

PROJECT DOCUMENT

1. Identification

Project Name:	Sustainable Management of the Water Resources of the la Plata Basin with respect to the Effects of Climate Variability and Change
Duration:	5 years
Implementing Agency:	UNEP
Local Executing Agency:	Intergovernmental Coordinating Committee (CIC) for the la Plata Basin in cooperation with the following national institutions: Argentina: Ministerio de Planificación Federal, Inversión Pública y Servicios, Secretaría de Obras Públicas, Subsecretaría de Recursos Hídricos de la Nación. Bolivia: Ministerio del Agua, Dirección de Cuencas hídricas. Brazil: Ministério do Meio Ambiente, Secretaria de Recursos Hídricos. Paraguay: Secretaría del Ambiente (SEAM), Dirección General de Protección y Conservación de Recursos Hídricos. Uruguay: Ministerio de Transporte y Obras Públicas (MTOPE), Dirección Nacional de Hidrografía (DNH).
Regional Executing Agency:	OAS
Requesting Countries:	Argentina, Bolivia, Brazil, Paraguay and Uruguay
Eligibility:	Under paragraph 9(b) of the Instrument
GEF Focal Area:	International waters and Climate Change Adaptation with relevance to crosscutting issues of Land Degradation and Biodiversity.
GEF Operating Program:	OP#9 and SPA

2. Summary

The la Plata River Basin, extending over 3.1 million km², includes the south of Brazil, the southeast of Bolivia, a large part of Uruguay, the whole of Paraguay and an extensive portion of the central and northern parts of Argentina. The three main river systems comprising the la Plata River are: the Paraguay River, with an annual average flow of 3,800 m³/s (at Pilcomayo Harbor); the Paraná River, with an annual average flow of 17,100 m³/s (at Corrientes); and the Uruguay River, with an annual average flow of 4,500 m³/s. These latter two rivers come together to form the la Plata River, draining to the southwest Atlantic Ocean, with an average output of 25,000 m³/s. This outflow enriches the waters of this Large Marine Ecosystem, creating conditions conducive to a great variety of marine species and coastal ecosystems. A large wetland corridor links the Pantanal (in the headwaters of the Paraguay River) with the Delta del Parana, at its outlet to the la Plata River. This constitutes a surface drainage system with great biological diversity and productivity, intimately linked with its underlying groundwater systems, the Guaraní and Yrenda-Toba-Tarijeño Aquifers.

The mineral resources, forests and fertile soils of the Basin make the la Plata Basin one of the most important regions for economic development in South America. It is an area of concentrated population, exceeding 100,000,000 people, living in 57 cities, each with more than 100,000 inhabitants—including the four capital cities: Buenos Aires, Brasília, Asunción, and Montevideo—and generating more than 70% of the GDP of these countries. This level of economic development demands efficient and reliable communications and multimodal transport systems, of which the waterways constitute a fundamental element. Water-borne transportation on the Paraguay-Paraná Waterway increased from 70 thousand tons at the beginning of the 1990s to 13 million tons during 2004, with significantly lower costs compared with other alternative means of transport. River-borne transport is expected to reach 50 million tons in the near future. Additionally, the hydrologic system sustains this intensive economic production by providing more than 92,000 MV of hydroelectric potential, supplied by more than 150 power units, 72 of which have actual installed power generation capacities of over 10 MV. Three hydroelectric power units are binational: Itaipú (12,600 MW) and Yacyretá (3,100 MW) on the Paraná River, and Salto Grande (1,890 MW) on the Uruguay River. During the last 25 years, the rhythm and duration of alternate drought and flood periods have notably increased with significant impacts on people, country economies and the environment in general. These quantitative changes, in addition to the consequent quality variations, are mainly associated with the hydrologic effects of climate variability and change, upon which the anthropogenic consequences of changes in land use, settlement patterns, urbanization and industrial and agricultural development are superimposed.

In 1967, during the First Meeting of Ministers of Foreign Affairs of the countries of the la Plata Basin, the governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay established the Intergovernmental Coordinating Committee (CIC) as the coordinating mechanism of the Basin. Two years later, in 1969, they signed the la Plata Basin Treaty, the main legal instrument of the Basin. The CIC was created as the permanent Basin organisation “*in charge of the promotion, coordination, and follow up of multinational integrating development programs in the la Plata Basin, with the technical and financing assistance of international agencies and to execute the decisions approved the Ministries of Foreign Affairs.*”

The preparation of an integrated water resources management program in relation to climate change was agreed in 2001 during the IV Inter-American Water Management Dialogue. At that meeting, the President of the CIC, Foreign Affairs representatives of the Basin countries, experts, technicians, and project personnel from the five countries, with GEF support, agreed on the need to develop a Framework Program for the la Plata Basin in order to: “i) coordinate common interest projects for the la Plata Basin countries; ii) carry out projects in water resources management and select concrete prioritized actions; iii) highlight the importance of flood and drought phenomena in the Basin, among others; iv) define sustainable hydrology; and v) promote

regional initiatives identified as priorities by two or more countries within the framework of the la Plata Treaty....” To this end, the necessary technical management capacity in the la Plata Basin was approved by the Meeting of Foreign Affairs Ministers in Montevideo during December 2001, with the appointment of two representatives from each country—a political representative with full authority and a technical representative, the latter forming the Projects Unit of the la Plata Basin system and charged with the preparation of an **Action Plan** for the Basin. This Action Plan, approved by the CIC during 2003, has guided the preparation of the **Framework Strategic Action Program** (FSAP), itself based upon the common Vision of the five countries, and defining strategies to guide development in the Basin during the short (5 years), medium (10 years) and long term (more than 15 years). Within this context, the CIC requested GEF PDF Block A support to identify the priority transboundary program elements and GEF PDF Block B support to prepare the FSAP. The five countries catalyzed their own funds and agreed on cooperation efforts with the WMO and FONPLATA to assist in undertaking these efforts.

The overall **objective** of the proposed project is *to assist the governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay, within the framework of the CIC as the agreed intergovernmental organization set forth for this purpose in the Treaty of the la Plata Basin, in managing the shared water resources of the la Plata Basin in an integrated manner, focusing on environmentally sustainable economic and social development, as well as adaptation planning and assessment, in view of the effects of climate variability and change on the hydrology of the Basin.* The **outcome** of the Strategic Action Program will be such that the governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay will coordinate actions and investments in the la Plata Basin to achieve sustainable utilization of its water resources, adapting to climate variability and change, mitigating their negative impacts and capitalizing on the opportunities that such variability and change may provide. This Basin-wide project provides the context for, and linkages between, ongoing GEF-supported efforts within portions of the la Plata Basin. This project also promotes synergies amongst GEF focal areas, increasing the resilience and adaptive capacity of the Plata basin in preparing a basin-wide structured menu of concerted adaptation measures in response to a sound and rigorous vulnerability and adaptation assessment. These multiple approaches reflect the complexities of the Basin, the regional distribution of priority concerns, and the diversity of ecosystems, while recognizing the unifying role of the River and the connectivity of the upstream and downstream portions of the hydrologic system.

The **principal outputs** of this proposed project will include the formulation of a detailed TDA and SAP including a comprehensive structured programme of actions to address local adaptation needs but generating global environment benefits, and strengthening of an institutional and legal framework and technical capacity (enabling conditions) necessary for the long-term implementation of the SAP, taking into account the implementation plans and financing strategies agreed by the Basin countries. This project will thus ensure strengthened management of shared water resources through the development of predictive and decision support tools for climate induced alterations.

Accordingly, the project has three **Components**: (i) strengthening basin-wide cooperation capacity for integrated hydro-climate management; (ii) Strategic Action Program formulation; and (iii) adaptation to climate change. Detailed information of each Component and its associated tasks is presented in the Core Document.

