities • Work intensity: intense work with technical assistance from abroad is necessary • Overall: ~~easy~~ / ~~medium~~ / difficult
	• Municipalities raise the capacity of laboratory in order to cover BOD_5 analysis at every laboratory. - IMC, IMSJ, IMF, IML identify necessary work including upgrading of equipment of the analysis covering BOD_5 - Laboratories of IMC, IMSJ, IMF, IML strengthen the capacity to cover BOD_5	Municipalities	DINAMA						
	• Branch laboratory of OSE in each Municipality raise the capacity in order to cover BOD_5 analysis. - OSE identifies necessary work including upgrading of equipment of the analysis covering BOD_5 at branch laboratories of OSE - OSE strengthen the capacity of its branch laboratories to cover BOD_5	OSE	DINAMA						
	• DINAMA Laboratory obtains ISO/IEC 17025 Certificate for necessary items (This activity will be made by DINAMA itself separately from the JICA Project)	MVOTMA/DINAMA	---						
	• DINAMA maintains laboratory equipment and skills properly.	DINAMA	---						
	• DINAMA raise the capacity of laboratory in order to meet the strategies and action plans.	DINAMA	---						
	• DINAMA maintains proper number of staff for ambient water quality monitoring.	DINAMA	---						
3.5: Water quality information system is established	• DINAMA promotes to develop SISICA in the relevant organizations, e.g. OSE, RENARE, IMM, IMC, IMSJ, IMF, IML. - EQED promotes to develop SISICA in IMM, OSE and RENARE and assists the installation of the system - DINAMA gives necessary training to IMC, IMSJ, IMF and IML, and to promote inputting monitoring data to SISICA DINAMA through Internet - DINAMA promotes to develop SISICA in the relevant organizations	DINAMA	OSE, RENARE, Municipalities, etc.					• Human resources of DINAMA • Human resources of relevant agencies System engineers - 2-person, 2-year - Support establishment of other SISICA - Develop Integrated SISICA	• Human resources: staff of EQED and input of system engineer shall be needed • Budget: required to obtain system engineers • Technical level: standard: refer the experience of SISICA DINAMA development • Relevant agencies: related agencies • Work intensity: intense work is necessary for the support of develop SISICA in other agencies and establishment of Integrated SISICA • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA establishes integrated SISICA. - EQED develops Integrated SISICA	DINAMA	OSE, RENARE, Municipalities, etc.						
	• DINAMA continues to manage integrated SISICA.	DINAMA	OSE, RENARE, Municipalities, etc.						
3.6: Water quality data are properly evaluated	• DINAMA processes and interprets water quality data in a sustainable manner.	DINAMA	---					• Human resources of DINAMA	• Human resources: less required: staff of EQED shall conduct the work • Budget: less required • Technical level: standard: utilize the Manual developed in PLP 4 • Relevant agencies: in DINAMA • Work intensity: periodical • Overall: easy / ~~medium~~ / ~~difficult~~ •

Output	Activities in the Mid-Term Stage (-2008)	Responsible Agency	Relevant Agencies	Schedule 2005 I II III IV	2006 I II III IV	2007 I II III IV	2008 I II III IV	Input	Degree of Easiness / Difficulty for Implementation of Activities
									• ~~=~~ •
3.7: Water Quality Annual Report is publicized.	• DINAMA annually publicizes Water Quality Annual Report, interpreting and compiling diverse information like DINAMA's policy/strategies, water quality data, and others.	DINAMA	---	▲	▲	▲	▲	• Human resources of DINAMA	• Human resources: staff of EQED shall conduct the work • Budget: less required • Technical level: standard: • Relevant agencies: in DINAMA • Work intensity: periodical • Overall: ~~easy~~ / medium / ~~difficult~~
Module No.4: Promotion of Education and Public Participation									
4.1: Awareness of stakeholders for water quality is raised	• DINAMA issues in a sustainable manner News Letter on water quality and deliver it to stakeholders. - WQMC decides the general contents of News Letter - Publication group of DINAMA prepares a draft - DINAMA issues the News Letter quarterly	DINAMA	---	▪▪▪	▪▪▪	▪▪▪	▪▪▪	• Human resources of DINAMA • Human resources of Municipalities • Human resources of NGOs • National and local education authorities	• Human resources: Internal unit of DINAMA and existing personnel of relevant agencies shall participate • Budget: less required: education material has been developed by PLP 5 • Technical level: standard: • Relevant agencies: all the relevant agencies • Work intensity: intense work for each activity is needed • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA maintains a web page on water quality management - WQMC decides the necessary update of the web page - Person in charge of web site maintains	DINAMA	---	▪▪▪	▪▪▪	▪▪▪	▪▪▪		
	• National and Local Educational Authorities, Florida Water Quality Forum and DINAMA continue dissemination and education for water quality in Florida Municipality in a sustainable manner. - DINAMA National and Local Educational Authorities, and JICA hold Education Material Delivery Ceremony. - Florida Water Quality Forum holds Workshop on Industrial Wastewater Treatment in Fray Marcos (August 5, 2005). - Florida Water Quality Forum holds a workshop on Effluents of *Tambos* (small scale milk producers) (October 7, 2005) - Florida Water Quality Forum holds Workshop for presentation of paper work related to water management by secondary or institute students - Workshop with the participation of primary education director and teachers of Florida to design the scheme to introduce education materials of water quality management in the primary education curriculum is held (March 10, 2005). - National and Local Educational Authorities carry out test of implementation of the design by teachers in the class room - National and Local Educational Authorities, Florida Water Quality Forum and DINAMA continue dissemination and education for water quality in Florida Municipality in a sustainable manner.	Florida Water Quality Forum, DINAMA, Educational Authorities	Municipality of Florida, NGOs	▲ ▲ ▲ ▲ ▬	▪▪▪	▪▪▪	▪▪▪		
4.2: A system for the formulation of agreement on water quality management is created and public participation is promoted.	• Florida Water Quality Forum and DINAMA continue leading and implementing public participation campaigns. - Florida Water Quality Forum and DINAMA hold World Water Day Commemoration - Florida Water Quality Forum and DINAMA hold Environment Day Commemoration - Florida Water Quality Forum and DINAMA hold Campaign on Cleaning of Tomas Gonzalez River - Florida Water Quality Forum and DINAMA continue promoting of public participation for water quality in Florida Municipality in a sustainable manner.	Florida Water Quality Forum, DINAMA	NGOs, Residents	▲ ▲ ▲	▪▪▪	▪▪▪	▪▪▪	• Human resources of DINAMA • Human resources of Municipalities • Human resources of NGOs	• Human resources: Internal unit of DINAMA; existing personnel of Municipalities, NGOs shall participate • Budget: required for campaigns • Technical level: standard: • Relevant agencies: all the relevant agencies • Work intensity: intense work shall be needed for the establishment of water

Output	Activities in the Mid-Term Stage (-2008)	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• DINAMA and Florida Water Quality Forum assist the establishment of Water Quality Forums in other Municipalities and the federation of Water Quality Forum	DINAMA, Florida Water Quality Forum	Municipalities			quality forum in each municipality. • Overall: ~~easy~~ / medium / ~~difficult~~
	• Other Municipalities of the Project's Area establishes their own Water Quality Forum - Municipality of Lavalleja establishes and operates its own Water Quality Forum and conduct activities - Municipality of Canelones establishes and operates its own Water Quality Forum and conduct activities - Municipality of San José establishes and operates its own Water Quality Forum and conduct activities - Municipality of Montevideo establishes and operates its own Water Quality Forum and conduct activities - A federation of Water Quality Forums for the Santa Lucía River Basin is established and promote dissemination, education and public participation	Municipalities	DINAMA, OSE, DNH, NGOs, associations, etc			
4.3: Awareness for water quality management in the relevant organizations is raised.	• DINAMA organize an internal unit to be responsible for education and public participation activities	DINAMA	---		• Human resources of DINAMA • Human resources of Municipalities	• Human resources: Internal unit of DINAMA should be organized • Budget: less required • Technical level: standard: • Relevant agencies: all the relevant agencies • Work intensity: creation of internal unit requires intense discussion • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA plays a leading role to raise awareness on water quality under the collaboration with relevant organizations.	DINAMA	Relevant agencies			

Schedule: 2005 (I II III IV) | 2006 (I II III IV) | 2007 (I II III IV) | 2008 (I II III IV)

6.2 Trial Implementation of the Second Draft Integrated Master Plan and Evaluation in the Phase III of the Project

Trial implementation of the Second Draft Integrated Master Plan has been conducted in Phase III of the Project in the fiscal year 2005 by the Uruguayan side in order to confirm the adequacy of the plan for the sustainable implementation.

This section describes the final evaluation of the activities in Phase III on the basis of the "Evaluation Sheet" (**Annex 6.2.1**) prepared by the Uruguayan side during Phase III of the Project. The final evaluation has been summarized as follows for each module:

6.2.1 Module No.1: Strengthening of the Strategic Part

- It is judged good that the strategy for the water quality management, namely, with three pillars of water quality management for river basins, systematic water quality management, and integrated water quality management, is acknowledged by DINAMA and relevant organizations in the country. Important is to monitor the situation of the organizational strengthening of Water Quality Department of DINAMA for the necessary work related to the declaration of water bodies' specific use under the Decree No. 253 and Amendment.
- Output No.1.1 (Water quality management strategies and specific action plans of respective water quality approach are established): It was proposed that Water Quality Management Committee in DINAMA would review the water quality management strategies and specific action plans established in Phase II. Although the meetings in the Water Quality Management Committee have not been held, the strategy for the water quality management, namely, with three pillars of water quality management for river basins, systematic water quality management, and integrated water quality management, is confirmed in the every Steering Committee meeting and it is acknowledged inside DINAMA. It could be judged that the strategy is already of Uruguay itself. The review of the action plans of respective water quality approach is to be conducted for each module and reported to the Steering Committee. Thus the Output No.1.1 could be judged realized.
- Output No.1.1 (continued.): Based on Law No.17930 National Budget, DINASA (National Directorate of Water and Sanitation) has been established on January 17th 2006. Article No. 327 of the said law declares that the Ministry of Housing, Use of Land and Environment shall propose to the Executive Power the formulation of national water and sanitation policies, according to what is stated under article 47 of the Constitution of the Republic. Article 328 of Law 17930 establishes that in order to fulfill the assignments stated on article 327 of the abovementioned law, the "National Directorate of Water and Sanitation" (DINASA) should be created, under subsection 14 Ministry of Housing, Use of Land and Environment, Executing Unit 001 "General Secretariat Directorate". During the meeting with the National Director of DINASA, the National Director mentioned that DINASA is the policy-making directorate and not the executing directorate. It was also mentioned that integration of all the organizations of water sector (quantity and quality) is important and the approach of integrated river basin management is deemed important. It was confirmed that the strategy of DINASA is in the same direction with the strategy of the present project and thus there expects no adverse impacts on the strategy of water quality management in Uruguay.

- Output No.1.2 (Decree No.253 is amended): For this output, JICA Project provided DINAMA with technical information. In the meeting on Module No.1, it has been confirmed the final version of Gesta Water Group would be submitted to COTAMA by May 2006.
- Output No.1.3 (Water bodies' specific use is declared based on the Decree No.253/79 and Amendments.): The Ministerial Order dated on 28th of February 2005 describes that all the rivers with the catchment area of 10 km^2 of more fall in Class 3 of the Decree No.253/79. Upon the amendment of Decree No.253/79, DINAMA is responsible for the identification for the specific use. "Water bodies of high quality" should be proposed by other agencies and DINAMA should declare it, thus no much work is expected. However, declaration of "Water bodies under recovering" requires certain activities of Water Quality Department of DINAMA and thus actual proposal of the increase of personnel has already been made.

6.2.2 Module No.2: Strengthening of Pollution Source Management

- Preparation of manuals scheduled in Phase III has been implemented and it could be judged good. Important point for the finalization of Integrated M/P is whether the Environmental Control Division would be strengthened with necessary personnel.
- Output No.2.1 (Collaboration system among relevant agencies on pollution source management is maintained.): Actual activities and the evaluation are as follows:
  - Activity: (Periodical meetings take place to exchange information on pollution source management.) It was reported that the periodical meetings have not been held due to the lack of human resources. It could be evaluated that the objective of the output "meetings take place" seems not clear and it has not been realized. It is proposed that actual collaboration work for Output No.2.6 (An integrated information system for pollution sources is established) and Output No.2.7 (Influence of pollution sources to river water is grasped) would be incorporated in the Final Integrated M/P.
  - Activity: (Evaluate the capacity of EnCD of DINAMA for the necessary work for this activity by the end of 2005.) EnCD already submitted a proposal for the future work with staff increase to the National Director.
  - Activity: (DINAMA maintains necessary data in a sustainable manner.) There are no changes from the status before the Project and updating of the data has not been carried out.
  - Activity: (DINAMA establishes a system for the information exchange on pollution source management among OSE, RENARE, municipalities and other organizations.) DINAMA and IMM already exchanged an agreement on pollution source management. For the other organizations and for the pollution sources other than industrial wastewater, continuous activities should be included in the Final Integrated M/P.
  - Activity: (Conclude agreement if necessary.) DINAMA and IMM already exchanged an agreement, but no progress in the other municipalities.
- Output No.2.4 (Industrial wastewater related manuals are prepared.) Of the seven scheduled manuals, four manuals, namely, "Guidance for industrial wastewater flow measurement", "Guidance for sampling, preservation and transportation of groundwater", "Registration Manual of Competent Professional", and "Authorization Manual of Industrial Wastewater Discharge" have been completed

and published by web. Of the remaining three, "Industrial User Inspection Manual" has already been prepared for the use of DINAMA based on the EPA manual and it is under the check by the legal advisor of DINAMA. It will then be sent to municipalities for check. It has been concluded that result and the status of the work would be reported in the Steering Committee meeting scheduled on March 10, 2006. Regarding "Industrial Wastewater Sampling Manual", EPA based version is completed and the customizing for DINAMA would be scheduled in 2006. "Self-monitoring Report Manual" should also be conducted in 2006. Five manuals of the scheduled seven have been completed and the Output No.2.4 is evaluated almost realized.

6.2.3 Module No.3: Strengthening of Ambient Water Quality Monitoring

- Module No.3 is generally very active and it could be evaluated that this module achieved the best output among the four modules.
- Output No.3.1 (Manuals related to monitoring are prepared.) Final version of the contents has been prepared and in actual use. DINAMA publishing group already prepared final design version for the hard copy manual and printed. It could be judged that the originally expected output has been realized.
- Output No.3.2 (Ambient water quality monitoring plan for the Santa Lucía River Basin is established.) It has been implemented as scheduled. Monitoring sites of the monitoring plan prepared by the pilot project in Phase II has been amended by DINAMA at the beginning of Phase III and it is evaluated that the monitoring plan is prepared and used by Uruguay side itself.
- Output No.3.3 (Collaborated implementation system for sampling, analysis and evaluation is established.) Periodical technical committees took place; inter-laboratory calibration was proposed by Uruguay side and implemented; collaborated monitoring system has been established thus the output is well realized. The actual activity has thus been realized and the Agreement was scheduled to be discussed in Steering Committee meeting, though it was not realized and Steering Committee meetings have not been taken place in the absence of the JICA Project Team. In the Steering Committee meeting on February 3 2006, it has been agreed to proceed to conclude the agreement and the draft agreement prepared by the JICA Project Team to be sent to the legal advisor of DINAMA for the check. It could be judged good that the actual monitoring system has been established and the necessary work is being conducted. Thus it could be judged that the target output has been achieved. Necessity of periodical holding of Steering Committee meeting is recognized by Uruguay side and monthly meeting of the Steering Committee has been proposed, but it was not realized.
- Output N.3.4 (Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened.) The status is as follows:
  - Activity: (JICA provides technical training for the sampling and laboratory analysis.) Training for the specific purpose of the monitoring has not been realized.
  - Activity: (JICA provides technical training for the sampling and laboratory analysis.) Dispatch of specialist on pesticide analysis from Chile has been realized utilizing the scheme of JCPP from October 24 to November 1. It has been reported with much output.

- Activity: (DINAMA provides technical transfer for sampling and analysis of water for municipalities in a sustainable manner (incl. inter-calibration).) Technical transfer from DINAMA to municipalities and inter-calibrations have been taken place and it could be judged that the municipal laboratories have been strengthened steadily. It has been proved in the case of the water quality incident last year when the municipality conducted prompt monitoring upon the request of DINAMA.
- Activity: (Laboratory of DINAMA strengthens the capacity for pesticide analysis.) Pesticide analysis for the ambient water quality monitoring for the Santa Lucía River Basin is conducted by DINAMA Laboratory. Although the technical level for the pesticide analysis has been strengthened through the JCPP scheme, the analysis capacity of the laboratory for pesticide is low due to the lack of auto-sampler and much time is required. Evaluation of the pesticide analysis is important since pesticide is detected from water and sediment (higher rates in sediments) as reported in the Technical Committee in October 2005. Evaluation for pesticide in the periodical monitoring including the comparison with the standard value was scheduled in the Steering Committee meeting scheduled on April 14 2006, but not realized.

- Output No.3.5 (Water quality information system is established.) Campaigns for the effective use of SISICA took place in each municipality, OSE, DNH and RENARE. The different methods for the water quality data accumulation were proposed to IMM and the rest of the municipalities. In the case of IMM, it has a large amount of historical data with a lot of the monitoring points and analysis items, thus it has been proposed to establish SISICA IMM. IMM agreed to establish SISICA IMM and it is presently conducting necessary adjustment with the intranet system of IMM. It was scheduled to report in the Steering Committee scheduled on March 10 2006, but not realized. On the other hand, the other four municipalities have less monitoring point and the laboratory conducts some analysis for the common sample with DINAMA, thus it has been proposed to input data through internet directly to SISICA DINAMA. SISILAB has been established with the basic function and municipal laboratories request to introduce to their laboratory. Uruguay side agreed to include SISILAB to Output No.3.5. DINAMA made a request to JICA Project Team that JICA Project Team includes a specialist of laboratory management in order to raise the function of SISILAB in the 7th Field Work.
- Output No.3.6: (Water quality data are properly evaluated.) This output has not been realized well. There is a request from DINAMA and municipalities to make more technical transfer on the evaluation of the monitored data and it should be considered in the seminar or workshop scheduled in Phase IV. Method of evaluation is included in the Monitoring Manual, though technical transfer that includes evaluation of actually monitored data with some case studies is necessary.
- Output No.3.7: (Water quality annual report is publicized.) This output has not been realized will. One of the reasons is the lack of the capacity for the evaluation of the data as discussed under the Output No.3.6. Draft version of the water quality annual report has however been published electronically through JICA web page and through SISICA. Raising the quality of the annual report and publishing of hard copy version is the important work in Phase IV.

6.2.4 Module No.4: Promotion of Dissemination, Education and Public Participation

- Generally, certain output has been achieved including establishment of Florida Water Quality Forum, activities with Florida Water Quality Forum as the core, establishment of Lavalleja Water Quality Forum, and preparation of education materials. Important point for the finalization of Integrated Master Plan is the establishment of the system and the action plan for the sustainable implementation of the activities, since there are some unsuccessful cases including the stagnation of the activities of Florida Water Quality Forum.
- Output No.4.1 (Awareness of stakeholders for water quality is raised.)
  - Issue of Newsletter in September 2005 has not been realized and it was scheduled in March 2006. Due to the capacity of the publishing group of DINAMA, quarterly issue is deemed difficult. In the year 2006, it was scheduled twice, March and October.
  - JICA web page has been completed and under operation. Ministry of Housing, Use of Land and Environment has a policy to elaborate web pages of national directorates including DINAMA, and the web pages of projects would be kept outside of the system of the Ministry. Link to the JICA Project page is already provided in the page of DINAMA.
  - Activities for the dissemination, education and public participation with the Florida Water Quality Forum established in Phase II as the core were stagnated. The reason is that several municipalities (industrial wastewater management, livestock, education, etc.) inside IMF relate to the holding of workshop, though the collaboration has hardly realized due to the new structure of the Florida Municipality after the erection in 2005. Re-vitalization of Florida Water Quality Forum is deemed important in Phase IV.
- Output No.4.2 (A system for the formulation of agreement on water quality management is created and public participation is promoted.)
  - Activities of the Florida Water Quality Forum have been conducted until June 2005 including, World Water Day commemoration, Environment Day commemoration. Cleaning of Tomas Gonzalez River has been halted since it has been realized as the other project.
  - Establishment of Lavalleja Water Quality Forum has been realized earlier than the original schedule with the assistance of DINAMA and Florida Water Quality Forum. The forum held periodical meeting, four times after the establishment, and the future activities should be monitored.
- Output No.4.3 (Awareness for water quality management in the relevant organizations is raised.)
  - Strengthening of education and public participation in DINAMA has been realized as the establishment of a unit with the assignment of Ms. Luján Jara as a chief.
  - Awareness for water quality management in the relevant organization is realized through the abovementioned unit in DINAMA

6.3 Status of the Implementation of the Master Plan in Phase IV

The previous section presented the results of the Master Plan implementation in Phase III of the Project. Phase III was the stage for the trial implementation of the Master Plan by the Uruguayan side. Activities proposed in the master plan have continuously been implement in Phase IV of the Project, namely in the fiscal year 2006 mainly by the Uruguayan side with some input from JICA Project Team.

Outcome in Phase IV is summarized as follows:

6.3.1 Module No.1: Strengthening of the Strategic Part

- Discussions were held relating to the Output No.1.5 (Necessity of Council for Water Quality Management in the Santa Lucía River Basin is discussed.) JICA Project Team advised to create a council for water quality management in the Santa Lucía River Basin, it, however, has finally been decided to setup "Follow-up Committee for the Implementation of the Master Plan DINAMA/JICA in the Basin of Santa Lucía River and Sub-Basins of Carrasco and Pando Streams". The Committee will be under COTAMA in order to fully utilize the coordination function of COTAMA. It is a good outcome and should be fully utilized for the sustainable implementation of the Master Plan.
- DINASA is working to identify it's duty as originally proposed. It is necessary to include DINASA in Output No.1.5.

6.3.2 Module No.2: Strengthening of Pollution Source Management

- Environmental Control Division of DINAMA looks more active under the new director. As a part of the activities for Output 2.1 (Collaboration system among relevant agencies on pollution source management is maintained.), DINAMA and the Municipality of Florida jointly held a workshop on the pollution source management. It was successful. This status will be taken into consideration for the finalization of the Integrated Master Plan.
- Environmental Control Division has strong intention to finalize the remaining manuals.
- Discussion was held in the Steering Committee meeting and with the executives of DINAMA regarding the necessary future input for the implementation of the Master Plan. It has been agreed that inputs to the Output No.2.7 (An integrated information system for pollution sources is established) and Output No.2.8 (Influence of pollution sources to river water is grasped.) are deemed necessary. It will be taken into consideration for the finalization of the Master Plan.

6.3.3 Module No.3: Strengthening of Ambient Water Quality Monitoring

- As an activity for the Output No.3.3 (Collaborated implementation system for sampling, analysis and evaluation is established.) the ambient water quality monitoring in the Santa Lucía River Basin is being conducted in a sustainable manner, namely in March-April and June-July in the year 2006.
- The Agreement for the Joint Monitoring has finally been concluded in a ceremony on September 11, 2006 attended by the Minister of Housing, Use of Land and Environment and mayors of the five municipalities with the presence of Ambassador of Japan and the JICA Project Team as witness.

- Regarding Output No.3.4 (Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened.), DINAMA has a plan to provide necessary equipment of monitoring to the municipalities with the budget of 2006. The Municipality of Florida also has a plan to purchase an incubator for BOD analysis with the budget of 2006. Such actions of the Uruguayan side should be taken into consideration to the finalization of the Master Plan.
- SISILAB is still under elaboration to strengthen the function.
- Regarding Output No.3.7 (Water Quality Annual Report is publicized.), a monitoring report for the Santa Lucía River Basin is presently in the final preparation phase.

6.3.4 Module No.4: Promotion of Dissemination, Education and Public Participation

- Revitalization of Florida Water Quality Forum has been carried out. Although there is no concrete activity in this period, the Forum is deemed better status than before.
- Regarding Output No.4.3 (Awareness for water quality management in the relevant organizations is raised.), the education group in DINAMA is deemed active for every work.

CHAPTER 7. FINAL INTEGRATED MASTER PLAN ON CAPACITY DEVELOPMENT FOR THE WATER QUALITY MANAGEMENT

7.1 Review of the Policies and Strategies

7.1.1 Principles of Water Quality Management in Uruguay

Principles of water quality management in Uruguay has been proposed in the First Draft Integrated Master Plan as discussed in **Chapter 4** and the Master Plan was established on this basis. After the proposal in February 2005, the principles were presented in various chances to the personnel of DINAMA and relevant organization. It can be considered that the principles are already of won one for Uruguay.

Principles of water quality management are herewith confirmed as: i) Water Quality Management for River Basins, ii) Systematic Water Quality Management, and, iii) Integrated Water Quality Management as follows.

Water Quality Management for River Basins

Water quality management should be conducted by river basin and not by administrative territory. This is needed for the adjustment of conflict between upstream and downstream areas, to grasp influence of water quality to river water utilization, and to grasp influence of pollution sources to river water quality.

Systematic Water Quality Management

Water quality management should be conducted in a systematic manner considering the following cycle of the management.

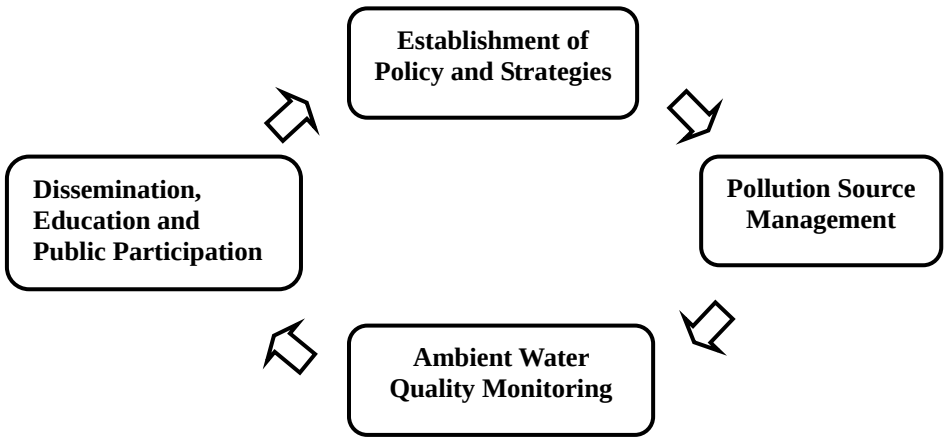


Figure 7.1.1 Proposed Cycle of Water Quality Management

Integrated Water Quality Management

Water quality management should be implemented in an integrated manner, namely under the collaboration of all the relevant organizations with the awareness of ownership. Integrated management also avoids concentration of loads to DINAMA and thus realizes

sustainability of water quality management in Uruguay. Relevant organizations include, DINASA, DNH, RENARE, OSE, and Municipalities.

7.1.2 Concreted Directions by Module of Water Quality Management

After the implementation of the First and Second Draft Master Plan, there identified no specific problem in the directions by module of water quality management. Concrete directions by module of water quality management as discussed in **Section 4.6** of this report are maintained in the Final Integrated Master Plan.

7.1.3 Objectives for the Capacity Development in Each Module

Objectives for the capacity development in each module are maintained the same with those proposed in the First Draft Integrated Master Plan as follows:

(1) Module No.1: Strengthening of Strategic Part

- Water quality management for river basin is introduced
- Systematic water quality management is introduced
- Integrated water quality management is implemented

(2) Module No.2: Strengthening of Pollution Source Management

- Pollution source management is properly implemented

(3) Module No.3: Strengthening of Ambient Water Quality Monitoring

- Periodical ambient water quality monitoring in the Santa Lucía River Basin is implemented
- Water quality data of the whole nation is stored, evaluated, utilized and publicized

(4) Module No.4: Promotion of Dissemination, Education and Public Participation

- Dissemination, education and public participation are promoted in the Santa Lucía River Basin
- People's opinion is reflected to water quality management in the Santa Lucía River Basin

7.2 Final Integrated Master Plan (2004-2013)

The Final Integrated Master Plan has been prepared for the period 2004 to 2013. It includes all the activities conducted up to the present time including those of the pilot projects and those implemented in Phase III, the stage for the trial implementation by Uruguayan side.

Figure 7.2.1 Final Integrated Master Plan on Capacity Development for Water Quality Management

Output	Activities	Responsible Agency	Relevant Agencies	Schedule (2004–2013, quarters 1 2 3 4)	Input	Degree of Easiness / Difficulty for Implementation of Activities
Module No.1: Strengthening of Strategic Part						
1.1: Water quality management strategies and specific action plans of respective water quality approaches are established.	• DINAMA establishes proper committee for the coordination for water quality management inside DINAMA.	DINAMA	---	Water Quality Management Committee (WQMC) was established on 2004.11.01 but not functioning well	• Human resources of DINAMA • The function of WQMC is given to Directors meeting	• Human resources: less required • Budget: less required • Technical level: standard • Relevant agencies: inside DINAMA • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~ • Note: The work itself is not difficult, but the recognition of the necessity of the strategy and action plans by the executive officers of DINAMA is most important.
	• JICA provides necessary technical transfer through the technical training in Japan and through horizontal cooperation.	DINAMA	---	Environmental Management of Regional Drainage Basin II Strengthening of Water Quality Management System (1) and (2) Water Quality Administration in Japan Gestión Politica Ambiental para Latino America y El Caribe		
	• DINAMA reviews the strategy of water quality management and the action plan established in the course of the Project, and modifies them (if necessary). - The strategy of water quality management will be reviewed in the Directors meeting	DINAMA	---	Conducted through discussion with JICA Project Team To be conducted at the end of every year		
	• DINAMA sets the Work Plan for respective development modules, based on the action plan mentioned above. - Each Division establishes a work plan for the strengthening of water quality management capacity for next year and discuss in the Directors meeting.	DINAMA	---	Conducted in the JICA Project Team To be conducted at the end of every year		
1.2: Decree No.253 is amended.	• GESTA Agua (Grupo de Estandares Agua = Group for Water Standards), COTAMA prepares a technical draft for "the Decree No.253/79 and Amendments" (not included in the work of Pilot Projects)	DINAMA	COTAMA	Technical Draft	• Human resources of DINAMA (related to legal aspects) and COTAMA, MVOTMA	• Human resources: less required, but legal check part has so much work and difficult to allocate the time to this matter • Budget: less required • Technical level: standard • Relevant agencies: inside MVOTMA • Work intensity: sporadic • Overall: ~~easy~~ / medium / ~~difficult~~
	• JICA Project Team provides technical advice on the "the Decree No.253/79 and Amendments" upon confirmation of the basic direction of the amendment.	DINAMA	COTAMA	Provision of a report for the Japan's case		
	• DINAMA plays the leadership in the GESTA Water of COTAMA in making "Decree No.253/79 and Amendments" from the technical aspect.	DINAMA	COTAMA			
	• Legal procedure for the "Decree No.253/79 and Amendments" proceeds. - MVOTMA prepares "Decree No.253/79 and Amendments", and send it for the signature of all the relevant Ministers, and send it to Executive Power for approval.	MVOTMA	COTAMA	Target to complete within 6 months		

Note: Completed intensive work, Completed sporadic work, ▲ Completed output, Scheduled intensive work, Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
1.3: Water bodies' specific use is declared based on the "Decree No.253/79 and Amendments". (All the activities depend upon the contents of the "Decree No. 253/79 and Amendments")	• DINAMA designates proper unit for the task of declaration of water bodies' specific use. - Unit for declaration of water bodies' specific use shall be under EQED	DINAMA	---	Timing should be adjusted to the completion of the Decree No.253 and Amendment	• Human resources of DINAMA (Environmental Quality Evaluation Division: EQED) • Human resources of OSE, MGAP, INAPE, MSP and other relevant agencies	• Human resources: need assignment of personnel to the Unit • Budget: required for man-power • Technical level: standard • Relevant agencies: all the agencies related to water quality • Work intensity: intense work is required for identification of river stretch for each specific use • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA coordinates with "Follow-up Committee for the Implementation of the M/P DINAMA/JICA" for the declaration of water bodies' specific use. - The Unit prepares a draft for declaration - Periodical meeting shall be held	DINAMA	OSE, MGAP, INAPE, MSP and relevant agencies	Draft for declartion		
	• DINAMA coordinates with relevant organizations for the declaration of "water bodies of high quality", and issues declaration.	DINAMA	Relevant agencies	Declartion		
	• DINAMA coordinates with OSE, Municipalities, MGAP, INAPE, MSP, and relevant organizations for the declaration of "water bodies for specific use", and issues declaration.	DINAMA	OSE, MGAP, INAPE, MSP and relevant agencies	Declartion		
	• DINAMA coordinates with relevant organizations for the declaration of "water bodies under recovery", and issues declaration.	DINAMA	Relevant agencies	Declartion		
	• DINAMA continues to review the declaration of water bodies' specific use.	DINAMA	Relevant agencies			
1.4: Present river water quality is evaluated	• DINAMA evaluates present river water quality utilizing SISICA referring to the water bodies' specific use.	DINAMA	---	Human resources of EQED should be strengthend	• Human resources of EQED, DINAMA	• Human resources: less required • Budget: less required • Technical level: standard (compare monitored value to the declared class) • Relevant agencies: inside DINAMA • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~
1.5: Necessity of Council for Water Quality Management in the Santa Lucía River Basin is discussed.	• Ad Hoc Council for the Water Quality Management in the Santa Lucía River Basin is established.	DINAMA	Relevant agencies	Steering Committee conducted the role	• Human resources of MVOTMA and DINAMA • Human resources of OSE, MGAP, INAPE, MSP and other relevant agencies	• Human resources: less required • Budget: less required • Technical level: no specific problem • Relevant agencies: all the agencies related to water quality • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~
	• Necessity of the establishment of Council for the Water Quality Management in River Basins is discussed in the meeting of the Steering Committee under the new government organization.	MVOTMA/ DINAMA	DNH, OSE, RENARE, Municipalities, etc.	The functiono of the Steering Committee was given to the newly created "Follow-up Committee for the Implementation of the M/P DINAMA/JICA" under COTAMA		
	• Necessity of the establishment of Council for the Water Quality Management in the Santa Lucía River Basin is discussed when any situation for the water quality management has been changed. - Ad Hoc Council shall be established when the necessity is recognized - Legalization shall be conducted when the necessity of the Council is confirmed. - Official Council shall be established when it has been legalized.	MVOTMA/ DINAMA	DNH, OSE, RENARE, Municipalities, etc.	If "Follow-up Committee for the Implementation of the M/P DINAMA/JICA" functions well, the setup of the Council shall not be so crucial.		