Costs and Financing (see detail budget in section 7)	
GEF:	
- SAP formulation project	US \$ 10,730,000
- PDF A:	(US \$ 25,000)
- PDF B:	(US \$ 700,000)
Co-financing	US \$ 16,222,150
Government and other financing sources	US \$ 34,339,812
Total Project Cost:	US \$ 61,291,962
Associated Financing (see details in Annex 7)	US \$ 126,060,000

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List of Acronyms

ANA: National Water Agency, Brazil	INEMET/MAPA: National Meteorological Institute, Brazil
CAF: Andean Development Corporation	INPE: National Space Research Institute, Brazil
CARP: Commission for the Administration of the la Plata River, Argentina-Uruguay	INTA: National Institute for Agricultural Technology, Argentina
CARU: Commission for the Administration of the Uruguay River, Argentina-Uruguay	IPCC: Intergovernmental Panel for Climate Change
CDM-MDL: Clean Development Mechanisms	IPH: Hydraulic Research Institute, UFRS, Brazil
CdP: la Plata River Basin	ISARM-Américas: Management of Shared Transboundary Aquifer Resources Programme
CIC: Intergovernmental Coordinating Committee for the la Plata Basin countries	ISP: Inter-American Strategy for the Promotion of Public Participation in Sustainable Development
CIH: Intergovernmental Committee for the Paraguay-Paraná Waterway.	ITAIPU: Itaipu Binational, Brazil-Paraguay.
CIMA: Meteorological and Atmospheric Research Centre, Argentina	LART: Regional Laboratory for Analysis and Telemetry, Argentina
COMIBOL: Mining Commission, Bolivia	MDS: Ministry for Sustainable Development, Bolivia
CONICET: National Council of Science and Technology, Argentina	MERCOSUR: Southern Common Market
CPTEC/INPE/MMA: Weather Forecast and Climate Studies Centre, Brasilia	MTOP: Ministry of Transport and Public Works, Uruguay
CRAS-INA: Regional Groundwater Centre, Argentina	NPU: National Project Units
DNH: National Hydrographic Directorate, Uruguay	OAS: Organization of American States
DRENARE: Renewable Resources Directorate, Uruguay	OSC: Civil Stakeholders Organization
DSA: Agriculture Soils Directorate, Uruguay	OTCA: Amazonian Cooperation Treaty Organization
DSD: Department of Sustainable Development - OAS	PK: Kyoto Protocol
EBY: Yacyretá Binational Entity, Argentina-Uruguay	SAP: Strategic Action Program
EMBRAPA: Brazilian Agricultural Research Enterprise, Brazil	SAYTT: Yrendá-Toba-Tarijeño Aquifer System
FICH: Hydro Sciences Engineering Faculty, Littoral National University, Argentina	SEAM: Environment Secretariat, Paraguay
FONPLATA: Fund for the Development of the la Plata Basin.	SEDEC: National Civil Defense Secretariat, Brazil
FREPLATA: Environmental Protection Project of the la Plata River and its Maritime Front.	SENAMHI: National Meteorological and Hydrological Service, Bolivia
FSAP: Framework Strategic Action Programme	SENSASA: National Sanitary and Quality Agro-foods Service, Argentina
GEF: Global Environment Facility	SIFEM: Federal National Emergency System, Argentina
GHG: Green house gas emissions	SMNs: National Meteorological Systems
GIWA: Global International Waters Assessment	TDA: Transboundary Diagnostic Analysis
IBAMA: Brazilian Environment and Renewable Natural Resources Institute, Brazil	UBA: University of Buenos Aires, Argentina
IMFIA: Institute of Fluid Mechanics and Environmental Engineering, Uruguay	UDELAR: University of the Republic, Uruguay
INA: National Water Institute, Argentina	UFRGS: Federal University of Río Grande do Sul, Brazil
INIA: Agricultural Research Institute, Uruguay	UFPR: Federal University of Paraná, Brazil
IHP: International Hydrologic Program	UNA: National University of Asunción, Paraguay
	UNEP: United Nations Environment Programme
	UNFCCC: United Nations Framework Convention on Climate Change
	USP: University of São Paulo, Brazil
	WMO: World Meteorological Organization
	WSSD: World Summit on Sustainable Development

TABLE OF CONTENTS

1. Program background and context	2
1.1. GEF Programming Context	2
1.2 Country Programming Context	2
1.3 Global Importance of the la Plata Basin	4
1.4 Threats and Barriers Identified during Project Development	6
1.5 The Effects of Scale	10
1.6 The Over-riding Impact of Climate Change and Variability	12
2. Rationale and Project Objectives	13
2.1 Rationale for the Project	13
2.2 Program objectives	14
3. Components/Activities and Expected Results	16
4. Risk, Sustainability and Replicability	30
5. Project Implementation Arrangements	32
6. Relation with other Projects (GEF and others)	35
7. Project Financing and Incremental Costs	36
8. Monitoring, Evaluation and Dissemination	41

ANNEXES

- Annex A: Incremental cost analysis
- Annex B: Project Logical Framework
- Annex C: STAP Review and Response
- Annex D: Public Participation Plan
- Annex E: Monitoring & Evaluation Plan
- Annex F: Endorsement Letters
- Annex G: Co-financing Commitment Letters

SUPPLEMENTAL MATERIALS

(see http://www.cicplata.org/marco/?id=mc_etp1)

- Annex 1: Framework Program (on the website)
- Annex 2: Map of the la Plata Basin
- Annex 3: Macro-Transboundary Diagnostic Macro-Analysis: critical transboundary issues, causal chain, actions and lack of information
- Annex 4: Development Program Structure Scheme
- Annex 5: Critical transboundary issues and Phase I Components in Relation to the Program
- Annex 6: FONPLATA financed projects list (associated with the Framework Program)
- Annex 7: Financing for associated activities
- Annex 8A: Priority Projects and Pilot Demonstration Projects-alias “Feasibility” projects -
Summaries
- Annex 8B: ITAIPU *Cultivando Agua Boa* Demonstration project – **Official Document**
- Annex 8C: Priority Projects and Pilot Demonstration Projects - **Detailed information**
- Annex 9: Preliminary Budget in UNEP format

1. Program background and context

1.1. GEF Program context

The present Framework Program for the Integrated Management of the Water Resources of the la Plata Basin was prepared, utilizing PDF Block B funds allocated under the auspices of GEF International Waters Operational Program N° 9 for Integrated Water and Land Management. This Framework Program includes priority interventions focused on the application of appropriate land distribution and water resources strategies and policies, and reformulated sectoral activities, consistent with the principles of sustainable development. Considering the large area extent of the la Plata Basin, the main problems facing the management and utilization of its water resources are intimately connected with the causes and effects of climate variability and change. This interrelationship also influences concerns relating to Sustainable Land Management and Biodiversity Protection that remain as cross-cutting issues; however, unlike in the Amazon River Basin situated immediately north of the la Plata Basin, the influences of climate change and variability dominate those of the humans on the landscape.¹

The five countries which form the la Plata Basin—Argentina, Bolivia, Brazil, Paraguay and Uruguay—have ratified the following United Nations Conventions linked to the present program: (i) the Framework Convention on Climate Change and its main instrument, the Kyoto Protocol; (ii) the Convention on Biodiversity; (iii) the Convention on Combating Desertification; and (iv) the Ramsar Convention on wetlands protection. The five countries have presented their respective, first national communications and inventories as agreed under the United Nations Framework Convention on Climate Change (UNFCCC). These reports address vulnerability to climate change, define future climate scenarios and propose the adoption of necessary adaptation measures. In addition, the five Basin countries have published their initial National Communications (NCs) in response to the UNFCCC requirements; Paraguay, Argentina and Brazil are completing their Second National Communications (SNCs) which recommend implementation of programs to prepare policies and strategies for identifying measures and responses to climatic variability and change. In particular, these SNCs recommend capacity building and institutional strengthening measures necessary to integrate climate change concerns into regional planning scenarios, which activities form the nexus with this project.

The agreements (policies, programs and plans) concluded in the context of the la Plata Basin include development and implementation of the necessary tools to attain the millennium development goals by 2015, as agreed by the World Summit on Sustainable Development (WSSD) in 2002. In terms of these goals, water resources are identified as key components for economic development and poverty reduction as well as for the rational use of shared natural resources. In relation to WSSD Objective 7, environmental sustainability measures were prioritized by resource management, including contamination control and water conservation, incorporating the principles of sustainable development to improve water resources governance. These priorities coincide with those of the GEF International Waters Focal Area.

1.2. Country Programs Context

In 1967, during the First Meeting of Ministers of Foreign Affairs of the countries of the la Plata Basin, the governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay established the

¹ See, for example, Ferreira, Rosana Nieto, Rickenbach, Thomas M., Herdies, Dirceu L., Carvalho, Leila M.V., “**Variability of South American Convective Cloud Systems and Tropospheric Circulation during January–March 1998 and 1999**,” *Monthly Weather Review*, 131(5):961-973. ISSN: 1520-0493.

Intergovernmental Coordinating Commission (CIC) as the coordinating organisation; and, two years later, in 1969, signed the la Plata Basin Treaty, the main legal instrument of the Basin. The CIC was created as the permanent Basin organisation “*in charge of the promotion, coordination, and follow up of multinational integrating development programs in the la Plata Basin, with the technical and financing assistance of international agencies and to execute the decisions approved the Ministries of Foreign Affairs.*” Within the Treaty, a series of complementary agreements created different specialized bodies that have been designed with specific competencies in the Basin, including FONPLATA, a financing agency, and the Intergovernmental Committee for the Paraguay-Parana Waterway (CIH), an inter-modal transportation agency; technical entities, including the Unit for Projects; the CIC Commission with its political and technical representation; and the Office of the Secretary General. The Treaty also allows for independent binational or trinational agreements to focus on specific issues, creating numerous other organisations and programs. This institutional framework for regional integration is reaffirmed by the Asuncion Treaty, which created the MERCOSUR in 1995, as an incentive for intraregional and international trade for the five countries.

Since its creation, CIC has concentrated on carrying out projects, studies, programs and works of mutual interest related to hydrology, natural resources management, transportation and navigation, soils and energy. The comprehensive study of the natural resources of the la Plata Basin, carried out by the OAS during the 1970s, identified critical environmental zones, such as the Pilcomayo and Bermejo sub-basins—with the highest erosion and sediment transport rates measured in the world, and the Upper Paraguay-Pantanal sub-basin—with its wetland ecosystem and key role in water flow regulation in the whole la Plata Basin.