Note: ▬ Completed intensive work, ▪▪▪▪ Completed sporadic work, ▲ Completed output, ▮▮▮▮ Scheduled intensive work, ╲╲╲╲ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
Module No.2: Strengthening of Pollution Source Management						
2.1: Collaboration system among relevant agencies on pollution source management is maintained.	• Various discussions are held for the pollution source management attended by relevant organizations.	DINAMA	OSE, RENARE, Municipalities	Held in Steering Committee meetings	• Human resources of EnCD • Human resources of relevant agencies	• Human resources: personnel of EnCD should be carefully examined and increased accordingly • Budget: should be carefully examined for required for personnel • Technical level: standard • Relevant agencies: all the agencies related to water quality. • Work intensity: sporadic • Overall: ~~easy~~ / ~~medium~~ / difficult
	• Periodical meetings take place to exchange information on pollution source management; attended by DINAMA, OSE, RENARE, Municipalities and other relevant organization (“Steering Committee” shall be utilized.) - Establish a system for the systematic work - Exchange agreement if necessary	DINAMA	OSE, RENARE, Municipalities	Held in Steering Committee meetings Discuss in the Followup Committee towards the future JICA Project for pollution source management		
	• DINAMA would collect the information on sewerage development in a sustainable manner. - Features of sewerage as GIS information - Information on vacuum vehicle domestic wastewater system	DINAMA	OSE, Municipalities			
	• DINAMA would collect the information on solid waste management. - Features of solid waste dumping site (GIS information) and general information on solid waste management in each Municipality	DINAMA	Municipalities			
	• DINAMA would collect the information on non-point source pollution management. - Information on the use of fertilizer and pesticide.	DINAMA	RENARE, Municipalities			
2.2: Capacity of relevant organization on pollution source management is strengthened	• JICA provides necessary technical transfer through the technical training in Japan.	DINAMA or relevant agencies	---	Industrial Wastewater Treatment Technique II Domestic Wastewater Treatment Technique	• JICA Scheme: Training in Japan	• Overall: easy / ~~medium~~ / ~~difficult~~
	• DINAMA holds a workshop to share the output of training in Japan by the relevant personnel.	DINAMA	Relevant agencies		• Human resources of EnCD • Human resources of relevant agencies	• Overall: easy / ~~medium~~ / ~~difficult~~
2.3: Industrial wastewater management is conducted under the collaboration of DINAMA and Municipalities	• The consensus between DINAMA and Municipalities for sharing a certain part of the industrial wastewater management is reached, and agreements are concluded.	DINAMA Municipalities	---	General consensus has been reached through Steering Committee meetings, but agreements have not been concluded.	• Human resources of EnCD, DINAMA • Human resources of industrial wastewater management in Municipalities	• Human resources: personnel of EnCD should be examined carefully and increased accordingly • Budget: should be carefully examined for required for personnel • Technical level: standard • Relevant agencies: Municipalities in the basin. • Work intensity: part of normal work • Overall: ~~easy~~ / ~~medium~~ / difficult
	• Agreement between DINAMA and Municipalities for the collaboration on industrial wastewater management is concluded. - Draft agreement has already been prepared. - Collaborated management work with IMM - After the completion of procedural and management manual as prepared in 2.4 below, collaborated work shall be discussed with the other municipalities.	DINAMA Municipalities	---	Draft Agreement Agreement Collaborated work with IMM is carried out. Discussion started with IMF Continue discussion with municipalities		

Schedule: 2004 (1 2 3 4) 2005 (1 2 3 4) 2006 (1 2 3 4) 2007 (1 2 3 4) 2008 (1 2 3 4) 2009 (1 2 3 4) 2010 (1 2 3 4) 2011 (1 2 3 4) 2012 (1 2 3 4) 2013 (1 2 3 4)

Note: ▬ Completed intensive work, ▪▪▪▪▪ Completed sporadic work, ▲ Completed output, ▮▮▮▮▮ Scheduled intensive work, ╲╲╲╲╲ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• DINAMA continues providing Municipalities with information of SADI and engineering data of industry.	DINAMA	Municipalities	Information of SADI was provided to IMM Information of SADI should be provided to the other municipalities		
	• DINAMA and Municipalities conduct collaborated management of industrial wastewater - DINAMA and Municipalities coordinate for the compliance inspection. - DINAMA and Municipalities mutually exchange the inspection results of industrial wastewater facilities in a sustainable manner. - DINAMA plays a leading role in the industrial wastewater management. - Municipalities work as so-called “Liaison Office” in the industrial wastewater management. - DINAMA maintains to keep the sharing of the inspection of industrial wastewater facilities in a sustainable manner.	DINAMA	Municipalities	Details should be discussed between DINAMA and municipalities.		
2.4: Industrial wastewater related manuals are prepared	• DINAMA and JICA Project Team jointly prepare procedural manuals of industrial wastewater management. - Industrial User Inspection Manual - Industrial Wastewater Sampling Manual - Guidance for Industrial Wastewater Flow Rate Measurement - Guidance for Sampling, Preservation and Transportation of Underground Water	DINAMA	---	Tentative version	• Human resources of EnCD	• Human resources: difficult: some staff of EnCD should concentrate to the work • Budget: standard (part of normal work) • Technical level: standard • Relevant agencies: inside DINAMA • Work intensity: intense work by staff of EnCD is needed • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA and JICA Project Team jointly prepare technical guidance for industrial wastewater management.	DINAMA	---			
	• DINAMA develops procedural and management manuals for industrial wastewater. - Self-monitoring Report Manual - Authorization Manual of Industrial Wastewater Discharge - Registration Manual of Competent Professional	DINAMA	---	Originally proposed to be completed in the pilot projects, but not finished.		
	• DINAMA amends established manuals, when necessary. - EnCD shall amendment when necessary	DINAMA	---			
2.5: Capacity of DINAMA and relevant agencies on industrial wastewater management is developed	• JICA Project Team provides technical transfer of industrial wastewater management to DINAMA’s staff, using Manuals to be established in <Output 2.4>.	DINAMA	---		• JICA Scheme: Training in Japan • Human resources of EnCD	• Human resources: existing staff of EnCD and Municipalities • Budget: standard (part of normal work) • Technical level: standard • Relevant agencies: Municipalities • Work intensity: sporadic • Overall: easy / ~~medium~~ / ~~difficult~~
	• JICA provides necessary technical transfer through the technical training in Japan.	DINAMA or Municipality	---	See Output 2.2 above		
	• DINAMA provides technical transfer of industrial wastewater management to Municipalities staff, using Manuals to be established in <Output2.4>.	DINAMA Municipalities	---			

Note: ▬ Completed intensive work, ▪▪▪▪▪ Completed sporadic work, ▲ Completed output, ▮▮▮▮▮ Scheduled intensive work, ▭▭▭▭▭ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
2.6: River water quantity observation system is established	• DNH under the collaboration with DINAMA and relevant organizations establishes a system for observation of water quantity (river flow) in the Santa Lucía River Basin that is required for the simulation of the future water quality prediction. - DNH identifies necessary work including equipment for the establishment of proper system for observation of water quantity in the Santa Lucía River Basin. - DNH strengthen the system for observation of water quantity in the Santa Lucía River Basin.	DNH	DINAMA	Donor has not been identified yet.	• International technical assistance Experts - River management planner - Hydrological observation Structure and equipment - for water level and flow measurement	• Human resources: staff of DNH and foreign assistance shall be needed • Budget: much required (Technical assistance from abroad shall be considered) • Technical level: high: needs the study on the river management • Relevant agencies: DINAMA • Work intensity: intense work with technical assistance from abroad is necessary • Overall: ~~easy~~ / ~~medium~~ / difficult
2.7: An integrated information system for pollution sources is established	• DINAMA maintains some of relevant information on pollution sources.	DINAMA	---		• Human resources of DINAMA • Human resources of relevant agencies • International technical assistance Input of the following experts. - Leader - Pollution source management - Hydrology and meteorology - GIS - Water quality simulation - Socioeconomy • Equipment - Personal computers - Software for pollution simulation	• Human resources: much required: should be carefully examined and staff of EQCD should be increased for this purpose and foreign assistance shall be needed • Budget: much required (Technical assistance from abroad shall be considered) and should be carefully examined for local budget • Technical level: high: simulation of water quality requires high technique. • Relevant agencies: all the relevant agencies. • Work intensity: intense work with technical assistance from abroad is necessary • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA constructs an integrated information system with GIS database on pollution sources. - EnCD under the collaboration with EQED studies and proposes necessary system specification - EnCD creates a GIS database system for various pollution sources. - Technical committee consisting of members from the relevant agencies shall be formulated for the creation of the system	DINAMA	OSE, RENARE, Municipalities	Proposed for next technical cooperation by foreign countries		
	• DINAMA inputs data and information of various pollution sources to the integrated information system.	DINAMA	OSE, RENARE, Municipalities			
2.8: Influence of pollution sources to river water is grasped	• JICA provides necessary technical transfer through the technical training in Japan.	DINAMA, relevant agencies		See Output 2.2 above Not committed yet.		
	• DINAMA allocates proper staff assigned to the task of water quality assessment. - A unit shall be formulated preferably under EQED with collaboration from EnCD.	DINAMA	---			
	• DINAMA makes preliminary survey on the pollution loads from various kind of wastewater. - Information stored in the GIS database for pollution sources shall firstly be evaluated. - The Unit assigned to the task of water quality assessment makes a plan for the preliminary survey on the pollution loads. - Preliminary survey on the pollution loads shall be conducted.	DINAMA	OSE, RENARE, Municipalities			

Note: ━━ Completed intensive work, ▪▪▪▪▪ Completed sporadic work, ▲ Completed output, ┅┅ Scheduled intensive work, ╌╌╌ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• DINAMA develops a simulation model for the assessment of the influence of pollution sources to the water environment. - The Unit assigned to the task of water quality assessment shall study for the necessary system for water quality assessment - Water quality assessment system shall be developed - Water quality shall be assessed for the possible future change in the basin	DINAMA	DNH, OSE, RENARE, Municipalities			
	• DINAMA assesses the influence of various kinds of pollution sources to the water environment in a sustainable manner.	DINAMA	---			
Module No.3: Strengthening of Ambient Water Quality Monitoring						
3.1: Manuals related to monitoring are prepared	• DINAMA and JICA Project Team jointly prepare a manual of monitoring network designing and sampling consisting of the following part. - Designing of Water Quality Monitoring Network - Methods of Field Work and Sampling - Field Testing Methods - Processing and Interpretation of Water Quality Data	DINAMA	---		• Human resources of DINAMA	• Human resources: less required and to be covered by staff of EQED • Budget: less required • Technical level: normal. Utilize the established manual in PLP 4 for updating of monitoring plan. • Relevant agencies: inside DINAMA • Work intensity: sporadic • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA Laboratory updates the manual of laboratory measurement and analysis.	DINAMA	---			
	• DINAMA amends established manuals, when necessary. - EQED should make necessary amendment.	DINAMA	---			
3.2: Ambient water quality monitoring plan for the Santa Lucía River Basin is established	• DINAMA and JICA Project Team jointly design executive plan of trial water quality monitoring in the Santa Lucía River Basin, using the Manual of <Output 3.1>.	DINAMA	OSE, Municipalities and DNH		• Human resources of DINAMA and relevant agencies	• Human resources: less required and to be covered by staff of EQED • Budget: less required • Technical level: normal. Utilize the established manual in PLP 4 for updating of monitoring plan. • Relevant agencies: inside DINAMA • Work intensity: sporadic • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA updates water quality monitoring plan in the Santa Lucía River Basin based on the outcome of ambient water quality monitoring. - EQED updates water quality monitoring plan in the Santa Lucía River Basin through discussion with relevant agencies for water quality monitoring	DINAMA	OSE, Municipalities and DNH			
3.3: Collaborated implementation system for sampling, analysis and evaluation is established	• Consensus with DINAMA, DNH, OSE and Municipalities on a certain part of ambient water quality monitoring is reached.	DINAMA	OSE, Municipalities, DNH		• Human resources of EQED • Human resources of relevant agencies • Budget for monitoring and analysis in DINAMA and relevant agencies	• Human resources: staff of EQED and Municipalities • Budget: required for personnel and equipment and supplies for monitoring and laboratory analysis • Technical level: normal. • Relevant agencies: relevant agencies • Work intensity: periodic • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA and Municipalities jointly carry out sampling and analysis of water and sediment for the ambient water quality monitoring.	DINAMA	Municipalities			
	• Agreement for the collaborated ambient water quality monitoring is concluded. - Discussion on the collaborated ambient water quality monitoring is carried out after the election of Municipal mayors and with the new local government personnel - Agreement shall be concluded	DINAMA, Municipalities	---	Agreement was concluded on September 11, 2006		

Schedule: 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 (1 2 3 4 each)

Note: ▬ Completed intensive work, ▪▪▪▪▪ Completed sporadic work, ▲ Completed output, ▮▮▮▮▮▮▮▮▮ Scheduled intensive work, ╲╲╲╲╲ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
3.4: Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened	• DINAMA reinforces Water Quality Department for the implementation of sustainable ambient water quality monitoring.	DINAMA	---		• Human resources of EQED • Budget of JICA Project	• Human resources: staff of EQED and Municipalities • Budget: JICA provides for equipment • Technical level: normal. • Relevant agencies: relevant agencies • Work intensity: periodic • Overall: ~~easy~~ / medium / ~~difficult~~
	• JICA provides equipment necessary for the basic analysis in the laboratories of DINAMA and Municipalities.	DINAMA	Municipalities			
	• DINAMA checks the capability of pesticide analysis of DINAMA Laboratory.	DINAMA	---			
	• JICA provides technical training for the sampling and laboratory analysis. - Training in Japan shall be considered. - Horizontal cooperation shall be considered including JCPP and other schemes	DINAMA or relevant agencies	---	Course "Water Environmental Monitoring" JCPP Scheme	• JICA Scheme: Training in Japan • Horizontal cooperation	• Overall: easy / ~~medium~~ / ~~difficult~~
	• DINAMA provides technical transfer for sampling and analysis of water for Municipalities in a sustainable manner (incl. inter-calibration). - EQED conducts technical transfer for sampling when necessary - Laboratories of DINAMA and Municipalities conduct inter-calibration	DINAMA	Municipalities		• Human resources of DINAMA • Human resources of OSE and Municipalities • International technical assistance Experts - Pesticide analysis Equipment for Water Quality Analysis - for Pesticide - for BOD (Municipalities and OSE branch Office)	• Human resources: staff of laboratory in DINAMA, OSE and Municipalities should be increased for this purpose and foreign assistance shall be needed • Budget: much required (Technical assistance from abroad shall be considered) • Technical level: high: pesticide analysis requires high technique. • Relevant agencies: OSE and Municipalities • Work intensity: intense work with technical assistance from abroad is necessary • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA conducts pesticide monitoring. - Laboratory of DINAMA identify necessary work including upgrading of equipment for the pesticide monitoring - Laboratory of DINAMA strengthen the capacity for pesticide analysis	DINAMA	MGAP	Requires more equipment and personnel		
	• Municipalities raise the capacity of laboratory in order to cover BOD_5 analysis at every laboratory. - IMC, IMSJ, IMF, IML identify necessary work including upgrading of equipment of the analysis covering BOD_5 - Laboratories of IMC, IMSJ, IMF, IML strengthen the capacity to cover BOD_5	Municipalities	DINAMA	IMC is already capable. IMF is going to purchase an incubator.		
	• Branch laboratory of OSE in each Municipality raise the capacity in order to cover BOD_5 analysis. - OSE identifies necessary work including upgrading of equipment of the analysis covering BOD_5 at branch laboratories of OSE - OSE strengthen the capacity of its branch laboratories to cover BOD_5	OSE	DINAMA	Originally proposed, but considered not necessary since ambient water quality monitoring is carried out by DINAMA and municipalities. OSE conducts only for the analysis of source water		
	• DINAMA laboratory promotes computerized system for the process and evaluation to raise the quality of the data - DINAMA develops SISILAB for its laboratory - DINAMA promotes to expand SISILAB to the other environment laboratories	DINAMA	Municipalities			
	• DINAMA Laboratory obtains ISO/IEC 17025 Certificate for necessary items (This activity will be made by DINAMA itself separately from the JICA Project)	MVOTMA/ DINAMA	---			