The preparation of an integrated water resources management program in relation to climate change and variability was agreed in 2001 during the IV Inter-American Dialogue on Water Management. At that meeting, the President of the CIC, Foreign Affairs representatives of the Basin countries, experts, technicians, and GEF project personnel from the five countries, with GEF support, agreed on the need to develop a Framework Program for the la Plata Basin in order to: “i) coordinate common interest projects for the la Plata Basin countries; ii) carry out projects in water resources management and select concrete prioritized actions; iii) highlight the importance of flood and drought phenomena in the Basin, among others; iv) define sustainable hydrology; and v) promote regional initiatives identified as priorities by two or more countries within the framework of the la Plata Treaty....” To this end, the Meeting of Foreign Affairs Ministers in Montevideo during December 2001 amended the staff schedule of the CIC by adding a technical representative to the then existing political representative from each country—the technical representatives forming the Projects Unit of the la Plata Basin system were charged with the preparation of an Action Plan for the Basin. The **Action Plan** for the la Plata Basin, approved by the CIC during 2003, identified the main topics of common interest for the regional development of the la Plata Basin:² (i) capacity building on water resources and management to reduce flood and drought vulnerability; (ii) advancing integrated water and soil management; (iii) strengthening CIC to enhance regional integration through the existing projects identified in the Basin and preparation of a **Framework Strategic Action Program (FSAP)** for development action; (iv) implementing a “Digital Map” with updated Basin information, a “Regional Database” and updated “Documentation Center” within the framework of a decision support system the CIC General Secretariat; (v) promoting environmental preservation through environmental mechanisms compatible with the Basin ecosystems and public participation in environmental management; (vi) harmonizing policy integration among the CIC member states; and (vii) promoting education and capacity building on common issues.

² CIC No. 2/02-528

The preparation of the FSAP was based upon the common Vision of the five countries, defining strategies to guide development in the Basin during the short (5 years), medium (10 years) and long (more than 15 years) terms. Within this context, the CIC requested GEF PDF Block A support to identify the priority transboundary program elements, and GEF PDF Block B support to prepare the FSAP project. The five countries catalyzed their own funds and agreed on cooperation efforts with the WMO and FONPLATA to assist in undertaking these efforts.

1.3. Global importance of the la Plata Basin

The la Plata River Basin, extending over some 3.1 million km², is one of the largest river basins in the world. The Basin drains approximately one-fifth of the South American continent. It includes almost all of the southern part of Brazil, the south-eastern part of Bolivia, a large part of Uruguay, the whole of Paraguay, and an extensive portion of the central and northern parts of Argentina, as shown on the Map in Annex 2. Water and nutrients from the central regions of South America discharge through the la Plata River to the Southwest Atlantic Large Marine Ecosystem (LME). The importance of the Basin and its global priority has been highlighted in global studies such as the GEF/GIWA Project.³

The Basin is comprised of three large river systems; namely, the Paraná River, the Paraguay River, and the Uruguay River. The Paraguay River has an average annual flow of 3,800 m³/s (at Pilcomayo Harbor), the Parana River has an average annual flow of 17,100 m³/s (at Corrientes) and the Uruguay River has an average annual flow of 4,500 m³/s. These last two rivers come together to form the la Plata River, draining to the Atlantic Ocean, with an average output of 25,000 m³/s.

A large wetland corridor links the Pantanal (in the headwaters of the Paraguay River) with the Delta del Parana, at its outlet to the la Plata River. This system of interconnected wetlands is essential to the existence of a high biological diversity and productivity, foremost characteristic of the la Plata Basin.

The availability of large volumes of groundwater demands an integrated approach to the management of surface and groundwater in the Basin, while specific measures and management strategies are required for the management of groundwater aquifer systems. Important groundwater systems include: most of the Guaraní Aquifer System (1,190,000 km² in extent), one of the largest continental groundwater reservoirs in the world comprised of confined deep groundwater bodies,⁴ and the Yrenda-Toba-Tarijeño (SAYTT) Aquifer System, entirely contained within the la Plata Basin in the semiarid *Chaco* of Argentina, Bolivia and Paraguay. Climate change scenarios show an increasing process of desertification within this region, which, when combined with high poverty index values and the presence of indigenous communities, make the SAYTT a top priority for the integrated surface-groundwater management.

A published review by the World Resources Institute defines the la Plata River system as one of the most important river basins in the world, having a great number, variety, and degree of endemism in fish species (in the Paraguay River sub-basin), and the highest numbers of native birds (the Parana River sub-basin).⁵

³ Global International Waters Assessment, GEF/UNEP/Kalmar University, Sweden.

⁴ A GEF Full Sized Project is currently under execution for the protection and sustainable development of this mega aquifer system.

⁵ Revenga, C., S. Murray, J. Abramovitz, y A. Hammond, "Cuencas del mundo," *Valor Ecológico y Vulnerabilidad*, World Resources Institute and Worldwatch Institute, Washington, DC, 1998, 205 pp.

Mineral resources, forests, and soil fertility make the la Plata Basin an attractive population region and favor economic development, sustaining 70% of the five countries GDP. Present populations exceed 100,000,000 people, with 57 cities having more than 100,000 inhabitants—including four capital cities: Buenos Aires, Brasilia, Asunción, and Montevideo. The Argentine, Brazilian and Uruguayan economies, with a strong agriculture and cattle component, include a significant level of industrial and service production, while Paraguay maintains an agriculture-based economy. Bolivia's economy is mainly based in mining, oil and gas. Nevertheless, agriculture represents an important source of income within the Bolivian part of the la Plata Basin.

This economic development demands communication and multimodal transportation systems, of which the hydrological systems are a fundamental component, interconnecting production, supply and consumption centers and harbors, from which products are exported to different countries. The City of Sao Paulo, one of the largest cities and industrial concentrations in the world, is located in the Basin headwaters, tributary to the Parana River. The extensive navigation system of the la Plata Basin is favored by regional commercial agreements. The Paraguay-Paraná Waterway increased the fluvial transport of goods from 700,000 tons at the beginning of 1990 to 13,000,000 tons in 2004, due to lower costs relative to alternative transport means. In the near future, this tonnage is expected to reach 50,000,000 tons.⁶

The important hydrological potential of the Basin, estimated at 92,000 MW, has justified the construction of more than 150 dams, 72 of which exceed 10 MW. Three dams are binational: Itaipú (12,600 MW) and Yacyretá (3,100 MW) located on the Paraná River, and Salto Grande (1,890 MW) on the Uruguay River. Of this hydrological potential, two-thirds is already used. These dams have not only led to significant social and economic benefits, but also have led to substantial changes in flows, sedimentation, water quality and species composition in these fluvial ecosystems—while providing the framework within which environmental restoration programs, such as the reforestation program of *Cultivando Agua Boa*,⁷ are being conducted. The slight improvements in runoff foreseen in the long term climate forecasts could offer great opportunities for a coordinated approach to dam management.

The la Plata Basin lies in a complex climate region. Climate, modified by short term events associated with the El Niño/La Niña periodicities exhibited as a consequence of the thermal oscillations of the Southern Oceans (ENSO), is a determining factor in this heterogenic hydrological system. The relatively scarce rainfalls and high evaporation levels define the arid and semiarid zones (*Gran Chaco Americano*) in the west of the Basin, while strong rainfalls and runoff, exacerbated in part due to deforestation, characterize the north-eastern zones. The great Pantanal wetland plays a key role in the storage of runoff produced by rainfall in the Alto Paraguay River subbasin, delaying for almost six months the maximum flows to the Parana River, thus minimizing downstream flooding.

The economic and social impacts of flooding are very important. Available data for the last 20 years show that the floods on the Parana River are more frequent, intense and long lasting. These changes in the hydrology of the Basin are certainly related to changing climate factors,⁸ which, in turn, are overlain by the constant advance of urbanization and changes in land use. Floods are a

⁶ Final Report, “*Consortio de Integración Hidroviario COINHI*,” CIH, 2005.

⁷ *Cultivando Agua Boa* is an integrated micro-basin management program implemented by ITAIPU Binational in the Upper Parana River Basin.

⁸ See Ferreira, Rosana Nieto, Rickenbach, Thomas M., Herdies, Dirceu L., Carvalho, Leila M.V., *op. cit.*

major factor in the transport of sediment in the Basin. The la Plata Basin has one of the highest recorded average sediment transport rates—of approximately 100 million tons/year in the Parana River (at Corrientes)—associated with soil loss and water quality deterioration, leading to navigation problems and problems of infrastructure maintenance. Most solids come from the Bermejo River basin, tributary to the Paraguay River, where measures to control human-induced erosion are being implemented under the auspices of a GEF IW project.⁹ In the Upper Paraguay-Pantanal, there are significant wetland conservation problems related to increases in sedimentation, and, in the *Gran Chaco*, soil degradation is the principal issue to be addressed through integrated land and water resources management projects being carried out with GEF support. In addition to these GEF-related initiatives, more than twenty institutions or agencies have been created with direct responsibility to carry out water resources use and management in the la Plata Basin.