Note: ▬ Completed intensive work, ▪▪▪▪▪ Completed sporadic work, ▲ Completed output, ▮▮▮▮▮ Scheduled intensive work, ╲╲╲╲╲ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• DINAMA maintains laboratory equipment and skills properly.	DINAMA	---			
	• DINAMA raise the capacity of laboratory in order to meet the strategies and action plans.	DINAMA	---			
	• DINAMA maintains proper number of staff for ambient water quality monitoring.	DINAMA	---			
3.5: Water quality information system is established	• DINAMA, upon collaboration with relevant organizations through Technical Committee, jointly with JICA Project Team establishes computerized water quality information system inside DINAMA (SISICA DINAMA).	DINAMA	OSE, RENARE, Municipalities, etc.		• Human resources of DINAMA • Human resources of relevant agencies System engineers - 2-person, 2-year - Support establishment of other SISICA - Develop Integrated SISICA	• Human resources: staff of EQED and input of system engineer shall be needed • Budget: required to obtain system engineers • Technical level: standard: refer the experience of SISICA DINAMA development • Relevant agencies: related agencies • Work intensity: intense work is necessary for the support of develop SISICA in other agencies and establishment of Integrated SISICA • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA promotes to develop SISICA in the relevant organizations, e.g. OSE, RENARE, IMM, IMC, IMSJ, IMF, IML. - EQED promotes to develop SISICA in IMM, OSE and RENARE and assists the installation of the system - DINAMA gives necessary training to IMC, IMSJ, IMF and IML, and to promote inputting monitoring data to SISICA DINAMA through Internet - DINAMA promotes to develop SISICA in the relevant organizations	DINAMA	OSE, RENARE, Municipalities, etc.	Development of SISICA in the relevant organization should be continued.		
	• DINAMA establishes integrated SISICA. - EQED develops Integrated SISICA	DINAMA	OSE, RENARE, Municipalities, etc.			
	• DINAMA continues to manage integrated SISICA.	DINAMA	OSE, RENARE, Municipalities, etc.			
3.6: Water quality data are properly evaluated	• DINAMA and JICA Project Team jointly work for processing and interpreting water quality data, by using currently available water quality data.	DINAMA	Municipalities	Need more training for evaluation of monitoring data	• Human resources of DINAMA	• Human resources: less required: staff of EQED shall conduct the work • Budget: less required • Technical level: standard: utilize the Manual developed in PLP 4 • Relevant agencies: in DINAMA • Work intensity: periodical • Overall: ~~easy~~ / ~~medium~~ / difficult
	• DINAMA processes and interprets water quality data in a sustainable manner.	DINAMA	---			
3.7: Water Quality Annual Report is publicized.	• DINAMA and JICA Project Team jointly prepare the chapter of water environment for Annual Environment Report using currently available data, and open through the DINAMA's homepage.	DINAMA	---	Web version Publication version	• Human resources of DINAMA	• Human resources: staff of EQED shall conduct the work • Budget: less required • Technical level: standard: • Relevant agencies: in DINAMA • Work intensity: periodical • Overall: ~~easy~~ / medium / ~~difficult~~
	• DINAMA annually publicizes Water Quality Annual Report, interpreting and compiling diverse information like DINAMA's policy/strategies, water quality data, and others.	DINAMA	---	To be published at the end of second quarter every year		

Schedule: 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 (1 2 3 4 each)

Note: ━━ Completed intensive work, ▪▪▪▪ Completed sporadic work, ▲ Completed output, ┅┅ Scheduled intensive work, ╲╲╲ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
Module No.4: Promotion of Education and Public Participation					•	•
4.1: Awareness of stakeholders for water quality is raised	• DINAMA issues in a sustainable manner News Letter on water quality and deliver it to stakeholders. - WQMC decides the general contents of News Letter - Publication group of DINAMA prepares a draft - DINAMA issues the News Letter quarterly	DINAMA	---	Quarterly publication every year is difficult. It should be reviewed	• Human resources of DINAMA • Human resources of Municipalities • Human resources of NGOs • National and local education authorities	• Human resources: Internal unit of DINAMA and existing personnel of relevant agencies shall participate • Budget: less required: education material has been developed by PLP 5 • Technical level: standard • Relevant agencies: all the relevant agencies • Work intensity: intense work for each activity is needed • Overall: ~~easy~~ / medium / ~~difficult~~
	• National and local medias (TV, newspaper, radio) report various activities of the present JICA Project.	DINAMA	Relevant agencies	Local media reported activities of pilot projects Central media reported Education Ceremony and Monitoring Agreement Ceremony		
	• DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and prepare materials for dissemination for the use of campaigns and effectively utilize them.	DINAMA, Florida WQF	Relevant agencies	Posters, pamphlets, and stickers have been prepared and utilized.		
	• Water Quality Forum (as discussed below) as a main actor holds local workshops.	DINAMA, Florida WQF	Municipalities, Relevant agencies	A total of 9 workshops took place in municipalities Workshop for industrial wastewater management by DINAMA-IMF Workshop shold be held sporadically		
	• DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and prepare materials for education for water quality and effectively utilize them.	DINAMA, Florida WQF	Municipalities, Education people	Videos for common people and children, illustrated story, and booklet have been under preparation. Education material is utilized in municipalities		
	• DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and conduct training sessions utilizing the above developed materials.	DINAMA, Florida WQF	Municipalities, Education people	Training sessions were held.		
	• DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and conduct education sessions for teachers utilizing the above developed materials.	DINAMA, Florida WQF	Municipalities, Education people	Education sessions were held.		
	• DINAMA, JICA Project Team members, members of the Water Quality Forum (as discussed below), education related personnel and teachers, collaborate and have meeting for the evaluation of education materials.	DINAMA, Florida WQF	Municipalities, Education people	Education sessions were held.		
	• Environmental education for children is conducted through the implementation of various campaigns.	DINAMA, Florida WQF	Municipalities, Education people	Education material handover ceremony Campaigns and school education		

Note: ▬ Completed intensive work, ▪▪▪▪ Completed sporadic work, ▲ Completed output, ▮▮▮▮ Scheduled intensive work, ⟋⟋⟋⟋ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• DINAMA maintains a web page on water quality management - WQMC decides the necessary update of the web page - Person in charge of web site maintains	DINAMA	---			
	• National and Local Educational Authorities, Florida Water Quality Forum and DINAMA continue dissemination and education for water quality in Florida Municipality in a sustainable manner. - DINAMA National and Local Educational Authorities, and JICA hold Education Material Delivery Ceremony. - Florida Water Quality Forum holds Workshop on Industrial Wastewater Treatment in Fray Marcos (August 5, 2005). - Florida Water Quality Forum holds a workshop on Effluents of *Tambos* (small scale milk producers) (October 7, 2005) - Florida Water Quality Forum holds Workshop for presentation of paper work related to water management by secondary or institute students - Workshop with the participation of primary education director and teachers of Florida to design the scheme to introduce education materials of water quality management in the primary education curriculum is held (March 10, 2005). - National and Local Educational Authorities carry out test of implementation of the design by teachers in the class room - National and Local Educational Authorities, Florida Water Quality Forum and DINAMA continue dissemination and education for water quality in Florida Municipality in a sustainable manner.	Florida Water Quality Forum, DINAMA, Educational Authorities	Municipality of Florida, NGOs	Originally proposed but not realized due to the stagnation of the activities of Florida WQF		
4.2: A system for the formulation of agreement on water quality management is created and public participation is promoted.	• Florida Water Quality Forum is established in Florida Municipality as a model area.	IMF	DINAMA, Residents, NGOs, Related agencies, stakeholders	Setup on August 6, 2004	• Human resources of DINAMA • Human resources of Municipalities • Human resources of NGOs	• Human resources: Internal unit of DINAMA; existing personnel of Municipalities, NGOs shall participate • Budget: required for campaigns • Technical level: standard: • Relevant agencies: all the relevant agencies • Work intensity: intense work shall be needed for the establishment of water quality forum in each municipality. • Overall: ~~easy~~ / medium / ~~difficult~~
	• Residents exchange their opinion on water quality in the established Florid Water Quality Forum.	Residents	Florida WQF	More than 70 residents attended to the First Plenary Meeting		
	• The Coordinating Body of Florida Water Quality Forum holds periodical meeting and discuss on the activities.	Florida WQF	IMF			

Schedule

2004				2005				2006				2007				2008				2009				2010				2011				2012				2013			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Note: ▬ Completed intensive work, ▪▪▪▪▪ Completed sporadic work, ▲ Completed output, ┅┅┅ Scheduled intensive work, ╲╲╲╲╲ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4	Input	Degree of Easiness / Difficulty for Implementation of Activities
	• Florida Water Quality Forum and DINAMA continue leading and implementing public participation campaigns. - Flora Preservation Campaign - Santa Lucía Chico River Cleaning Campaign - Florida Water Quality Forum and DINAMA hold World Water Day Commemoration - Florida Water Quality Forum and DINAMA hold Environment Day Commemoration - Florida Water Quality Forum and DINAMA hold Campaign on Cleaning of Tomas Gonzalez River - Florida Water Quality Forum and DINAMA continue promoting of public participation for water quality in Florida Municipality in a sustainable manner.	Florida Water Quality Forum, DINAMA	NGOs, Residents	Originally proposed but canceled because the subject river has been cleaned by the other program	•	•
	• DINAMA and Florida Water Quality Forum assist the establishment of Water Quality Forums in other Municipalities and the federation of Water Quality Forum	DINAMA, Florida WQF	Municipalities			
	• Other Municipalities of the Project's Area establishes their own Water Quality Forum - Municipality of Lavalleja establishes and operates its own Water Quality Forum and conduct activities - Municipality of Canelones establishes and operates its own Water Quality Forum and conduct activities - Municipality of San José establishes and operates its own Water Quality Forum and conduct activities - Municipality of Montevideo establishes and operates its own Water Quality Forum and conduct activities - A federation of Water Quality Forums for the Santa Lucía River Basin is established and promote dissemination, education and public participation	Municipalities	DINAMA, OSE, DNH, NGOs, associations, etc			
	• JICA give training in Japan	Relevant agencies		Course "Participatory Local Social Development		
4.3: Awareness for water quality management in the relevant organizations is raised.	• A working group for dissemination, education and public participation is created in DINAMA.	DINAMA	---		• Human resources of DINAMA • Human resources of Municipalities	• Human resources: Internal unit of DINAMA should be organized • Budget: less required • Technical level: standard: • Relevant agencies: all the relevant agencies • Work intensity: creation of internal unit requires intense discussion • Overall: ~~easy~~ / medium / ~~difficult~~
	• Staff of DINAMA participates in the various campaigns, training and education sessions.	DINAMA	---			
	• Municipality of Florida plays leading role for the establishment of Florida Water Quality Forum.	IMF	---			
	• Staff of OSE participates to the campaigns.	OSE	---			

Note: ▬ Completed intensive work, ■■■■■ Completed sporadic work, ▲ Completed output, ⁞⁞⁞⁞ Scheduled intensive work, ⸌⸌⸌⸌ Scheduled sporadic work, △ Scheduled output

Output	Activities	Responsible Agency	Relevant Agencies	Schedule										Input	Degree of Easiness / Difficulty for Implementation of Activities
				2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		
				1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4		
	• Florida education authority promotes training and education sessions to schoolteachers.	IMF	---												
	• Teachers of the Municipality of Florida actively participate to the preparation of education materials.	Teachers of IMF													
	• Education authorities of IMM, IMC, IMSJ, IML promotes training and education sessions to schoolteachers.														
	• DINAMA organize an internal unit to be responsible for education and public participation activities	DINAMA	---												
	• DINAMA plays a leading role to raise awareness on water quality under the collaboration with relevant organizations.	DINAMA	Relevant agencies												

Note: ▬▬ Completed intensive work, ▪▪▪▪▪ Completed sporadic work, ▲ Completed output, ▮▮▮▮▮▮▮▮▮ Scheduled intensive work, ◺◺◺◺◺◺ Scheduled sporadic work, △ Scheduled output

7.3 Key Issues for the Future Activities in the Final Integrated Master Plan

Key issues for the future activities in the Final Integrated Master Plan have been identified in due consideration of the degree of the achievement of the original target.

7.3.1 Module No.1: Strengthening of Strategic Part

(1) Objective of the Module

Objectives of the capacity development in Module No.1 are given as follows:

- Water quality management for river basin is introduced
- Systematic water quality management is introduced
- Integrated water quality management is implemented

(2) Degree of the Achievement of the Original Target and Key Issues for the Future Activities

Water quality management for the Santa Lucía River Basin has been introduced and is being implemented as the first case of the water quality management for a river basin as a unit in Uruguay, thus the necessity of the water quality management for river basins has become well recognized in the country.

Systematic water quality management with a cycle of the modules is also well recognized by DINAMA and relevant agencies. Establishment of the strategies of the water quality management by Uruguay itself should be conducted through the implementation of the Integrated Master Plan by reviewing the strategy proposed by JICA.

Decree No.253 and Amendment should be implemented by efforts of the Uruguay government as was conducted up to the present time. It should be boosted otherwise the work for the water bodies specific use could not been started.

Setup of Basin Council for the implementation of the integrated water quality management should be studied and promoted in the future.

7.3.2 Module No.2: Strengthening of Pollution Source Management

(1) Objective of the Module

Objective of the capacity development in Module No.2 is the following:

- Pollution source management is properly implemented

(2) Degree of the Achievement of the Original Target and Key Issues for the Future Activities

Input for the capacity development in Module No.2 in the JICA Project focused on the promotion of collaboration between the agencies and elaboration of manuals. Of these, certain output has been achieved for the elaboration of manuals, collaboration between DINAMA and relevant agencies, however, has not progressed except with

IMM that already maintains some collaboration with DINAMA. The status of the collaboration is improving after entering to the Phase IV with the efforts of EnCD, DINAMA for the joint work for industrial wastewater management. The sustainable efforts are deemed necessary.

Module No.2 is far behind the required status compared to the modules No.3 and No.4, and it could not be recovered by the capacity development by the Uruguay itself. Input of technical assistance from countries with much experience should be implemented for the development of the capacity. Establishment of an integrated pollution source information system and a simulation model to grasp the influence of the pollution sources to the river water quality should be given higher priority.

7.3.3 Module No.3: Strengthening of Ambient Water Quality Monitoring

(1) Objective of the Module

Objectives of the capacity development in Module No.3 are as follows:

- Periodical ambient water quality monitoring in the Santa Lucía River Basin is implemented
- Water quality data of the whole nation is stored, evaluated, utilized and publicized

(2) Degree of the Achievement of the Original Target and Key Issues for the Future Activities

Through the JICA Project, monitoring manuals have been elaborated, an ambient water quality monitoring plan for the Santa Lucía River Basin has been established, a collaborated implementing system for the sampling, analysis and evaluation has been established, a water quality information system has been established, and the periodical ambient water quality monitoring in the Santa Lucía River Basin is being implemented.

Capacity development of both personnel and equipment for sampling, analysis and evaluation should be implemented in a sustainable manner with an input by Uruguay itself.

Annual report of water quality has been published as a result of the water quality monitoring in the pilot project. Sustainable publication of the annual report of water quality is indispensable for the maintenance of the established ambient water quality monitoring system.

SISICA, a water quality information system, should be evolved to the Integrated SISICA that targets information sharing with the relevant agencies.