1.4. Threats and Barriers Identified during Project Development

The GEF PDF-B supported activities executed between 2003 and 2005 have enabled the CIC, in cooperation with the la Plata Basin countries, to agree on a **Vision** for the Basin. In addition, these activities have allowed for the completion of a macro-diagnostic analysis of the Basin that identifies the main transboundary problems and their causes (**Macro-Transboundary Diagnostic Analysis**).¹⁰ These outputs, documented on the website of the CIC (www.cicplata.org), form the first comprehensive overview of this 3 million km² Basin, at the macro scale, of the 21st Century. Strong anthropogenic interventions have accelerated the natural dynamic of the Basin and resulted in severe environmental impacts, which dominate development efforts, increases social problems, and threatens the environmental sustainability of the Basin, with the consequent erosion of its physical and biological resources. The condition of the hydrological system was confirmed through a wide ranging participatory process.

The Macro-Transboundary Diagnostic Analysis identified nine risks facing the countries and communities of the la Plata Basin. Amongst the present, critical and emerging issues are:

- **Extreme hydrologic events linked to climate variability and change**, particularly in terms of the more frequent, longer and intense floods and extensive droughts, which periodically affect some Basin communities as a consequence of the El Nino/La Nina periodicities, with devastating social, economic and environmental effects. **“Gaps” in climatic data** and climate knowledge were identified with their consequent limitations on efficiently modelling climatic variability and mitigating climate change effects. Improvement in this forecasting capacity is very important in managing for climate change, identifying dangers and addressing vulnerabilities under new climate and hydrological scenarios. The addition of gases such as carbon dioxide to the atmosphere through forest fires and crop burns (slash and burn practices) must be included as an element contributing to climate change in the Basin.
- **Water quality degradation**, due to organic and chemical contaminants coming from mining and industrial activities without adequate treatment, and sewage water discharges and diffuse contamination mainly from agriculture activities with intensive agrochemical use, has the potential to reduce the utility of the waters of the la Plata Basin. Current development trends show an increasing pressure over the natural resources that demands a water quality monitoring system. In addition, lack of common or shared standards and instrumentation to

⁹ See *Strategic Action Program for the Binational Basin of the Bermejo River*, May 2000.

¹⁰ See details in Annex 3.

determine quality parameters, and limited control and monitoring networks in the five countries, have not allowed for a coherent and comprehensive water quality diagnostic. This diagnostic is required in order to better assess the causes and effects of transboundary environmental issues, and design strategies and identify measures to address them.

- **Sedimentation** affects navigable waterways and harbors, dams and reservoirs, degrades water quality, and leads to high maintenance costs. Sedimentation, arising from increasing human-induced erosion and from human-induced land degradation due to land use changes and deforestation, threatens not only the human use of the waters of the la Plata Basin but also its ecosystems.
- **Biodiversity alteration**, in particular in fluvial and coastal ecosystems including wetlands, results from habitat loss and fragmentation. In part, these alterations reflect human interferences in the hydrographic basin as well as longer-term and larger-scale climatic variations that affect the Basin.
- **Unsustainable management of fisheries resources**, due to overexploitation or lack of capture protection measures to limit incidental catches of nontarget species, has important ecological and economic consequences for the River and for the indigenous settlements and poorer (disadvantaged) population sectors dependent upon it for subsistence and livelihoods.
- **Unsustainable management of aquifers** in critical recharge and discharge zones has the potential to modify base flows in the River, and create further ecological modifications affecting human and natural uses of the aquatic systems of the la Plata Basin. Unsustainable abstraction of groundwater and the salination and contamination of groundwater resources can have similar impacts throughout the Basin, especially in the semi-arid *Chaco* (Argentina, Bolivia, and Paraguay.) Remediation of this unsustainable situation demands an integrated surface and ground water resource management approach to accomplish shared development goals, while maintaining the underlying structure and function of the aquatic ecosystems that, in their totality, comprise the la Plata Basin.
- **Conflicts and environmental impacts generated by water use for irrigated crops** have wide ranging impacts on downstream human uses as well as ecosystem wide ecological impacts. Without a shared vision, and the recognition of the la Plata Basin as a single hydrological resource, continued sectorally driven demands for water can impede the distribution and appreciation of the benefits to be derived from the system for humans and nature alike. Consequently, the capacity to engage and maintain stakeholder participation in the management of the system forms a major challenge to managing the land and water resources of the Basin in a sustainable manner, especially in the face of climate variability and change.
- **Lack of contingency plans to face disasters**, including hazards of anthropogenic origin such as those associated with dam safety, navigation, and the transportation of dangerous materials and contaminants as well as crises of natural origin such as floods and droughts, can exacerbate the consequences of such disasters on the human and ecosystem. Understanding the natural periodicity of hydrologic events, identifying potential changes in such periodicity, and planning for accident responses present opportunities to reduce the magnitude of negative impacts and effectively utilize the opportunities presented by increased runoff and availability of flows.

- **Unsafe water and environmental sanitation conditions** have effects on human and ecosystem health, produced as a result of contamination and deterioration of water quality. It is important to note the coincidence of urban development with insufficient sewage treatment and the increase in cyanobacteria, which can form toxic varieties. Cyanobacterial blooms are further aggravated by agricultural runoff, industrial discharges, and anthropogenic river flow modifications. Resolving this issue demands greater financial support for water and waste management, mainly from national sources, and has a great importance in terms of its transboundary aspects. Wastes, wastewater, and associated contamination arising from both point and nonpoint sources, or generated *in situ*, can be transported downstream to affect communities other than those generating the contaminants, with concomitant human and ecosystem impacts.

Underlying these risks, are eight barriers or impediments to change that potentially limit the effective response to these challenges by the Basin countries. The Macro-Transboundary Diagnostic Analysis, conducted during the PDF-B process, enabled the identification of the principle existing barriers to be overcome or mitigated. To overcome these barriers, it is necessary to consider not only the insufficiency of budgetary allocations by national institutions, which limit the implementation of the Action Plan, but also the necessity for an integrated Vision of the Basin. Both aspects are closely related to an understanding of the complete hydrological cycle—and, therefore, of its vulnerability to short term climate variability and long term climate changes, as well as to an understanding of the active stakeholder involvement in creating and maintaining demands for water in addition to the natural demands imposed by the ecosystem. The main factors and barriers identified in the Macro-Transboundary Diagnostic Analysis are:

- **Lack of framework plans to manage the diverse demands for shared resources** in the Basin is exacerbated by the fact that responsibility for various components of the system is distributed among different juridical structures in the federally and centrally governed Basin countries, and that such responsibilities are poorly coordinated. Consequently several initiatives and projects—including GEF-IW projects—have been and are being executed without a Basin-wide Framework, and in turn allow for the creation and/or existence of territorially-based entities to address specific issues. Current legislation does not consider the scientific linkages between climate, water and soil, so there are no harmonized regulations on water quality and land management, and only a weak pre-existing coordination capacity.
- **Weak institutions** and low levels of support for assigned competencies limit agency and societal responses to the identified challenges. The CIC has a remarkable planning, management and coordination structure, as defined in the Treaty of the la Plata Basin, but is limited by its weak technical attributes. The new statute (2002) affirmed both the institutional and technical role of the CIC in the Basin, and strengthened the countries' command over the decisions of CIC. However, the national organisations working on issues of common concern focus on national priorities, and have not used the CIC to its fullest potential to address those activities of a transboundary nature. This limits the ability of the CIC to develop and transfer knowledge within the Basin. Further, some asymmetries were identified in implementing an integrated management policy within the Basin as a whole, due to the diversity of national objectives and their differing legal and institutional frameworks. Consequently, management actions to address critical issues or subbasins occur without coordination. Project teams have little interaction, resulting in duplication of efforts and inefficiencies. Lack of organized stakeholder participation to support sustainable Basin water resources management is a common feature in the five countries. A Basin information network is being constructed by the CIC Secretariat, utilizing in part GEF-Block B funds and counterpart contributions from

FONPLATA and CONICET (Argentina), but it, by itself, is insufficient to redress the institutional weaknesses inherent in this Basin.