In the field of analysis and evaluation in laboratory, SISILAB, an information system in laboratory, should be evolved so as to raise the efficiency and quality of the laboratory work.

7.3.4 Module No.4: Promotion of Dissemination, Education and Public Participation

(1) Objective of the Module

Objectives of the capacity development in Module No.4 are as follows:

- Dissemination, education and public participation are promoted in the Santa Lucía River Basin
- People's opinion is reflected to water quality management in the Santa Lucía River Basin

(2) Degree of the Achievement of the Original Target and Key Issues for the Future Activities

Activities on dissemination and education were implemented as the elaboration and effective use of education materials and implementation of various campaigns. JICA Project implemented such activities mainly in the municipalities of Florida and Lavalleja, but effective utilization of the education materials was promoted in all the relevant five municipalities. Such activities should be continued in a sustainable manner.

As a system for the formulation of agreement on water quality management, Water Quality Forum was set up in the municipalities of Florida and Lavalleja. These Water Quality Forums should be managed in a sustainable manner in the future. Water Quality Forums in the other three municipalities should be established by the effort of the municipalities with the help of already established Forums and DINAMA.

Federation of Water Quality Forums for the Santa Lucía River Basin should be established by the effort of Uruguay.

ANNEXES

Annex 5.1.1 (1/7) Evaluation of Pilot Project

PLP 1a: Development of Capacity for Strategic Part of Water Quality Management

Background and necessity

DINAMA is prescribed a comprehensive mandate of planning, implementation, supervision and coordination with relevant agencies for water quality management by Decree No.257. Principles of water quality management in Uruguay are proposed in the present Project as i) water quality management for river basins, ii) systematic water quality management, and, iii) integrated water quality management. In order to realize the systematic water quality management, it is important to establish a cycle consisting of; establishment of policies and strategies; pollution source management; ambient water quality monitoring; and, dissemination, education and public participation. Establishment of policies and strategies are in the most upstream part of the water quality management.

In order to implement the Module No. 1: Strengthening of Strategic Part, establishment of a basic system and strengthening of the capacity are deemed important.

Objective

The objective of PLP 1a is to realize the capacity development for the strategic part of the systematic water quality management, namely, "Establishment of Policy and Strategies".

Originally expected output

- Capacity is developed for the establishment of strategies and specific action plans of respective water quality approach.
- Amendment to Decree No.253 proceeds accordingly.
- Water bodies' specific use is declared based on the amended Decree No.253

Achieved output

- Capacity is developed for the establishment of strategies and specific action plans of respective water quality approach.
- Amendment to Decree No.253 has not proceeded.
- Declaration of water bodies' specific use has not proceeded.

Originally proposed activities

- Create a system for the integrated water quality management (incl. council for water quality management in river basins) and conduct capacity development for the personnel.
- Give technical support for the amendment to Decree No.253
- DINAMA under the collaboration with the relevant organizations declares "Water Bodies' Specific Use".

Implemented activities

- Water Quality Management Committee (WQMC) was created.
- Council for the water quality management in the Santa Lucia River Basin was not created, but Steering Committee is providing the same function to that of the Council.
- Conducted training in Japan for personnel capacity development.
- Technical referential document introducing Japan's practice was provided for the amendment of Decree No.253.

Evaluation of the achieved output (Note: 3: good / 2: normal / 1: poor)

- Relevancy: 2 Strengthening of strategic part is relevant for the implementation of systematic water quality management.
- Effectiveness: 2 Establishment of WQMC is effective if it is fully utilized. Though effectiveness of C/P training in Japan is difficult to evaluate, it is deemed effective for the personnel to know about the practice in Japan.
- Efficiency: 3 Not much expenditure is needed for the strategic part, and it is efficient if the strategic part is strengthened with the improvement of a system in DINAMA.
- Impact: 1 Impact is not very clear.
- Sustainability 2 Sustainability of WQMC depends on the awareness of the members of the Council.

Faced issue during the implementation of the activities

- Lack of human resources in DINAMA for the amendment of Decree No.253 (not directly related to the Project)

Issues to be considered in the future

- Necessity of Council for water quality management in the Santa Lucia River Basin should be discussed under the authorities of the new government before the end of the Project.

Annex 5.1.1 (2/7) Evaluation of Pilot Project

PLP 1b: Development of Capacity for Pollution Source Management

Background and necessity

Pollution source management is one of the components of the systematic water quality management cycle. DINAMA is prescribed by Decree No.257 the responsibility for the establishment of a system including pollution source management as a part of the water quality management. Pollution sources in the Basin include industrial and domestic wastewater, solid waste, and agriculture activity. Actual implementation of the measures for pollution source is executed by various organizations, namely, industrial wastewater is covered by DINAMA and municipalities, domestic wastewater is by OSE and IMM, solid waste is by municipalities, and agricultural activities are by municipalities and MGAP.

In order to implement the Module No. 1: Strengthening of Strategic Part, development of the capacity for pollution source management is deemed important.

Objective

The objective of PLP 1b is to realize the capacity development for the pollution source management of the systematic water quality management.

Originally expected output

- Capacity is developed for the industrial wastewater management and domestic wastewater management, and analysis and assessment of pollution source to river water environment.

Achieved output

- Capacity was developed for the industrial wastewater management and domestic wastewater management, and analysis and assessment of pollution source to river water environment.

Originally proposed activities

- Conduct C/P training in Japan.
- Hold a workshop for the presentation of the outcome of the training in Japan by the C/P training participants.

Implemented activities

- A C/P from IMC attended to a group course “Industrial wastewater treatment technique II”.
- A C/P from OSE attended to a group course “Domestic wastewater treatment technique”.
- A workshop for the presentation of the outcome of the training in Japan was held on March 11, 2005.

Evaluation of the achieved output (Note: 3: good / 2: normal / 1: poor)

• Relevancy:	2	Capacity development of personnel is a basic method for the strengthening of the system.
• Effectiveness:	2	Though effectiveness of C/P training in Japan is difficult to evaluate, it is deemed effective for personnel to know about the practice in Japan. Effectiveness was raised through the implementation of the workshop for the sharing of knowledge.
• Efficiency:	2	Expenditure in Uruguay side is for the support of the work in the absence of the C/P during the training. Efficiency including with the Japan’s expenditure is difficult to evaluate.
• Impact:	1	Impact is not very clear.
• Sustainability	2	Sustainability depends on the awareness of the C/P who joined to the training for the effective utilization of the training results.

Faced issue during the implementation of the activities

- N.A.

Issues to be considered in the future

- N.A.

Annex 5.1.1 (3/7) Evaluation of Pilot Project

PLP 1c: Development of Capacity for Ambient Water Quality Monitoring and Strengthening of Coordination with Relevant Agencies

Background and necessity

DINAMA is declared the leading role for the ambient water quality monitoring by Decree No.253. The ambient water quality monitoring consists of a series of work, namely, i) monitoring network designing; ii) sampling, field testing, sample transportation; iii) sample preservation and laboratory analysis; iv) data management; and, v) data processing and evaluation. The processed and evaluated data are provided to the policy maker and are publicized as the status of ambient water quality. Presently, appropriate ambient water quality monitoring is absent due to the low capacity of the organization and personnel. Besides DINAMA, municipalities also have responsibility for the maintenance and improvement of hygiene environment in their territory, and conduct water quality monitoring for this purpose. Capacity of the municipalities for water quality monitoring is not sufficient except IMM.

In order to implement the Module No. 3: Strengthening of Ambient Water Quality Monitoring, development of capacity for ambient water quality monitoring and strengthening of coordination with relevant agencies is deemed necessary.

Objective

The objective of PLP 1c is to build the implementing regime for periodical and systematic water quality monitoring, initiating the trial water quality monitoring.

Originally expected output

- Capacity of Water Quality Dep. (WQD) is reinforced.
- Capacity of relevant laboratories is strengthened.
- Joint work agreement for water quality monitoring between DINAMA and municipalities is concluded.
- Trial monitoring is started and lessons learned are reflected to the subsequent monitoring.

Achieved output

- Capacity of WQD was reinforced.
- Capacity of relevant laboratories was strengthened.
- Contents of joint work agreement for water quality monitoring between DINAMA and municipalities were generally accepted.
- Trial monitoring was conducted and lessons learned were reflected to the subsequent monitoring.

Evaluation of the achieved output (Note: 3: good / 2: normal / 1: poor)

- Relevancy: 3 Strengthening for ambient water quality monitoring is relevant in the systematic water quality management
- Effectiveness: 3 Establishment of the collaborated system and the strengthening of the capacity is effective to the water quality management.
- Efficiency: 3 Output was achieved with less cost and is considered efficient.
- Impact: 3 Relevant personnel shared awareness of the necessity of ambient water quality monitoring and it was a good impact.
- Sustainability 3 The established system is considered sustainable.

Originally proposed activities

- Reinforcement of WQD
- Capacity strengthening of laboratories
- Conclusion of joint work agreement on water quality monitoring and information sharing
- Execution of trial water quality monitoring

Implemented activities

- Staff in WQD was increased.
- Equipment supply and technical transfer to laboratories were done.
- Pesticide analysis ability at DINAMA laboratory was checked.
- Draft joint work agreement was prepared and discussions were held.
- Trial monitoring was conducted and the lessons learned were reflected to the subsequent monitoring.

Faced issue during the implementation of the activities

- The cost for the equipment supply was limited and the strengthening of laboratories was limited.
- Availability of personnel and equipment resources in both DINAMA and municipalities were limited.

Issues to be considered in the future

- When the ambient water quality monitoring is conducted in a sustainable manner under the established system, further strengthening of the capacity for both equipment and personnel should be considered in the future.
- Discussion should be continued for joint work agreement with the new municipal governments to be elected in May 2005.

Annex 5.1.1 (4/7) Evaluation of Pilot Project

PLP 2: Establishment of Water Quality Information System

Background and necessity

DINAMA is declared the leading role for the ambient water quality monitoring by Decree No.253. The ambient water quality monitoring consists of a series of work, namely, i) monitoring network designing; ii) sampling, field testing, sample transportation; iii) sample preservation and laboratory analysis; iv) data management; and, v) data processing and evaluation. The processed and evaluated data are provided to the policy maker and are publicized as the status of ambient water quality. Presently, items iv) and v) above are hardly executed and the existing water quality information is not utilized for any aspect.

In order to implement the Module No. 3: Strengthening of Ambient Water Quality Monitoring, establishment of a basic system for water quality data storage and effective utilization is necessary.

Objective

The objective of PLP 2 is to realize sharing and effective utilization of water quality data obtained in the ambient water quality monitoring.

Originally expected output

- Water quality information system is established.
- Annual Report on Water Quality is publicized.

Achieved output

- Water Quality Information System in DINAMA (SISICA DINAMA) is established.
- A draft of the Annual Report on Water Quality is prepared.

Originally proposed activities

- DINAMA and JICA Team jointly establish a computerized Water Quality Information System in DINAMA considering the full use of the Internet environment for the use of various kinds of users.
- Relevant agencies will join to discussions for the system development held in technical committee level.
- DINAMA and JICA Team jointly prepare Annual Report on Water Quality and publicize it.

Implemented activities

- DINAMA and JICA Team jointly established a computerized Water Quality Information System in DINAMA (SISICA DINAMA) considering the full use of the Internet environment for the use of various kinds of users.
- Relevant agencies joined to discussions for the system development held in technical committee level.
- DINAMA and JICA Team jointly prepared a draft of Annual Report on Water Quality.

Evaluation of the achieved output (Note: 3: good / 2: normal / 1: poor)

- Relevancy: 3 Effective utilization of water quality data is an important part of the ambient water quality monitoring, and thus PLP 2 is considered relevant enough.
- Effectiveness: 3 Water quality information system is very effective in the ambient water quality monitoring
- Efficiency: 3 SISICA consists of public domain software (free of charge) and designed for a standard Internet environment, and the development was implemented just with the employment of system engineers, and thus SISICA is very efficient.
- Impact: 3 It is the first system in Uruguay for water quality information, and the impact is high.
- Sustainability 2 The system requires less cost for maintenance and it is sustainable. Introduction of the system to the other key agencies of water quality and development of Integrated SISICA is important to realize sustainable use of the system.

Faced issue during the implementation of the activities

- Lack in hardware (computers) for the system development

Issues to be considered in the future

- Introduction of SISICA in the other agencies is deemed important.
- Development of Integrated SISICA after the introduction of SISICA in the other agencies is necessary.

Annex 5.1.1 (5/7) Evaluation of Pilot Project

PLP 3: Establishment of Industrial Wastewater Management Manual and Strengthening of Coordination

Background and necessity

Pollution source management is one of the components of the systematic water quality management cycle. DINAMA is prescribed by Decree No.257 the responsibility for the establishment of the system including pollution source management as a part of the water quality management. Of the various kinds of pollution sources, industrial wastewater is the one DINAMA directly manage. The results of the problem analysis revealed absence of the unified work for the industrial wastewater management due to the lack of various kinds of manuals. Establishment of a system for the collaborated work between DINAMA and municipalities for the industrial wastewater management also has identified.

In order to implement the Module No.2: Strengthening of Pollution Source Management, development of manual and strengthening of coordination are deemed necessary.

Objective

The objectives of PLP 3 are to realize industrial wastewater regulations under unified standards and practices, and to build a basis for coordination between DINAMA and municipalities.

Originally expected output

- Procedural and management manuals for industrial wastewater regulations are developed.
- Technical guidance related with wastewater treatment technologies is developed.
- Joint work agreement for the coordination in industrial wastewater management between DINAMA and municipalities is prepared and concluded.

Achieved output

- Procedural and management manuals for industrial wastewater regulations were developed.
- Technical guidance related with wastewater treatment technologies was developed.
- Draft of joint work agreement for the coordination in industrial wastewater management between DINAMA and municipalities was prepared.

Originally proposed activities

- DINAMA and JICA Team jointly develop a series of manuals for industrial wastewater regulations.
- DINAMA and JICA Team jointly develop technical guidance.
- Formulate the draft of joint work agreement and make the agreement.

Implemented activities

- Manuals for: industrial user inspection; industrial wastewater sampling; industrial wastewater flow rate measurement; sampling, preservation and transportation of underground water; were developed.
- Technical guidance was developed.
- Draft of joint work agreement was formulated and general agreement was reached.

Evaluation of the achieved output (Note: 3: good / 2: normal / 1: poor)

- Relevancy: 3 Development of manuals is relevant to raise the quality of the work and those for the industrial wastewater is deemed relevant in the water quality management.
- Effectiveness: 2 Effectiveness should be confirmed through real application of the manuals to the actual work.
- Efficiency: 3 Manuals were prepared with less cost and thus it is considered efficient.
- Impact: 2 Impact is not clear.
- Sustainability 2 Sustainability should be confirmed through real application of the manuals to the actual work.

Faced issue during the implementation of the activities

- There was a severe lack of human resources in Environmental Control Division (EnCD) for the development of the manuals.

Issues to be considered in the future

- Manuals development has not been completed and it should be continued.
- Careful check of necessary human and other resources in EnCD should be considered for future work.
- Discussion should be continued for joint work agreement with the new municipal governments to be elected in May 2005.

Annex 5.1.1 (6/7) Evaluation of Pilot Project

PLP 4: Establishment of Manuals for Monitoring Network Designing and Sampling

Background and necessity

DINAMA is declared the leading role for the ambient water quality monitoring by Decree No.253. The ambient water quality monitoring consists of a series of work, namely, i) monitoring network designing; ii) sampling, field testing, sample transportation; iii) sample preservation and laboratory analysis; iv) data management; and, v) data processing and evaluation. The processed and evaluated data are provided to the policy maker and are publicized as the status of ambient water quality. Presently, items i) to iii) above are executed by DINAMA and municipalities. One of the issues identified is the fact that unified standards and practices for water quality monitoring have not been in place without needed manuals.

In order to implement the Module No. 3: Strengthening of Ambient Water Quality Monitoring, establishment of manuals is thus deemed necessary.

Objective

The objectives of PLP 4 are to establish manual covering a series of monitoring activities and to formulate an executive plan of trial water quality monitoring.

Originally expected output

- Executive plan of trial water quality monitoring is furnished.
- Manuals necessary for the series of monitoring activities are established.
- Existing manuals for laboratory measurement and analysis are updated.

Achieved output

- Executive plan of trial water quality monitoring was furnished and updated for the output of PLP 1c.
- Manuals necessary for the series of monitoring activities were established.
- Existing manuals for laboratory measurement and analysis were updated.