- **Lack of an integrated water resources management vision** reinforces sectoral biases, and scant information from existing meteorological stations in key regions of the Basin limits awareness of the connectivities inherent in the component waters of the la Plata Basin. A joint groundwater and surface water resource management strategy is needed to resolve development issues in critical (drought prone areas) zones with low water availability, at risk from diminishing availability of water due to climate change and variability. The protection and management of aquifers in the five countries is especially weak and disconnected from the protections offered to surface water resources. In this regard, GEF support for the strategic management of the Guaraní Aquifer System is facilitating a very interesting first experience in conjunctive management of linked surface and groundwater resources in the Basin.
- **Inappropriate land and soil use**, resulting from the expansion of the agricultural frontier, and encroachment of surrounding urban areas, has contributed to deforestation and soil erosion, with concomitant effects on the regional and global climate. Marginal and fragile zones have been converted to production due to exceptionally high international grain prices, increasing soil erosion. Soil losses result in the increased transport of particulates and their deposition in rivers, lakes and dams. This sedimentation of channels, waterways and harbors limits the navigability of the waterways and affects hydroelectric production capacity and dam capacity providing water for other human uses. Habitats and remaining ecosystems are affected. The great natural wetland corridor of the Pantanal, including the Paraguay and Paraná rivers, is showing signs of degradation, with a diminution of the necessary nutrients to support its considerable biodiversity.
- **Technological limitations on agricultural production** result in deforestation, burns and “hot house” gas emissions as diverse natural systems are replaced by crop monocultures. Removal of the natural vegetation coverage increases soil erosion and sedimentation in navigable waterways, while higher levels of agrochemical utilization result in (currently) poorly understood surface and groundwater impacts.
- **Uncoordinated models for dam management at the Basin scale.** The natural changes in topography that occur within the la Plata Basin have created opportunities for humans to exploit these head differences by the strategic placement of dams. These dams have provided the energy and regulation of river hydrodynamics that support other human economic activities. The dams are managed using models which include regional information. However, the models are limited to specific impoundments and single purpose operations; such models face difficulties when applied to the management of the multi-purpose operations occurring at the Basin scale. These models can be improved, with wider climate forecasting and the inclusion of accurate data in their design, to yield greater social, economic and environmental benefits. The implementation of a holistic system-wide program requires further planning before models can be used for integrated resource management and formulation of responses to climate variability and change.
- **Interferences in fluvial ecosystem dynamics**, such as overexploitation of commercial fish species in some regions, have affected the richness, volume and quality of this renewable resource. The construction of dams in the Paraná and Uruguay rivers, while providing hydroelectric benefits to human developments, has impacted fish migrations, biological cycles and ecosystem trophic webs. Similarly, the introduction of exotic species, like the “*mejillón*”

Dorado,” to provide nutrients in the nutrient poor trophic webs of the la Plata system, has had a negative impact on investments and infrastructure, especially in the water supply sector, as well as on the native species present in the waters of the la Plata Basin. These latter impacts have the potential to most significantly affect disadvantaged communities dependent upon the River for subsistence.

- **Urban development models with low levels of resource allocation, and marginal and poor settlements**, have a direct connection to unsafe water supplies and environmental deterioration through discharges of solid waste treatment residues and sewage (domestic, industrial and pluvial). Although flooding in floodplains and coastal zones is a natural and desirable process within normal levels, the last decades, with their intensive urbanization, increased impervious surfaces and imposed (partial) channelization, have generated the new phenomenon of urban flooding, with devastating human consequences and economic impacts. These are especially severe in areas where land use is poorly regulated, such as areas of informal settlement characteristic of disadvantaged communities. Such occurrences are strongly exacerbated by climate change and variability, which create less predictable sequences of flood and drought, greater variability in water level elevations, and seemingly more erratic and severe occurrences of extreme events.

1.5 The Effects of Scale

Even though the threats and barriers summarized above are common throughout the Basin in general, their impacts and intensities vary considerably between subbasins. Consequently, the mitigation of their most significant impacts on both humans and ecosystems require regional level actions in the different subbasins. These variations in levels of impact in the major component subbasins of the la Plata Basin are summarised below. These differences in emphasis, identified during the PDF-B activities, are reflected in the project components, set forth in Section 3 below, by the locations of specific pilot demonstration projects in critical areas representative of specific concerns and providing the best opportunities for development, application and assessment (of economic and technical feasibility) of specific interventions to address these concerns. Successful and feasible interventions can be subsequently disseminated more widely within the Basin during subsequent phases of the Program.

- **Upper Paraguay** (to its confluence with the Apa River, including the “Planalto” and the extensive “Pantanal” wetland). The Pantanal acts as a great dam in the headwaters of the la Plata system, retaining enormous and increasing amounts of sediment originated from agriculture on the Planalto. Sediments are a great threat to the species richness of this wetland ecosystem. A key feature of this area is that it acts to maintain a low level of runoff, limiting major flooding downstream on the Paraguay River and on the already affected Parana River. The GEF supported project on the Upper Paraguay and Pantanal in Brazil has led to a completed Strategic Action Program, and the proposal to incorporate Paraguay and Bolivia into a subsequent phase of the project. ITAIPU Binational is supporting citizen-based reforestation programs within this Basin and The World Bank has supported projects in micro-basins to limit soil loss and restore riverine vegetation, which programs need to be maintained and replicated.
- **Lower and Middle Paraguay River** (downstream of the Apa River to the confluence with the Parana River, including the *Gran Chaco Americano* biome to the east). The Paraguay River, in spite of the upper basin flows received, has a negative hydrological balance. Along the main river course, the City of Asuncion, capital of Paraguay, is frequently affected by floods. This portion of the River is an important part of the Paraná-Paraguay Waterway. This

portion of the Paraguay River is affected on its right margin by two tributary systems, the **Pilcomayo** River and **Bermejo** River, which greatly affect its water quality. The Pilcomayo River Basin is remarkable because of its critical contaminant levels arising from old mining activities. Strong sediment charges have produced a recession of more than 70 km in its confluence with the Parana River. The European Union is cooperating with Argentina, Bolivia and Paraguay to elaborate a Basin Plan. The Bermejo River has a similarly high level of sediment production, transporting more than 70% of the sediments to the Parana River at Corrientes, Argentina, which affects the waterways and channels in the ports of Buenos Aires and Montevideo. The GEF has supported the Binational Commission in implementing a Strategic Action Plan to address the anthropogenic portion of this erosion, sustainable development and water resources management in an integrated way. The *Gran Chaco Americano* is located on the western side of the Basin in an important semiarid region. The GEF has recently approved a PDF Block B grant to fight land degradation in this region, which overlies the Yrendá-Toba-Tarijeño Aquifer System (SAYTT).

- **Upper Paraná River** (upstream of the confluence with the Iguazú River). This Basin has the highest number of dams, which has resulted in the diminishing of the river flow. The high deforestation rates expose the soils, making them more vulnerable to erosion. In the last decade productive activities, such as pork farms, intensive agriculture and cattle have also intensified, increasing the production and deposition of organic effluents in the river. Urban fluid waste from major cities, such as Brasília, adds to all these factors accelerating the eutrophication process of the Upper Parana River. Micro-basin management projects are being implemented to address this issue. Among them, the project *Cultivando Agua Boa*, implemented by ITAIPU Binational, deserves a special mention. The hydrological balance has been positive.
- **Lower and Middle Paraná River** (from the Iguazú River to its confluence with the la Plata River). The main characteristics of this region are great floodplains and wetland corridors, some of which—such as the Ñambucú, Iberá and Delta del Paraná—are very extensive. Some wetland areas are under protection, like the Esteros del Iberá, but without a common and joint management policy. These systems are strongly dependant on surface and groundwater systems. This portion of the la Plata Basin is the primary navigational area for the Paraguay-Paraná Waterway and is occupied by the Yacyretá Dam, the first obstruction to fish migrations during their upstream reproductive journey. There are many important cities along its margins which are frequently affected by the Parana River floods. These communities have been motivated to install alert systems, particularly in Argentina.
- **Upper Uruguay River** (to the Garabí River). The river originates as runoff from the basaltic strata of the Planalto of Río Grande do Sul and Santa Catarina, and drains, as a low gradient stream, toward the Campos Sulinos. This portion of the Basin is subject to a variety of agricultural land uses, with rice, soy bean and grain crops being more common in the upper zone, while in the lower regions, with a greater number of dams, rice crops predominate. This is a great pork and poultry production area, runoff from which contaminates the river.
- **Lower Uruguay River** (downstream of the Garabí River to its confluence with the la Plata River). In this part of the Basin there are some conflicts between the use of water for irrigated rice production, city supplies and ecological flows, particularly in the Cuareim-Quarai River subbasin that forms the boundary between Brazil and Uruguay. The hydroelectric dam on the Uruguay River (Salto Grande) creates hydrological alterations –including coastal erosion, and aquatic biodiversity alterations in the River. The Lower Uruguay River has a series of islands and coastal wetlands, which could potentially serve as a development focus for ecotourism

and nautical activities. CARU, in the Lower Uruguay River, is the responsible organisation for water quality monitoring and control for Argentina and Uruguay. Current development trends show an increasing pressure over the natural resources that demands a water quality monitoring system.

- **Río de la Plata.** The la Plata River is the last part of the basin's waterways, through which the Parana and Uruguay rivers discharge to the South Atlantic. Its main feature is the confluence with oceanic water and the high levels of nutrients and numbers of fish species with high commercial value. In its coastal zone is the City of Buenos Aires with its port—which is affected by the great volume of sediment deposited from the Parana River and by waste discharges from the high concentration of industrial settlements, and the City of Montevideo and coastal seaside of Uruguay. The la Plata River and its maritime front is being studied by FREPLATA, co-financed by the GEF.