Originally proposed activities

- DINAMA and JICA Team jointly prepare the executive plan of the trial water quality monitoring.
- DINAMA and JICA Team jointly prepare manuals for monitoring activities.
- DINAMA updates existing manuals for laboratory measurement and analysis

Implemented activities

- DINAMA and JICA Team jointly prepared the executive plan of the trial water quality monitoring.
- DINAMA and JICA Team jointly prepared manuals for monitoring activities.
- DINAMA updates existing manuals for laboratory measurement and analysis (independent work of DINAMA and not proposed by JICA Project)

Evaluation of the achieved output (Note: 3: good / 2: normal / 1: poor)

- Relevancy: 3 Start of the periodical ambient water quality monitoring for a river basin is relevant for the water quality management in Uruguay.
- Effectiveness: 2 Manual and the experience for the preparation of the executive plan of trial monitoring would be used for the other basins, and it is considered effective.
- Efficiency: 3 The work has been conducted with less cost and it was efficient.
- Impact: 2 Start of the periodical ambient water quality monitoring for a river basin has an impact to the water quality management in the country.
- Sustainability 2 Sustainability should be confirmed through real application of the manuals to the actual work.

Faced issue during the implementation of the activities

- There was a lack of human resources in Water Quality Dep. (WQD) for the preparation of the manual.

Issues to be considered in the future

- Executive plan of trial water quality monitoring has been reviewed on the basis of the outcome of the PLP 1c and water quality monitoring plan for the Santa Lucia River Basin has been formulated. The plan should further be reviewed for the DINAMA's national water quality monitoring program, which covers six major river basins in the country, suspended since 1995 and is likely to resume in June or July of 2005.

Table 2.1.1 (7/7) Evaluation of Pilot Project

PLP 5/6: Promotion of Education, Dissemination and Public Participation

Background and necessity

In order to strengthen the capacity for the water quality management in a sustainable manner, not only the level of government organization and government personnel but also the higher level, namely, the level of local society should be included for this purpose. Also needed is the introduction of participatory approach, and it is necessary, i) to realize participation of all the stakeholders from the initial stage of the formulation of the master plan for the strengthening of capacity for water quality management, ii) to raise the awareness of the stakeholders and realize actual participation to the strengthening of the capacity, iii) to assure transparency in the plan formulation stage through the periodical report to stakeholders, and iv) to formulate a plan acceptable for the local community.

In order to implement the Module No. 4: Promotion of Education, Dissemination and Public Participation, implementation of various actual activities for this purpose is deemed important to start the concrete work.

Objective

The objectives of PLP 5&6 are; to improve awareness of the people and their motivation to conserve water quality; to formulate wider basis for the consensus of the people on drawing up water quality policies; to promote public participation in the contribution of water quality policies as well as integrate the community for the effective implementation of them; and, to improve the motivation of related agencies in charge of water quality to implement the water quality policies efficiently (surveillance of the public sector by the people).

Originally expected output	**Achieved output**	**Evaluation of the achieved output** (Note: 3: good / 2: normal / 1: poor)
• Water Quality Forum is established in Florida. • Education materials are produced and distributed • Education and training for water quality conservation are performed in Florida with utilizing education materials. • Campaign activities for water quality conservation are performed in Florida with utilizing education materials • Newsletters on water quality are published. • Web pages on water quality project are located in DINAMA site and updated periodically. • Activities of all pilot projects are documented with videotapes.	• Water Quality Forum was established in Florida. • Education materials were produced. • Education and training for water quality conservation were performed in Florida with utilizing education materials. • Campaign activities for water quality conservation were performed in Florida with utilizing education materials • Newsletters on water quality were published once. • Web pages on water quality project are going to be located in DINAMA site. • Activities of all pilot projects were documented with videotapes.	• Relevancy: 3 Education, dissemination and public participation is deemed important for the proper water quality management and the PLP 5&6 was considered relevant. • Effectiveness: 3 PLP 5&6 was effective to realize the purpose in the Municipality of Florida. • Efficiency: 3 Materials prepared and activities conducted are considered cost effective. • Impact: 3 All the activities in Florida gave great impact to the local society. Various activities were introduced to the society by media and gave good impact. It would give a great impact for the water quality management in Uruguay, if videos be broadcasted by central media. • Sustainability 2 Continuance of the activities in Florida should be monitored and supported by the Project. In order to realize the sustainability, expansion of the activities to the other municipalities is deemed important.

(to be continued)

Originally proposed activities	Implemented activities	
• Preparation work for education material is conducted through the participation of teachers and person who use the materials. • Training of teachers is conducted and education materials are evaluated. • Design of educative activities for children is conducted. • Education of primary students on water quality by trained teachers is conducted. • Establishment work for the Water Quality Forum is conducted in Florida. • Preparation work for campaign materials for public awareness is conducted. • Public participation activities are conducted.	• Preparation of video for stakeholders, video for children, illustrated story, and booklet was conducted through participation of various stakeholders. • Training of teachers was conducted and education materials were evaluated. • Design of educative activities for children was conducted. • Education of primary students on water quality by trained teachers was conducted. • Establishment work for the Water Quality Forum was conducted in Florida through the participation of various stakeholders. • Preparation work for campaign materials for public awareness was conducted and the following are developed. - Posters - Triptychs - Stickers • Public participation activities were conducted. - Flora preservation campaign - Santa Lucia Chico River cleaning campaign - Workshop on effluent management - Workshop on pesticide management	**Faced issue during the implementation of the activities** • Lack in human resources in DINAMA for this purpose. **Issues to be considered in the future** • Continuance of the activities in Florida should be monitored and supported by the Project. • In order to realize the sustainability, expansion of the activities to the other municipalities is deemed important. • Developed materials should be used for the whole country.

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (9/17)

Progress of Activities for each Output

(***Output No.1.1****: Water quality management strategies and specific action plans of respective water quality approaches are established*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** This issue has been discussed initially at the Water Quality Management Committee (WQMC). A deeper approach is pending in the next WQMC. With the change of authorities there has been a change of view in the Water Quality Management strategy within the Ministry but we have not been able to analyze it with the new authorities. **2005.10.04 Steering Committee Meeting** New Budget Law proposes to create a unified organization for "water" although the approval by the Executive Power is not yet made. If the Executive Power approves it, detailed discussion would be made for the period of two years. If it is realized, it is a large change in the institutional setup, though the strategy for water quality management proposed in the present Project includes all the relevant sectors for water quality management, and thus the strategy could be applied as proposed even for the new institutional setup. ➔	**2005.08** A new WQMC meeting should be implemented for next September 15. **2005.10.04 Steering Committee Meeting** The meeting has not been taken place on 15th of September. Review of the strategy by the end of 2005 is needed and when necessary amendment should be made for the strategy in 2006. **2006.02** Implement activities proposed in the Action Plan.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** reviews the strategy of water quality management and the action plan established in the course of the Project, and modifies them (if necessary) - **WQMC (Water Quality Management Committee in DINAMA)** reviews the strategy of water quality management • **DINAMA** sets the Work Plan for respective development modules, based on the action plan mentioned above. - **WQMC** establishes a work plan for the strengthening of water quality management capacity for next year.	P A P A							↔	↔		△			➔The action plan proposed in the present Project should be adjusted reflecting to the final integrated master plan upon the final decision on the New Budget Law. **2005.12** Water Quality Management Committee has not met to discuss strategies. **2006.02** Though the discussions inside DINAMA, the strategy of water quality management consisting of i) Water quality management by river basins, ii) Systematic water quality management, and iii) Integrated water quality management, has been considered appropriate and no change has been proposed. Work plan basically follows those proposed in the M/P, but presently under review by each module.

Lessons learned

2005.08 (DINAMA): An important impact in the Project is noticed due to the change of municipal authorities.

2005.10 (Steering Committee Meeting): No distinct effects due to the change in officers concerned (chiefs of environmental departments) in the municipalities were identified. All the municipalities are positive for the collaboration in the Project.

2005.12 (Canelones): The change of authorities had not had negative incidence on the Project. By the contrary it will be probably strengthen. Particularly about Canelones Municipality Sasabe san had a meeting with new Director General Eng. Mario Pareja and he was told about the concern on going ahead with the Project including probable future steps after the Master Plan.

Progress of Activities for each Output

(***Output No.1.2****: Decree No.253 is amended*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.12/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** This activity does not belong to the Project's framework but it is within another sphere of DINAMA. On August 31st 2005 the GESTA Agua work group shall be taken up again at an inter-institutional level within the framework of COTAMA. The Municipality of Canelones has stated its concern on the delay of the Decree amendment activities. **2005.10.04 Steering Committee Meeting** First meeting after the re-start of GESTA Water has been held on 4th of October 2005. The present Project should continuously monitor the status. **2005.12** GESTA group resumed its activities. The new work schedule was presented to COTAMA. This activity does not belong to the project but it is under the responsibility of DINAMA's consultancy. **2006.02** Information from GESTA Water group says that the result of their activities would be sent to COTAMA by May 2006.	**2005.08** The process is continued according to what has been planned by the work group. **2005.12** June 2006 is stated as the term for finalizing the work. **2006.02** Monitor the action of GESTA Water Group and COTAMA.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** plays the leadership in the GESTA Water of COTAMA in making "Decree No.253/79 and Amendments" from the technical aspect - EQED (Environmental Quality Evaluation Division) checks the status. • Legal procedure for the "Decree No.253/79 and Amendments" proceed - **MVOTMA** prepares "Decree No.253/79 and Amendments", and send it for the signature of all the **relevant Ministers**, and send it to **Executive Power** for approval	P A	Progress should be checked.										Probably in 2006		

Lessons learned

2005.12 (Canelones): Some amendments were presented at the last session of COTAMA by GESTA Water staff. Also GESTA Air reaches the standard definition steps. Both groups will go ahead from January to the front. There is a strong expectation about the end of the procedures and we hope the goal will be accomplished as soon as possible. The concern is still in term because a lot of administrative and decision steps have to be got pass. The experience with other relevant regulations as this on Industrial Solid Waste justifies the expectation.

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (11/17)

Progress of Activities for each Output

(***Output No.1.3****: Water bodies' specific use is declared based on the "Decree No.253/79 and Amendments" (All the activities depend upon the contents of the "Decree No.253/79 and Amendments"*))

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** On 02/28/05 a Ministerial decision was passed stating: "To generically classify on class 3 under Art. 3 of decree 253/79 dated May 9th, 1979, all the water bodies and courses whose tributary basin is bigger than 10 km^2 and that have not been classified up to date". **2005.10.04 Steering Committee Meeting** The Ministerial Order dated on 28th of February 2005 describes that all the rivers with the catchment area of 10 km^2 or more fall in Class 3 of the Decree No.253/79. Upon the amendment of Decree No.253/79, DINAMA is responsible for the identification for the specific use, thus the amendment of Decree No. 253/79 should be monitored. In any case, the periodical water quality monitoring for the river basin should be continued and the data for the evaluation of the present water quality condition should be accumulated. **2006.02** Checked the status of preparation of Decree No.253/979 and Amendments.	**2005.08** DINAMA should define the watercourses that do not comply with the CLASS classification and define action plans for their recovery. No terms were identified for this activity. **2005.12** The incorporation of new technicians in the Water Quality Department shall make the watercourse classification possible. **2006.02** Propose the activities by DINAMA with the necessary input (personnel, etc.).
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** designates proper unit for the task of declaration of water bodies' specific use - Unit for declaration of water bodies' specific use shall be designated under **WQMC of DINAMA**.		Status of preparation of "Decree No.253/79 and Amendments" should be checked first.												
Lessons learned **2005.08 (DINAMA)**: If DINAMA does not increase human resources to be able to implement the water monitoring network, it will not be able to evaluate water quality on the different bodies and to identify those that do not comply with the classification defined in the above mentioned ministerial decision. **2005.12 (Canelones)**: A great expectation exists about this issue. DINAMA is carrying a procedure to incorporate human resources and we hope some of them will be included on the work needed to get the goal. Cooperation and coordination with relevant institutions have to be considered for developing an approach on the wider basis. Working together is the way. A lot of coordination between Institutions is needed.													

Progress of Activities for each Output

(***Output No.2.1****: Collaboration system among relevant agencies on pollution source management is maintained*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** • The unavailability of human resources has made it impossible to implement said meetings periodically. • A good coordination with OSE is maintained at a technical level, not at an institutional level. • The municipality of Canelones deems that the information exchange with DINAMA regarding pollution sources is based on personal efforts. **2005.10.04 Steering Committee Meeting** DINAMA gives priority to the actual work in the industrial wastewater management, and the staff (total six) work fully on this. The Environmental Quality Management Division already submitted a proposal for the increase of six persons to the National Director. Meetings between the relevant organizations for the pollution source management have not been held. The reason would not be the lack of the personnel, but the lack of recognition of the necessity of the meaning for the holding of the meeting, and thus the incentive is low. ➔	**2005.08** • The improvement process regarding information exchange and the works with the municipalities are continued. • The coordination with municipalities is progressing, planned to be carried out gradually regarding both information exchange and joint inspections. • The coordination with OSE is continued. **2005.12** A workshop is planned to be held in February, aimed at improving coordination among all the project's institutions. **2006.02** Steering Committee will discuss Terms of Reference on Output 2.6 and 2.7 of the M/P.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• Periodical meetings take place to exchange information on pollution source management; attended by DINAMA, OSE, RENARE, Municipalities and other relevant organizations ("Steering Committee" shall be utilized) - **EnCD (Environmental Control Division, DINAMA)** arrange meeting on pollution source management. - **EnCD** evaluates its capacity for the necessary work for this activity by the end of 2005. - **EnCD** continuously maintains necessary information - **DINAMA** under the collaboration with **OSE**, **RENARE**, **Municipalities** and **other relevant organizations** establishes a system for the systematic work for the exchange of information on pollution source management. - **DINAMA** arranges for the exchange of agreement if necessary.	P A					△ ---						△ ---		➔It is deemed necessary that DINAMA recognizes the necessary of conducting the modeling of pollution source runoff and conducts the necessary activities in the future. **2005.12** Good coordination actions were achieved, particularly with Montevideo and Canelones. In Montevideo specifically, technical, administrative and monitoring procedures were coordinated. **2006.02** More concrete topics would be necessary. DINAMA wants to discuss with the relevant agencies Terms of Reference (TOR) on Output 2.6 and 2.7 of the M/P.

Lessons learned

2005.08(DINAMA): The good relationship existing among the institutions at a technical level should be institutionalized.

2005.10.04 (Steering Committee Meeting): The status of the collaboration between DINAMA and municipalities for the industrial wastewater management is as follows: **IMM**: An agreement exists. Collaborated work is ongoing under a schedule. Laboratory data are shared. **IMC**: Collaboration is less, and not systematic even there is. **OSE**: Collaborated work exists in the technical level. It should be studied how to create a systematic structure for the collaboration.

2005.12(DINAMA): The industrial sector's view towards the control institutions is improved when implementing actions agreed upon among them.

2005.11(Canelones): Steering Committee must have sessions more frequently, even without the Japan Consultants. Information on DINAMA internal meetings about the Project must be given at those sessions. Coordination was not improved to better levels. A lot of effort and work have to be implemented as soon as possible. Probably OSE has to consider the Regional level on each Department as an active local participant. Coordination between Municipalities and with OSE is urgently needed. The coordination level between DINAMA and IMM told at the Steering Committee last session is expected at Canelones but it has not been possible to be implemented until now.

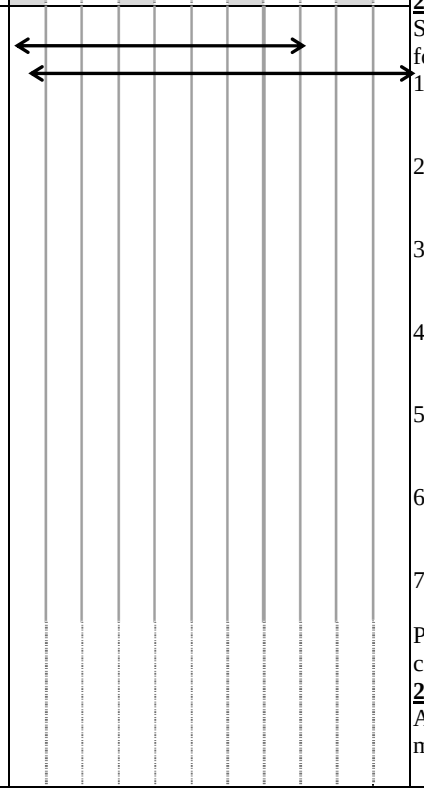
2006.02 (DINAMA): Proposal to have periodical discussion is sometimes difficult for implementation if specific and concrete tasks are not given to the meeting.