1.6 The Over-riding Impact of Climate Change and Variability

During the project development process, a series of climate change scenarios were developed that indicated that climatic variability, related to the El Niño/La Niña periodicities, had a dominant influence over the hydrology of the la Plata Basin. This is in contrast to the situation prevailing in the Amazon River Basin, located immediately to the north of the la Plata Basin, which is more severely influenced by anthropogenic factors.¹¹ These climate change scenarios examined a 30-year period during which precipitation in the la Plata Basin was forecast to increase by between 10% and 15% on average, with increases of up to 30% in specific areas of the Basin. These changes in rainfall affect land use and soil loss, and have the potential to upset of delicate balance between precipitation and evaporation in the Basin. At the Basin level, these changes have the potential to increase the risk of flooding, especially when rainfalls consistently exceed historical means. These scenarios are based on a variety of climate models, all of which demonstrated a consistency of output suggesting a trend toward increasing precipitation.

Notwithstanding, as a consequence of increasing concentrations of greenhouse gases in the atmosphere, temperatures also are expected to increase by between 2°C and 5°C. These higher temperatures have resulted in increased evaporation, and this increase is likely to offset the increase in precipitation to the extent that the models forecast a greater likelihood of drought in the Basin, especially in the *Chaco*. The net effect of the temperature changes, when viewed in light of the expected changes in rainfall, is an increased risk of extreme events, as runoff becomes more “flashy” or erratic. This increased periodicity in precipitation, reduction in available moisture due to higher evaporation, and reduced runoff has a significant potential to impact human economic activities dependent on rainfall and runoff. In particular, these likely decreases in mean annual runoff have the potential to seriously reduce the availability of hydroelectric power generation potentials. As hydroelectric power currently supports much of the economic development in the five Basin countries, the forecast changes in rainfall and runoff represent serious threats to sustainable economic development, as suggested by the data from the Parana River Basin in north-eastern Argentina presented below.

¹¹ Ferreira, Rosana Nieto, Rickenbach, Thomas M., Herdies, Dirceu L., Carvalho, Leila M.V., *op. cit.*

Año	Río Paraná, en Posadas, (m3/seg)	Superficie afectada (millones de ha)	Pérdidas económicas (millones USD)	Número de personas afectadas
1982-1983	50.882	4.0	1.790	177.035
1992	48.790	3.0	905	133.106
1997-1998	33.000	18.5	17.502	121.348

Fuente: PNUMA/UNEP - 2004

In order to better understand these risks, as well as the opportunities that changes in rainfall and runoff may represent, it is essential to further refine the global climate models that have, to date, been utilised to develop these scenarios. To this end, acquisition of more complete data on current hydrometeorological conditions in the la Plata Basin forms an important element of this project. These data will contribute to the development of Basin-specific models.

2. Rationale and Project Objectives

The sustainable development and management of the Basin requires the efforts of all five countries to take advantage of the opportunities and overcome the barriers to resolving the critical transboundary issues summarized in Section 1. No one country alone can address all of these issues and concerns. Hence, integration of the independent, country-level actions is one of the main objectives of the CIC. This Project contributes to the fulfilment of that promise.

2.1. Rationale for the Project

The preparation of an integrated water resources management program in relation to climate change and variability was agreed in 2001 during the IV Inter-American Water Management Dialogue, which took place in Foz de Iguazú, Brazil. At that meeting, the President of the CIC, Foreign Affairs representatives of the Basin countries, a group of experts, technicians, and GEF project staff from the five countries specialized in water management, climate and transboundary waters, with GEF support, agreed on the need to develop a Framework Program for the la Plata Basin in order to “i) to coordinate common interest projects for the la Plata Basin countries; ii) to carry out projects in water resources management and select concrete prioritized actions; iii) to highlight the importance of the Basin flooding and drought phenomena, among others; iv) to define sustainable management of water resources and promote regional initiatives, identified as priorities by two or more countries; v) to consider the la Plata Treaty, its institutional system, and existing programs and projects to avoid duplication and to complement and collaborate with the current CIC framework.”

The need for technical management capacity in the la Plata Basin, within the framework of the CIC, was addressed by the Foreign Affairs Ministers Meeting which took place in Montevideo, during December 2001. This meeting authorized the appointment of a second, technical representative by each Basin country, in addition to the then existing political representative. The technical representatives form the Projects Unit of the la Plata Basin. This Unit completed the **Action Plan**, adopted by the CIC during 2003, that formed the basis for the preparation of the Framework Strategic Action Program (FSAP). The FSAP includes a common Basin vision guiding the development of short term (5 years), medium term (10 years) and long term (more than 15 years) development scenarios. Within this context, the CIC requested GEF PDF Block A support to identify the priority transboundary program elements and GEF PDF Block B support to prepare the FSAP project. The five countries catalyzed their own funds and agreed on cooperation efforts with the WMO and FONPLATA to assist in undertaking these efforts.

In the absence of such a Framework Program, the development in the basin will continue in a haphazard manner. Issues like flooding and drought management (including adaptation to climate change and variability), erosion and sediment transport, water contamination, energy generation and navigation problems, the lack of alert systems, loss of biodiversity and wetlands will continue to be only partially addressed, individually by each country.

The formulation of the FSAP constitute a first step in ensuring a holistic basin-wide integrated approach to the management of the Basin. This proposed project through the formulation of an agreed SAP will further strengthened this holistic and integrated approach to the management of the Basin.

2.2. Project objectives

The overall **objective** of the proposed project is *to assist the governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay, within the framework of the CIC as the agreed intergovernmental organization set forth for this purpose in the Treaty of the la Plata Basin, in managing the shared water resources of the la Plata Basin in an integrated manner, focusing on environmentally sustainable economic and social development, as well as adaptation planning and assessment, in view of the effects of climate variability and change on the hydrology of the Basin.* The **outcome** of the Project will be such that the governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay will coordinate actions and investments in the la Plata Basin to achieve sustainable utilization of its water resources, and initiating the process of adapting to climate variability and change, mitigating their negative impacts, and capitalizing on the opportunities that such variability and change may provide. This Basin-wide project provides the context for, and linkages between, ongoing GEF-supported efforts within portions of the la Plata Basin. This project also promotes synergies amongst GEF focal areas, increasing the resilience and adaptive capacity of the Plata basin in preparing a basin-wide structured menu of concerted adaptation measures in response to a sound and rigorous vulnerability and adaptation assessment. These multiple approaches reflect the complexities of the Basin, the regional distribution of priority concerns, and the diversity of ecosystems, while recognizing the unifying role of the River and the connectivity of the upstream and downstream portions of the hydrologic system.

The proposed project will advance recommendations set forth in the FSAP to formulate a detailed TDA and SAP, taking into account the implementation Plan and financing strategies agreed by the Basin countries. The project also responds to recommendations adopted or proposed in the National Communications—in the case of Argentina and Brazil, the Second National Communications—prepared pursuant to the country obligations under the United Nations Framework Convention on Climate Change (UNFCCC) for the preparation of scenarios for adaptation to climate variability and change, which are wholly integrated into the FSAP.

3. Components/Activity Program and Expected Results

This proposed project includes the following three Components: (i) strengthening basin-wide cooperation capacity for integrated hydro-climate management; (ii) Strategic Action Program formulation (including a Transboundary Diagnostic Analysis); and (iii) adaptation to climate change. Annex 4 shows the Development Program Structure Scheme, and Annex 5 shows the critical transboundary issues identified in the Macro-TDA, together with the proposed component development. The “identified executing partners” for each Sub-component (including each country’s public, private, and academic organisations, among others) will receive GEF support to execute their portion of the Work Program. These executing partners were identified during the project preparation process, without limitation or obligation, pending initiation of project activities.

Component I: Strengthening basin-wide cooperation capacity for integrated hydro-climate management.

Overall Objective: To establish the technical and legal conditions necessary for providing the participating institutions with the management capacity for the formulation of the SAP and its subsequent implementation. To develop a harmonized legal framework for the la Plata Basin for the integrated water resources management, based upon plausible climate change scenarios. To provide coordination and oversight capacity for project planning and management.

Sub-component I.1: Integrated Water Resources Management

Objective: The five countries of the la Plata River Basin represent widely differing legal regimes and technical and institutional capacities. This Sub-component seeks to develop a standardized framework within which the five countries can readily and effectively communicate with each other. Through the activities elaborated below, specific technical capacity and institutional strengthening activities will target gaps identified during the project formulation period to better enable the five countries to interact. In addition, a similar review of country legislation will contribute to the ability of the five countries to coordinate planning, enforcement, and management actions within their jurisdictions for the benefit of the Basin as a whole. Differences in legislation will be identified and recommendations provided to ensure consistent application of environmentally sustainable measures throughout the Basin.

Element I.1.1 Technical institutional and capacity building (for the integrated management of the Basin). This Element is comprised of three activities that will develop: (i) horizontal cooperation programs among the participating countries, based on initial needs assessments and conduct of an institutional analysis;¹² (ii) technical and management capacity building, based on training courses to execute the various components and activities of the SAP; and (iii) scholarships for advanced students to collaborate with the Project national executing institutions, based on public announcements and an Operational Procedures Manual to be defined before the start of the FSAP execution.