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (13/17)

Progress of Activities for each Output

(***Output No.2.4****: Industrial wastewater related manuals are prepared*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** The manuals have not been elaborated. **2005.10.04 Steering Committee Meeting** Status of the preparation of the manuals is as follows: 1. Industrial user inspection manual: A draft based on EPA has been prepared. It should be amended in order to fit to Uruguay. 2. Industrial wastewater sampling manual: A draft based on EPA has been prepared. It should be amended in order to fit to Uruguay. 3. Guidance for industrial wastewater flow rate measurement: Already prepared and published through the web page. 4. Guidance for sampling, preservation and transportation of groundwater: Already prepared and published through the web page. 5. Registration manual of competent professional: Already prepared and published through the web page. 6. Self-monitoring report manual: DINAMA hopes to prepare next year, but seems difficult. 7. Authorization manual of industrial wastewater discharge: Progress unknown. Priority should be given to "1." above so far to complete by the end of November. **2006.02** Amendment of "Industrial user inspection manual" to fit to Uruguay has been completed. ➔	**2005.08** DINAMA should prioritize the elaboration of these manuals. Environmental Control Division maintains its will to progress but no terms are introduced due to a lack of human resources. **2005.10.04 Steering Committee Meeting** For the strengthening of the capacity for pollution source management in municipalities, the collaboration with the project "Fortalecimiento de las capacidades institucionales de los gobiernos departamentales para la mejora de la gestón ambiental del territorio" conducted under the collaboration between DINAMA-MVOTMA and SEMA-IDRC de Canadá should be taken into consideration. **2006.02** Proceed for the finalization of "2. Industrial wastewater sampling manual" and "6. Self-monitoring report manual".
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** develops procedural and management manuals for industrial wastewater. - Self-monitoring Report Manual - Authorization Manual of Industrial Wastewater Discharge - Industrial User Inspection Manual - Industrial Wastewater Sampling Manual - Registration Manual of Competent Professional	P A													
													➔It will be sent for the check by the legal advisor of DINAMA. "7. Authorization manual of industrial wastewater discharge" is not a manual, but an education booklet for SADI presentation. It is finished and available via web.	In Phase III, five out of the scheduled seven manuals have been prepared

Lessons learned

2005.08(Canelones): The municipality of Canelones deems that it should have had more participation in the elaboration of the manuals.

2005.10 (Steering Committee Meeting): It has been agreed by the Steering Committee that the draft of the Manual should be prepared by DINAMA and it should be reviewed by the relevant agencies through the opportunities including the Steering Committee Meetings.

2005.12(Canelones): Canelones deems it wise to do on going ahead with the manuals. We put into consideration the Montevideo Municipality expects about having participation en manuals elaboration. The materials are strongly needed and it is not desired to postpone the outputs. Manuals have to be elaborated as soon as possible on the wider coordination and inter action basis including all relevant institutions.

Status as discussed in Fourth Field Work Report. ◯ Not yet completed.

Line No.	Titles	Purposes of Manuals	Forms of Products	Contents	Progress Status as of Now
◯1	Industrial User Inspection Manual	This is a guideline to be used for DINAMA inspectors (and possibly municipal inspectors) to enforce the inspection of industrial wastewater.	Paper document (total about 115 pages)	• General instructive document describing on how to carry out the inspection of industrial wastewater facilities.	The tentative versions in Spanish and English have been completed, referring to EPA manual. Further examination from the legal viewpoint has been raised by the legal adviser.
◯2	Industrial Wastewater Sampling Manual	This is a guideline to be used for DINAMA inspectors (and possibly municipal inspectors) to carry out the sampling of industrial wastewater.	Paper document (total about 80 pages)	• Instructive document describing on how to carry out sampling of industrial wastewater.	The tentative versions in Spanish and English have been completed, referring to EPA manual. Further examination from the legal viewpoint has been raised by the legal adviser.
3	Guidance for Industrial Wastewater Flow Rate Measurement	This is a technical guideline to enforce the resolution of the effluent measurement (to be issued October 2004)	Paper document (total 26 pages)	• Technical descriptions of flow rate measurement (methodologies, constructions, calculations, etc.) by means of open channel weir, • Detail explanation of triangular, rectangular, and other type.	The documents (both in Spanish and English) have been completed in the middle of November 2004.
4	Guidance for Sampling, Preservation and Transportation of Underground Water	This is a technical guideline to be used for sampling underground water.	Paper document (total 21 pages)	• Instructive document describing on how to preserve and transport underground water.	The documents (both in Spanish and English) have been completed in the middle of November 2004.
◯5	Registration Manual of Competent Professional	This is a program to be used for registering the competent professional with digitized information, aiming to realize a computerized registration procedure.	Programmed input format and paper document	• Programmed electric format for the input of information on the competent professional, • Instructive documents on how to use the input format.	This work has been not started yet.
◯6	Self-Monitoring Report Manual	This is a program to be used for receiving the self-monitoring report from industries with digitized information, aiming to realize a computerized procedure.	Programmed input format and paper document	• Programmed electric format for the input of information on the self-reporting, • Instructive documents on how to use the input format, • Instruction on the selection of water quality laboratory, etc.	This work has been started by DINAMA but is just at the beginning stage.
◯7	Authorization Manual of industrial wastewater discharge			•	

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (15/17)

Progress of Activities for each Output

(***Output No.3.1****: Manuals related to monitoring are prepared*)

Monitoring Date/Evaluator: 2005.08.28/Magdalena Hill; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** The review of the monitoring manual contents is finished. The publication way has not been defined yet. **2005.10.04 Steering Committee Meeting** Publication Group of DINAMA finalizes for publication by the end of October and it would be printed and distributed in November. **2005.12** The manual is finished. **2006.02** Finalization of the Monitoring Manual for publication has been delayed, but it would be finalized by the beginning of February. It would be printed and published by February.	**2005.08** To publish the manual. **2005.12** The final printing is planned for the next project's period. **2006.02** Monitoring Manual will be delivered accordingly.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** amends established manuals, when necessary. - **EQED** makes necessary amendment - DINAMA publishes Monitoring Manual	P A P A	⇔									⇔			
		Originally proposed after April.2006												

Lessons learned

2005.12 (Canelones): Is not possible to amend manuals that don't exist. A great expectation exists on the possibility of having this management tools as soon as possible. We know about the effort to reach the goal but the lack of human resources at DINAMA fixes a strong limitation. Working all relevant Institutions together it would be probably possible to reach the goal.

2006.02 (DINAMA): Technical contents are prepared earlier, but it took time to prepare good looking layout one since the capacity of publishing group of DINAMA is limited and they have too much work. The same thing shall happen in the preparation of Annual Water Quality Report when we consider publication in book.

Progress of Activities for each Output

(***Output No.3.2***: *Ambient water quality monitoring plan for the Santa Lucia River Basin is established*)

Monitoring Date/Evaluator: 2005.08.28/Sandra Castro; 2005.12.14/Magdalena

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** Some Technical Committee meetings were held, where the evaluation of the pilot project's data was discussed with all the participants in order to carry out its adjustment in view of the Master Plan. Some monitoring stations were changed (Arroyo Pando) and a station was added in IMC. Each Municipality is requested a local report of the obtained data to elaborate the General Report. **2005.10.14 Steering Committee Meeting** • Technical Committees have been properly held for the monitoring. The monitoring has been well conducted including the review of the monitoring points through the meeting. • Municipalities except IMM could hardly conduct evaluation of the monitoring results. There are strong requests for the technical transfer on the evaluation of the monitoring results from DINAMA and municipalities. It should be considered for the review of the future activities. • The collaboration between DINAMA and OSE has been strengthened, though there needs a necessity for the share of the data (introduction of SISICA to OSE is scheduled). ➔	**2005.08** Start of the Master Plan for the basin's monitoring. Elaboration of the Pilot Project evaluation report with the contributions of all the municipalities involved. **2006.02** EQED shall consider the review of monitoring plan when necessary.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** updates water quality monitoring plan in the Santa Lucia River Basin based on the outcome of ambient water quality monitoring. - **EQED** updates water quality monitoring plan in the Santa Lucia River Basin through discussion with relevant agencies for water quality monitoring	P A	⇔ ⇔												
Some description for Output No.3.3														➔ • Capacity of DINAMA for the pesticide analysis should be evaluated based on the results of JCPP program.

Lessons learned

2005.08 (DINAMA): Except from IMM, we have not received the contributions of the rest of the Municipalities, regarding the local evaluation of the Pilot Project's data. Up to date, we do not have OSE's data for those stations of the Pilot Project that match such institution's stations. According to municipal technicians, there is still technical dependence on DINAMA from the Municipalities regarding the monitoring issue. The report shall be preliminary and shall not have pesticide data since DINAMA has not been able to provide them due to some problems with the measurement equipment. We have identified the need of strengthening training in the different institutions regarding water quality data evaluation and handling through the visit of a foreign expert to Uruguay to provide training in this regard.

2005.12 (Canelones): We would like to have knowledge about the progress on this output. We expect to have this information on the next Steering Committee meeting and go ahead on the discussion. At that time it would be good to consider the new Direction General on Water and Sewage proposed on National Budget Law and the idea development at that time. Strengthnesses and weaknesses of the proposal. Convenience on the implementation. It would be also good to have political definition on Water Constitutional modification and planed steps to go ahead on this issue.

2005.12
The water quality monitoring plan was continued according to what was established after the Pilot Project.

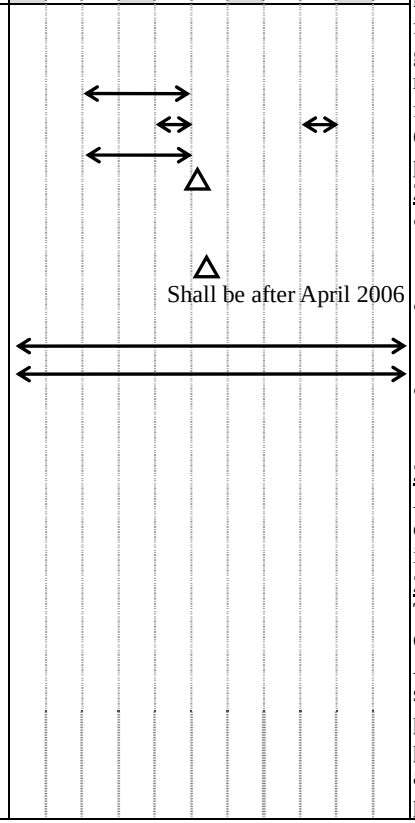
2006.02
Activities have been conducted successfully.

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (17/17)

Progress of Activities for each Output

(***Output No.3.3***: *Collaborated implementation system for sampling, analysis and evaluation is established*)

Monitoring Date/Evaluator: 2005.08.28/Sandra Castro; 2005.12.14/Magdalena Hill

Progress of activities			Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed / Actual	5 6 7 8 9 10 11 12 1 2 3		
• Agreement for the collaborated ambient water quality monitoring is concluded. - **DINAMA** arranges for the holding of Steering Committee meeting. - **Steering Committee members** discuss the collaborated ambient water quality monitoring carried out after the start of the new local government. - **MVOTMA** and **Municipalities** conclude agreement. • **DINAMA** and **Municipalities** jointly carry out sampling and analysis of water and sediment for the ambient water quality monitoring.	P A P A P A P A		**2005.08** There has not been a Technical Committee meeting with the new elected authorities, neither from DINAMA nor from the municipal governments. All the Institutions have been requested to ratify or rectify its representatives for the Steering Committee and the Technical Committees. The Monitoring Master Plan is planned according to the Institutions. **2005.10 Steering Committee Meeting** • New organizations of the municipalities are positive for the implementation of the collaborated monitoring with DINAMA. • The agreement has not been concluded. It should be discussed in next Steering Committee meeting. • Actual collaborated monitoring work is properly conducted. Technical Committee is active for the monitoring work. **2005.12** All the monitoring stated on the master plan could be carried out, with participation of all the institutions. **2006.02** The necessity of "Agreement" should be discussed in Steering Committee meeting. Actual collaborated monitoring work has successfully been implemented according to the proposal. Not only the collaborated periodically monitoring, but the necessary work against the water quality incidents that took place in IMC and IMSJ was successful. ➔	**2005.08** An answer from the Institutions is expected to call a Steering Committee meeting. The first joint sampling of the Master Plan is carried out. DINAMA centralizes the data waiting for SISICA's operation from each Institution. **2005.12** To keep working with the municipalities so they achieve self-sustainability on monitoring, under DINAMA's supervision and coordination. In the specific case of IMM, a technical meeting is needed to adjust the operation of this activity, since when changing authorities it was the institution with more changes at a technical level. The scope of the agreements among the institutions and MVOTMA should be defined. **2006.02** Exchange "Agreement" if determined to do so.
				➔In the incidents, each municipality did quick and proper water quality check with the collaboration of DINAMA.

Lessons learned

2005.12 (DINAMA): Municipalities may work independently on monitoring. However, they should continue to depend on DINAMA for those monitoring points that require special material: dredges, boats, sampling bottles, etc.

2005.12 (Canelones): The main goal of the output was not reached. The agreements are not implemented. We expect to strengthen the procedures during 2006 and conclude the step for the next Steering Committee meeting. Sampling and analysis are going ahead on established basis.

Progress of Activities for each Output

(***Output No.3.4**: Capacity for both personnel and equipment for sampling, analysis and evaluation is strengthened*)

Monitoring Date/Evaluator: 2005.08.28/Sandra Castro; 2005.12.14/Magdalena Hill

Progress of activities

Activities	Planed / Actual	5	6	7	8	9	10	11	12	1	2	3
• **JICA** provides technical training for the sampling and laboratory analysis.												
- Training in Japan shall be considered.	P						↔					
	A						---					
- Horizontal cooperation shall be considered including Japan Chile Partnership Program and other schemes	P		↔									
	A						↔					
• **DINAMA** provides technical transfer for sampling and analysis of water for Municipalities in a sustainable manner (incl. inter-calibration).	P					↔						
	A				↔							
- **EQED** conducts technical transfer for sampling when necessary												
- **Laboratories of DINAMA** and **Municipalities** conduct inter-calibration												
• **DINAMA** conducts pesticide monitoring.	P	⇠	⇠	⇠	⇠	⇠	⇠	⇠	⇠	⇠	⇠	⇠
	A						⇠	⇠	⇠	⇠	⇠	⇠
- **Laboratory of DINAMA** identify necessary work including upgrading of equipment for the pesticide monitoring												
- **Laboratory of DINAMA** strengthen the capacity for pesticide analysis												

Concrete activities and problems in this term

2005.08

Training in Japan on sampling and laboratory analysis was not possible. The Chilean experts shall come by the middle of October. The established plans regarding inter-calibration exercises are continued, planning the second round (surface water), to begin by the end of August. What was planned for the pesticide monitoring is continued, although with a term change due to an equipment failure, so the extractions are carried out in both matrixes but not still the measures.

2005.10.04 Steering Committee Meeting

- Inter-calibration has been conducted. Sampling on Aug. 22, 29, Sep. 5, 12 and samples were sent in the following day. Through the discussion in the Technical Committee, technical transfer from DINAMA to municipalities are properly conducted.
- Mr. Luis Roas, SAG and Ms. Stella Moyano, INIA from 23 October to 6 November visit under JCPP. Evaluation is needed.
- Collaborated workshop with JCPP scheme has been conducted. It should be evaluated.

2005.12

The training of a DINAMA technician is being carried out in Japan. The consultancy of two Chilean experts to DINAMA's laboratory was realized for organic analyses by chromatography. A workshop with the institutions involved in the project was carried out with the Chilean experts. Inter-calibration exercises among laboratories were executed with real samples. ➔

Targets and activities in the next term

2005.08

Technical transfer with Chile (coming of experts and visit from DINAMA's technicians to Chile). Working day on technical updating and discussion regarding laboratory analysis, previously to the inter-calibration exercise. Four weeks of inter-calibration exercises. Workshop on result presentation and discussion. Two up-date working days regarding GC- maintenance to be coordinated with the representative company.

2005.12

To finish pesticide analyses with the methodology developed by DINAMA, after the technical exchange executed through the Chilean experts' consultancy.

2006.02

Continue training in Japan and training of municipal laboratories by DINAMA.

➔ An assessing workshop was carried out for the obtained data. We started to implement SISILAB (laboratory information system) at the laboratory.

2006.02

Training under JCPP has been conducted and evaluation reports from both Chilean and DINAMA sides have been submitted. Training of municipal laboratories by DINAMA also successfully be conducted. DINAMA started and is conducting pesticide monitoring, though the capacity is limited.

Lessons learned

2005.08 (DINAMA): The few availability of input for analysis equipment at a national level has prevented from fulfilling the stipulated terms due to the time requested for the imports proceedings. A water quality evaluation report shall be carried out without the pesticide data that shall be attached subsequently.