¹² This activity will utilize the institutional mapping tool developed under the auspices of the UNEP-OAS GEF-IW project on the San Juan River Basin in Central America to identify and analyze the relationships between agencies and organizations within and between the Basin countries. As such, this element contributes to the technology transfer elements of the San Juan project as well as enhancing understanding of the organizational climate of the la Plata River Basin.

Element I.1.2 Harmonization of conceptual, legal and institutional frameworks. Based on studies to be carried out with the support of workshops and technical meetings to be convened with the participation of political representatives and experts, this Element is comprised of two activities that will identify common principles of water law and draft proposals for key elements of a harmonized conceptual, legal and institutional framework for the sustainable management of water resources in the la Plata Basin: (i) identification, systemization and dissemination of concepts, legislation and institutional structures related to national, regional and international water-related environmental issues; and (ii) elaboration of key components for a conceptual framework for proposed legal and institutional harmonization. The activities will be developed in consideration of the long term goal of a harmonized and integrated water resources management system for the la Plata Basin, and will include generation of proposals for consideration by the Basin countries for inclusion within their national legal frameworks—adoption of any new or refined legislation relating to the integrated management of the water resources of the la Plata Basin remains subject to the constitutional processes of each of the Basin countries and to collective action by the five governments within the framework of the CIC, as well as action by the provincial and state authorities as required in the federal countries. A first step in this regard will be the determination of shared water quality indices and standards.

Results:

- National Project Units (NPUs) installed and operating as a mechanism for the Inter-sectoral and Inter-ministerial coordination and collaboration.
- Systematised and organized information within a Decision Support System for the integrated Management of the Water Resources in the la Plata Basin, pursuant to Activity II.2, centralized in the CIC, and with direct access from the five countries (through a network comprised of five identical mirror centers allowing access to the central data base through national gateways). The System will include the Digital Base Map of the Basin.
- Agreement by the Foreign Affairs Ministries of the five countries to deliver requested data and technical advice to the National Coordinators.
- Proposals to harmonize the conceptual, legal and institutional framework necessary to carry out strategic actions addressing resource management.
- An organized, effective and consolidated structure for the execution of a future SAP (during the fifth year of Project execution).
- A stronger CIC as the permanent organization to promote, coordinate and follow up on multinational water resources management actions and harmonized development in the region, as established in the Treaty of the la Plata Basin and its associated statutes.
- An administrative system for the implementation of the SAP, within the CIC, with country members and NPUs, equipped with the capacity to perform the necessary follow up.

Identified responsible institutions: The activities will be carried out by the CIC Secretary General, in cooperation and association with the federal and state agencies of the country governments, including, among others, the Subsecretaría de Recursos Hídricos, Secretaría de Ambiente y Organismos Provinciales and CONICET in Argentina; the Viceministerio de Recursos Naturales y Medio Ambiente del Ministerio de Desarrollo Sostenible in Bolivia; the Secretaría de Recursos Hídricos y la Agencia Nacional del Agua del Ministerio del Ambiente in Brasil; the Secretaría del Ambiente de la Dirección General de Protección y Conservación de Recursos Hídricos in Paraguay; and the Dirección Nacional de Hidrografía del Ministerio de Transporte y Obras Públicas in Uruguay. The sectoral activities within Component I are included under the responsible institutions' respective institutional responsibilities, which will be included in the respective NPUs.

Financing: This Sub-component will be executed throughout the 5 year Program. Total US \$ 4,92,350 (GEF, US \$ 1,823,000; counterpart, US \$ 2,823,850; co-financing, US \$ 315,500).

Sub-component I.2: Stakeholder Participation, Communication and Education

Objective: As part of the FSAP, a Plan for the Promotion of Public Participation (PPP) was designed for implementation during this project. While public participation and involvement is inherent in all of the project activities, the objective of the PPP is to focus and strengthen active, organized and responsible civil society participation in the execution of the project, increasing the knowledge and interaction among and between all riparian organizations, creating the enabling conditions for their participation within the framework of the CIC, and supporting the involvement of key stakeholders. Stakeholder participation serves indeed as an additional safeguard against “mal-adaptive” initiatives and measures. Hence, Component V will focus not only on communication and promotion of public participation, but also on education for responsible and conscious participation of the stakeholders and civil society, together with the establishment of a Public Participation Fund (PPF).

In order to achieve this purpose, the following activities are proposed in the Plan: (i) enhancing the database and interaction with stakeholders identified by the Institutional Mapping Tool; (ii) specifying new coordination and articulation activities building on the experiences, practices and achievements of other GEF projects being executed in the la Plata Basin; (iii) establishing inter-institutional agreements to coordinate the activities and mandates of the various commissions, agencies and organizations working in the la Plata Basin; (iv) including civil society organizations in the preparation of the TDA and the SAP; (v) communicating and disseminating information on the framework strategies of the Basin; (vi) executing environmental education activities and training in IWRM, and promoting comprehensive stakeholder participation; (vii) establishing a Fund for the Promotion of Public Participation that will facilitate the active commitment of social organizations in the management of critical issues; and (viii) executing four pilot demonstration projects and three priority projects (Component II) to be executed with local communities (see also Annex 8). It is further expected that representatives of the participating communities in these pilot demonstration and priority projects will form a consultative committee able to assist other communities in replicating successful interventions, a consortium of expertise able to participate meaningfully in local decision making, and a case study in successful public-private partnership that could serve as the basis for “lessons learned” from this project to be highlighted through the IWRN and IW-LEARN networks. Sub-component I.2 focuses on communication and promotion of public participation, as well as education for responsible and conscious participation by stakeholders and civil society, together with the establishment of a Public Participation Fund (PPF).

Element I.2.1 Communication and Promotion of Public Participation. The objective of this Element is to devise and to execute a Plan for Public Communication within the framework of the Decision Support System (DSS) set up in the CIC, to support the development of knowledge and capacities, and to promote the exchange of information with stakeholders. This activity will focus on access to information in the la Plata Basin, such as technical information from the TDA and its root cause analysis, and the proposals for remedial actions (FSAP/SAP) to ensure a responsible and fully informed constituency. The General Secretariat of the CIC will continue to coordinate this activity with the assistance of local experts in the preparation and implementation of the Communication Plan under the SAP. The CIC also will coordinate all activities related to the preparation and dissemination of informational materials and public information. The project will consider using the following media:

- CIC web page: www.cicplata.org;

- Online interactive virtual fora;
- Monthly bulletins;
- Videos and TV spots;
- With the support of sponsors, creation of a Publications Fund for the la Plata Basin, including, *inter alia*, thematic publications;
- Database of press cuttings and information bulletins;
- Contests and festivals related to relevant thematic issues in the FSAP/SAP.

Results: Internet-based communication system including on-line virtual fora, informational materials (newsletters, video and TV spots, etc.); an established and operational Publication Fund; a press database; and thematic contests and festivals.

Identified responsible institutions: The CIC and OSC, Ministries of Education and other riparian educational organisations participating in the production and dissemination of educational materials, and communications and media organizations.

Element I.2.2 Education for a Responsible and Conscious Public Participation. An important part of Sub-component I.2 relates to the educational and capacity building activities to strengthen the public participation process in the Project. The objective of this Element is to incorporate into the Project the technical capacities and scientific knowledge of the various academic institutions in the Basin and complement them with education and training in IWRM. Special emphasis will be placed on climate and hydrologic warning systems, prevention and adaptation to climate change and variability and their effects on the hydrology of the Basin, and strengthening institutional capacities of civil society organizations on issues related to the priorities of the la Plata Basin. This activity will take advantage of the UNESCO-IHP Program and established agreements between the CIC and specific centers of excellence in the Basin. Successful practices developed by other GEF projects in the la Plata Basin will be transferred—in the case of the Bermejo Project, for example, an environmental education teaching manual has been incorporated into the curricula of most basin schools in both Bolivia and Argentina with the support of the respective Ministries of Environment.

Results: Courses and seminars designed and implemented; and manuals, teaching and educational materials prepared, contributing to:

- Enhanced environmental education, measured in number of participants in courses and seminars promoted by the Project,
- Published educational materials relating to priority issues identified in the FSAP,
- At least 20 courses offered in identified “centers of excellence” (or through mobile and/or distance learning courses) and implemented within the framework of the Project,
- Dissemination of environmental education course materials, including environmental education documentation from other GEF projects.

Identified responsible institutions: The CIC and executing institutions in each country incorporating and promoting the inclusion of the civil participation in the Project activities, with technical coordination support within the framework of the SAP, will execute this task in cooperation with the Ministries of Education and educational establishments from the primary to university levels.

Element I.2.3 Public Participation Fund (PPF) for the Integrated Management of the Basin. The objective of this Fund is to involve private organizations and civil society organizations in

specific activities, ranging from research, to dissemination and management of critical issues in the la Plata Basin, for which such organizations would have a comparative advantage and/or strong proven capacity. The Fund should consider gender equity criteria as well as disadvantaged groups. The Fund will function according to defined operational procedures captured in a Manual presented for consideration and approval of the Steering Group at its first meeting. It will finance actions closely linked to the FSAP considering, *inter alia*, research projects, information dissemination and social integration as well as strategies for adaptation to climate change and variability, management of wetland corridors, etc.