2005.12 (DINAMA): In order to carry out the analyses in an adequate way, it is necessary to have two technicians exclusively for atomic absorption and two for chromatography. According to the Chilean experts' suggestions, it is necessary to improve the laboratory installations. Municipal laboratories have the technical conditions to organize inter-calibration exercises for all the institutions involved in the project, such as DINAMA's laboratory has been doing so far.

2005.12 (Canelones): Activities were properly developed in Canelones. Technical transfer, the inter-calibration, the training and the coordination are going ahead. A great expectation exists about development of the capacity for pesticide analysis at DINAMA laboratory and also in the possibility of a coordinated program on this particular environmental control aspect.

2006.02 (DINAMA): Since the capacity of DINAMA Laboratory is not enough to conduct all the required pesticide analysis for water samples and sediment samples. It is better to continue pesticide analysis focusing on important locations for water samples and sediment samples of monitoring point where pesticide has been detected.

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (19/17)

Progress of Activities for each Output

(***Output No.3.6****: Water quality information system is established*)

Monitoring Date/Evaluator: 2005.08.28/Sandra Castro; 2005.12.14/Magdalena Hill

Progress of activities														Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3		**2005.08** Difficulties at DINAMA and the rest of the Institutions have delayed the implementation of SISICA. We have identified the need of hiring the technician who developed the system in order to train SISICA's users in each Institution to start operating the system. **2005.10.04 Steering Committee Meeting** It is under implementation with the following schedule. Actual progress should be checked. • Week from Sep. 26: IMF. Completed. • Week from Oct. 3: IML. Completed. • Week from Oct. 10: IMC • Week from Oct 17: IMSJ • Week from Oct.17-21: IMM • Week from Oct. 24: OSE • Week from Oct. 31: DNH • Week from Nov. 7: RENARE It should be studied whether SISILAB (Information Management System in the Laboratory) should be included in the integrated M/P of not. **2005.12** Training for using SISICA was carried out in all the institutions, except from RENARE and DNH. The institutions have not entered yet the data corresponding to the spring campaign, according to what was stated. Work in SISICA is done via web since the institutions do not have adequate computer equipment for its installation. ➔	**2005.08** Meetings with the Institutions were planned to organize training regarding SISICA's use and installation. Training shall be coordinated with an Institution per week, from the week of August 29 on, and it shall be carried out in each participating Institution. The installation manual shall be elaborated and handed out in each institution. **2005.12** During December and January SISICA training shall be finished. **2006.02** Promote use of SISICA in the relevant organizations.
	Actual	5	6	7	8	9	10	11	12	1	2	3			
• **DINAMA** promotes to develop SISICA in the relevant organizations, e.g. OSE, RENARE, IMM, IMC, IMSJ, IMF, IML. - **EQED** promotes to develop SISICA in IMM, OSE and RENARE and assists the installation of the system - **DINAMA** gives necessary training to IMC, IMSJ, IMF and IML, and to promote inputting monitoring data to SISICA DINAMA through Internet	P A			△			△	⟷		△		△			➔ **2006.02** Development of SISICA in IMM, OSE and RENARE is not yet completed. Effective utilization of SISICA DINAMA should be given priority. Training to promote imputing monitoring data to SISICA DINAMA through Internet has been conducted, but there still is difficulty in conducting the activities. Recognition of the necessity of the activities should be confirmed through the Steering Committee meeting.

Lessons learned

2005.08 (DINAMA): Even though DINAMA was in charge of centralizing the Pilot Project's data of all the institutions and of inserting them in SISICA, it still has to enter IMM data due to some discrepancies in the station names, etc., which requires a better coordination with such institution regarding this aspect to avoid slowing the process down.

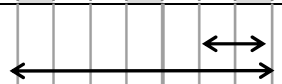
2005.12 (DINAMA): A follow up shall be carried out by DINAMA to foster the effective use of SISICA on the different institutions trained on its use.

2005.12 (Canelones): The activities were properly developed and Canelones Municipality got the promotion, the developing instruction and our data are incorporated to SISICA nowadays. It would be good to know what happened at the other relevant Institutions to have a whole vision of the planed and implemented system.

Progress of Activities for each Output

(***Output No.3.7****: Water quality data are properly evaluated*)

Monitoring Date/Evaluator: 2005.08.28/Sandra Castro; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** It still cannot be carried out in a sustainable way due to a lack of human resources, work overload of the technicians, unavailability of complete SISICA (cartography problems). **2005.10.04 Steering Committee Meeting** Version up of SISICA is presently in progress (amend of the design for the part of GIS from "Java Applet with GEO tools" to "MapServer" with the schedule to be completed by the end of November. There is a technical lack in the evaluation of the water quality data and technical transfer is needed. Introduction of Japanese practice, e.g. annual water quality report by Tokyo Metropolitan Office, and application in Uruguay in a workshop should be considered in the Sixth Field Work. Water Quality Department, DINAMA prepared a draft of Evaluation Report and scheduled to report it in the Technical Meeting on Oct. 10, though the Environmental Quality Evaluation Division has not approved the contents and it is presently under the review. **2006.02** Evaluation of monitoring results is in progress. Evaluation report, as an annual report, will be published by web through "Annual Report" menu of SISICA DINAMA by the beginning of February.	**2005.08** Entry of new technicians to the Water Quality Department. Adequate handling of SISICA. **2005.10.04 Steering Committee Meeting** There was an increase of one person in Water Quality Department in DINAMA and presently conducting with the four-person structure. **2006.02** Water Quality Department of DINAMA will continue process and interpretation of water quality data in the Santa Lucia River Basin.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** process and interprets water quality data in a sustainable manner -	P A													
Lessons learned **2005.08 (Canelones)**: Regarding data process and interpretation the Municipalities and other agencies should participate in order to combine criteria. **2005.12 (Canelones)**: We would like to know more about this output and also get the available information to improve the work on each involved Institution in the wider coordination basis. **2006.02 (DINAMA)**: There were requests from many agencies on the technical training for the evaluation of water and it should be taken into consideration for the determination of activities in the Seventh Field Work from July to September 2006.														

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (21/17)

Progress of Activities for each Output

(***Output No.3.8****: Water Quality Annual Report is publicized*)

Monitoring Date/Evaluator: 2005.08.28/Sandra Castro; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** A meeting was held among the several divisions of DINAMA and although the need to approach this task is acknowledged, it is necessary that the Institution's new authorities state their position regarding the priority given to this aspect. A series of environmental indicators have been elaborated and shall be an input for the elaboration of the Annual Environmental Report. **2005.10.04 Steering Committee Meeting** • Environmental Annual Report including the sectors besides the water quality would not be targeted since the coordination between the Divisions are difficult. • With regard to the annual water quality report, Environmental Management Division is in charge for the pollution source management and the update information on industrial wastewater (Tannery, Dairy, Wool Washing and Meat Processing) would be prepared by the end of this year. Water Quality Annual Report would be prepared by the end of March 2006. **2006.02** Evaluation Report of water quality monitoring shall be published as an annual report through "Annual Report" menu of SISICA DINAMA by the beginning of February. DINAMA should continue improvement of the annual report for publishing in a book.	**2005.08** This aspect shall be discussed in a meeting with the authorities. To finish the calculation, report and record of the environmental indicators within the framework of the Project with IDRC/CIID – Canada. **2006.02** DINAMA continues improvement of the annual report and publish it as a book version.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** annually publicizes Water Quality Annual Report, interpreting and compiling diverse information like DINAMA's policy/strategies, water quality data, and others. -	P A										△	△		
Lessons learned **2005.12 (Canelones)**: We would like to know about this planed output and offer the effort to work as coordinated as it is possible to get better results on wider basis. **2006.02 (DINAMA)**:														

Progress of Activities for each Output

(***Output No.4.1****: Awareness of stakeholders for water quality is raised*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** • Periodical publication shall be maintained. It was not possible to prepare the corresponding drafts. • The web is not defined, although it has been decided that due to human resources difficulties at DINAMA an independent web shall be carried out and the links with DINAMA's web shall be established afterwards. **2005.10.04 Steering Committee Meeting** Issuance of News Letter is stagnated. • Consider publication in PDF version if the printing is difficult. • The delay is due to the work to cover all the DINAMA projects not only the JICA Project. • What could be conducted by the present two staff of Publication Group should be considered. • JICA Project Page is under the preparation separately from DINAMA page. The contents are presently under review upon the comments by DINAMA. **2005.12** Regarding newsletters, problems related to the removal and the unavailability of materials prevented us from publishing the third newsletter. The sections of monitoring and analysis, and watercourse classifications were completed. An amendment of MVOTMA's Web information system is being processed; therefore, the project's page should be loaded during December as an independent page. ➔	**2005.08** To define the web contents and air it on the next trimester. To carry out the publication in September 2005. **2005.12** During December all the necessary actions shall be done so the technicians have all the necessary elements available to carry out editing works regarding newsletters. During December the web page shall be hung on DINAMA's Server. A name identifying the project as an independent web page shall be defined. **2006.02** News Letter will be published in March-April. ➔ **2006.02** DINAMA could issue News Letters two times after the start of the JICA Project. The present capacity of the publishing group of DINAMA is not enough to publish News Letters quarterly. JICA Project web page is available at http://www.oholeguy.com/jica/. Link will be given at DINAMA page.
		5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** issues in a sustainable manner News Letter on water quality and deliver it to stakeholders. - **WQMC** decides the general contents of News Letter - **Publication group of DINAMA** prepares a draft - **DINAMA** issues the News Letter quarterly	P A	△				△ ---						△		
• **DINAMA** maintains a web page on water quality management - **WQMC** decides the necessary update of the web page - Person in charge of web site maintains	P A	←-	-	-	-	-	-	-	-	-	-	-→		

Lessons learned

2005.12 (Canelones): We would like to know about these tasks. We offer our effort to strengthen the procedures in the wider coordination.

2006.02 (DINAMA): Increase of the personnel in publishing group of DINAMA to issue News Letters quarterly or reduction of publishing frequency in the case of no increase in staff should be considered.

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (23/17)

Progress of Activities for each Output

(***Output No.4.1****: Awareness of stakeholders for water quality is raised*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** The educational materials have been handed out in the departments of Canelones (west area), Florida and Lavalleja. The handing out strategy in Montevideo has not been defined. The Municipality of Canelones proposes to distribute all the material handled in the Project among private schools, to reach the whole universe of students in the basin. It also proposes to include the film in the web. This is considered in the web design of the project. **2005.10.04 Steering Committee Meeting** • IMM: mid October • IMC: Workshop has taken place at two location in the Santa Lucia catchment. • IMSJ: Workshop and evaluation implemented. • IMF: Workshop was implemented at two locations. • IML: Workshop was implemented at one location. Private schools could not be covered by the already prepared numbers. It should be studied that additional copies of video, manuals and Kamishibais are needed. Inclusion of the film in the web is presently under consideration. **2005.12** The corresponding materials were handed out to schools in San José Department and the related activities were carried out. ➔	**2005.08** All the activities planned in the Florida Forum regarding Industrial effluent treatment shall be carried out. During the week of August 8 the handing out shall be carried out in San José. **2005.12** On the first month of 2006, the delivery of the material in Montevideo and some areas of Canelones where the delivery has not been finished yet should be concluded. Besides, the training activities for teachers should be carried out in those places.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **National and Local Educational Authorities**, **Florida Water Quality Forum** and **DINAMA** continue dissemination and education for water quality in Florida Municipality in a sustainable manner.														
- **DINAMA**, **National and Local Educational Authorities**, and **JICA** hold Education Material Delivery Ceremony.	P A	△ △												
- **Florida Water Quality Forum** holds Workshop on Industrial Wastewater Treatment in Fray Marcos (August 5, 2005).	P A				△ Not realized.									
- **Florida Water Quality Forum** holds a workshop on Effluents of *Tambos* (small scale milk producers) (October 7, 2005)	P A						△ Not realized.							
- **Florida Water Quality Forum** holds Workshop for presentation of paper work related to water management by secondary or institute students	P A			←····→ Not realized.										
- Workshop with the participation of **primary education director and teachers of Florida** to design the scheme to introduce education materials of water quality management in the primary education curriculum is held (March 10, 2005).	P A	△ △												
- **National and Local Educational Authorities** carry out test of implementation of the design by teachers in the class room	P A			△ Not realized.										➔ **2006.02** Activities of Florida Water Quality Forum proposed after June 2005 have not been conducted.

Lessons learned

2005.12 (Canelones): Materials will be handed in other Canelones areas from next March 2006. We hope Steering Committee will take a decision on private schools during the next session. The film was properly provided but it was not able to be input in the Municipality web due to technical limitations.

2006.02 (DINAMA):

Progress of Activities for each Output

(***Output No.4.2****: A system for the formulation of agreement on water quality management is created and public participation is promoted.*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena HIll

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** We worked in the department of Lavalleja to define strategies for the Forum's implementation. **2005.10.04 Steering Committee Meeting** • Florida Water Quality Forum reviewed the action plan under the new organization of Florida. Activities are ongoing. • Lavalleja Water Quality Forum has been established by the assistance of DINAMA and Florida Water Quality forum. **2005.12** The activities related to Florida and Lavalleja Forums were continued. The agendas were redesigned to define new activities. Lavalleja Forum was installed on September 30th and it already has an agenda. **2006.02** Cleaning of Tomas Gonzalez River has been stopped since it was cleaned by machine and no alternative plan has been proposed. Lavalleja Water Quality Forum has officially been launched and is continuing meetings. DINAMA and Florida WQF assisted in the launching of Lavalleja WQF.	**2005.08** --- **2005.12** To keep the Forums of Florida and Lavalleja in operation. To plan the formation of San José and Canelones Forums. To include IMM on the running process. **2006.02** Florida WQF should re-program their activities. Lavalleja WQF shall continue activities. Establishment of WQF in Canelones and San José shall be promoted. Environmental Group of Montevideo shall be given the function of Montevideo WQF.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **Florida Water Quality Forum** and **DINAMA** continue leading and implementing public participation campaigns. - **Florida Water Quality Forum** and **DINAMA** hold World Water Day Commemoration - **Florida Water Quality Forum** and **DINAMA** hold Environment Day Commemoration - **Florida Water Quality Forum** and **DINAMA** hold Campaign on Cleaning of Tomas Gonzalez River	P △ A △ P △ A △ P △ A						Not realized.							
• **DINAMA** and **Florida Water Quality Forum** assist the establishment of Water Quality Forums in other Municipalities and the federation of Water Quality Forum	P ↔ A ↔			↔					↔					
• **Other Municipalities** of the Project's Area establishes their own Water Quality Forum - **Municipality of Lavalleja** establishes and operates its own Water Quality Forum and conduct activities	P ↔△ A ↔△													

Lessons learned

2005.12 (Canelones): Canelones Forum was not considered for implementation until now. The issue has to be discussed at the Steering Committee next session to establish particular objectives and goals in coordination with other relevant Institutions.

Annex 6.2.1 Evaluation Sheet for the Evaluation in Phase III (25/17)

Progress of Activities for each Output

(***Output No.4.3****: Awareness for water quality management in the relevant organizations is raised.*)

Monitoring Date/Evaluator: 2005.08.06/Magdalena Hill; 2005.12.14/Magdalena Hill

Progress of activities													Concrete activities and problems in this term	Targets and activities in the next term
Activities	Planed	5	6	7	8	9	10	11	12	1	2	3	**2005.08** A unit regarding education and public participation has not been made official but we are working jointly with all the staff related to this issue. This coordinated work improved the results of the education and public participation projects. **2005.10.04 Steering Committee Meeting** Environmental Education Group of DINAMA has been much strengthened with the appointment of Ms. Luján Jara. Activities are very active **2005.12** Even though this education and participation group has not been formalized yet, the group of technicians participating in it has been identified. This group is developing a national policy on environmental education. **2006.02** Internal Unit in DINAMA for education and public participation is actively working for the delivery of education material, review of the action plan of Module No.4 in the coming period, etc.	**2005.08** --- **2005.12** To follow the development of an education and participation unit in DINAMA. To contribute to the inclusion of water resource protection as one of the objectives of the national policy on environmental education. **2006.02** Internal Unit in DINAMA for education and public participation shall continue activities.
	Actual	5	6	7	8	9	10	11	12	1	2	3		
• **DINAMA** organize an internal unit to be responsible for education and public participation activities	P △ A △													
• **DINAMA** plays a leading role to raise awareness on water quality under the collaboration with relevant organizations. -	P ←---- A ←----													

Lessons learned

2005.12 (Canelones): The implementation of the unit will be very useful for the Project. Canelones offers the effort to implement the procedures in coordination with all the relevant agencies. We have to develop educational tools for the improvement of Water Quality. They are valuable elements to take into consideration.


JICA