There will be a first call for proposals geared towards civil society organizations and basin organizations, municipalities and private companies, for the presentation of project initiatives, in the following two critical issues:

- Protection of the large wetland corridors of the Paraguay, Paraná, Uruguay and la Plata Rivers, and the ecosystems of key wetlands for the conservation of the enormous wealth of the ichthyo- and coastal fauna impacted by the operation of dams and threatened by the modification on land use and climate change. The benefits are not only of interest for the conservation of one of the world's largest reserves of coastal and riparian biodiversity, but also for its recovery and maintenance in response to perturbations due to the impacts of climate change. Public and private participation in land tenure issues is key to ensuring the implementation of protection measures.
- Adaptation to the effects of climate change and variability, implementation of clean technologies development for replication throughout the la Plata Basin, and conjunctive use of surface and ground waters.

A second call for proposals will take place to encourage the generation of knowledge, support for capacity building and improved communication with respect to critical basin issues, with the participation of universities and educational centers, on the following two aspects:

- Innovative approaches to sustainable water resources management and their relationships to climate change and variability with a view to strengthening capacity in the basin countries through supporting post-graduate studies, and
- Communications and informational projects on critical issues identified in the FSAP to be executed by "centers of excellence" within the la Plata Basin.

Results: The Fund for Public Participation established with approved Regulations, and the financing of up to 20 projects proposed by civil society organizations and/or academic institutions working on critical issues in the la Plata Basin, together with related project reports and documented local impacts. The success of the Fund will be monitored and evaluated initially by the Fund's Proposal Selection Committee and, subsequently, during the monitoring and evaluation process at the mid-term and end of the Project.

Identified responsible institutions: The CIC and executing institutions in each country, incorporating and promoting the inclusion of the civil participation in the Project activities, with the support of the Technical Coordinator of the project, will execute this task.

Financing. The Sub-component will be executed during the five years of the Program. **Total US \$ 1,016,280. (GEF, US \$ 650,000; counterpart, US \$ 366,280).**

Sub-component I.3: Project Administration, Monitoring and Evaluation

Objective: The la Plata Basin is comprised of five countries and extends over approximately one-fifth of the South American continent. The proposed work program includes activities to be carried out by an even larger number of agencies, organizations, and partners, representing the many and diverse stakeholders within this large basin. Consequently, there is a need for a coordination mechanism that will serve as the management agency for the project, and take responsibility for the administrative, reporting, and monitoring functions required under the GEF collaborative program.

Element I.3.1 Coordination of project activities. This Element will provide the mechanism for the management of this multifaceted project. As agreed by the Basin countries, such a coordination and management function will be housed within the CIC, where the National Project Units (NPU) and the General Secretariat of the CIC form the Execution Coordinating Unit of the Project. Activities will be executed under the coordination of each NPU, acting as, *inter alia*, inter-ministerial committees to coordinate sectoral interests within their national territories, whereas the overall coordination and execution of specific Basin-wide activities will fall within the General Secretariat of the CIC. The Secretary General will act as the Project Director, being charged with the development and implementation of a Decision Support System (DSS) for the Integrated Management of the Water Resources in the la Plata Basin, which includes the Digital Base Map for the Basin. The DSS will be supported by the hydro-climate forecasting system to be developed under Component III. In addition, it will support the assessment and monitoring of water quality, and the Plan of Communication to be implemented under Sub-component I.2. The arrangements for the execution of the project are based upon those utilized during the PDF-B phase, and are described in detail in Section 5 below.

Element I.3.2: Monitoring and Evaluation of the Plan. The Monitoring and Evaluation Plan (M&E Plan)—see Annex E—is an integral part of Project Management, and seeks to provide the means to monitor and evaluate progress and performance in all components of the Project, and achievement of the Project goals. The M&E Plan is comprised by two very distinctive components: (1) Monitoring of progress; and (2) Evaluation of performance and achievement. While both components may use the same set of performance/achievement indicators, each uses a different set of tools and processes. Monitoring is characterized by a more frequent set of activities, providing for timely reviews and quick assessments. Often, decision-making lies with the Execution Coordinating Unit. Evaluation, on the other hand, is performed at a predetermined times, and decision-making corresponds to the highest level, the Steering Committee, of the Project.

Responsibilities for monitoring and evaluation are assigned to the various participating institutions—the Local Executing Agency, the Intergovernmental Coordinating Committee (CIC) and national institutions; the GEF Implementing Agency, UNEP; the International Executing Agency, GS/OAS; and different Project officers, according to their management functions and responsibilities. The Plan is guided by the principles of accountability and transparency. These principles apply to both institutions and individuals.

The Plan follows the standard UNEP procedures for Project Monitoring and Evaluation (administrative, technical and financial) which include quarterly and half-yearly progress reports; quarterly and annual statements of expenditures, including co-financing and counter-part contributions; a mid-term review (MTR); and a final evaluation. The MTR will be performed within the next quarter after project execution had reached the mid-term; that is, between the 30th

and the 33rd months of project execution, regardless the level of execution and disbursement. The final evaluation will take place once all funds had been disbursed and all activities completed.

In addition to Project Monitoring and Evaluation activities, the M&E Plan includes activities aimed at assessing the effectiveness of the SAP formulation. The purpose of this assessment is to identify corrective measures and/or changes in the SAP project in order to achieve more effectively and timely the Development Objective set forth by the participating countries, as agreed in the Vision for the la Plata Basin, addressing the main transboundary issues and associated global benefits identified in the Macro-TDA.

Performance and Achievement Indicators measure progress in the execution of Project activities, and include measures of procurement and production of goods and services, works and infrastructure, and use of human and monetary resources. They also include specific measurable goals. These indicators are summarized in the Logical Framework Analysis (Annex B), and are used to monitor the progress of Project execution, assess the achievement of its goals, and evaluate specific outputs. They are also used to evaluate performance. A list of indicators, along with their baseline values, parameters to be measured and means of verification are found in Table 2 of the M&E Plan set forth in Annex E. It is noteworthy that these indicators may be reviewed during the execution of the Project, baseline values may be adjusted, and new indicators and/or parameters may be added. The monitoring of these indicators may be assisted by Project Management software, such as MicroSoft Project Manager.®

Results: M&E Plan in place. Mid-term Review and Final Review will be available as per the M&E Plan time table, and recommendations for the Steering Committee will be drawn from the monitoring process.

Identified responsible institutions: The OAS, CIC and executing institutions in each country, and UNEP will execute this task.

Financing: The total cost for M&E is US\$1,012,500.00, where US\$714,500.00 is the GEF cost and US\$298,000.00 counterpart from the governments of the five participating countries, according to the break-down presented in Annex E (section 6) of the Executive Summary. Out of the US\$714,500.00 of GEF contribution to the M&E Plan, US\$370.00 is allocated under component #1, within the Technical Coordination and Administration of the Project. An additional US\$244,500.00 is allocated under the specific M&E Plans of the Pilot Projects (US\$200,000), and Priority Projects and Studies (US\$44,500). The remaining US\$100.00 corresponds to the MTR and FE, and the meetings of the Inter-ministry Committee, and is hereby allocated under this **Element I.3.2** as follows; **Total US \$ 398,000. (GEF, US \$ 100,000; counterpart, US \$ 298,000)**

The Sub-component will be executed during the five years of the Program. **Total US \$ 1,118,000. (GEF, US \$ 820,000; counterpart, US \$ 298,000).**

Component II: Strategic Action Program formulation

Overall Objective: To provide the diagnostic and feasibility analyses, implementation costs, and technical information necessary to formulate a Strategic Action Program for the la Plata Basin. To synthesize and compile the information gathered from scientific investigations, feasibility studies, and institution/capacity assessments into a management strategy for the Basin.

Subcomponent II.1 Integrated Water Resources Management. This Sub-component will include elements necessary for the development and implementation of the principles of integrated water resources management in the la Plata Basin, and is composed of six Elements.

Objective: This sub-Component will generate replicable management measures to implement practices promoting sustainable resource utilization in the Basin. The Outcomes of sub-component II.2 will inform the formulation of the basin-wide TDA and SAP, to be compiled under Sub-component II.3, looking *inter alia* at providing the conceptual framework for groundwater management, at the harmonization of national biodiversity strategies within the la Plata Basin, consolidating the actions of the Basin countries under the United Nations Convention on Biodiversity, formulating a dynamic information system with integrated water balance data for the whole Basin to support an integrated management program, and quantified water supply and demand information, specifically including water for hydroelectric generation, agricultural activities, transportation, recreation and commercial activities, municipal use and sewage discharges, as well as producing the framework for a water quality baseline for the Basin and a protocol for monitoring.

Element II.1.1 Integrated Water Balance for the la Plata Basin (Evaluating water supply and demand). The objective is to develop an Integrated Water Balance for the la Plata River as a support instrument for the integrated management of the water resources in the Basin, considering the distribution, quality, use and demand for water. This Element includes five activities: (1) development of a work methodology, with UNESCO-IHP support; (2) elaboration of the surface and ground water hydrological balance; (3) evaluation of resource supply and demand; (4) elaboration of an integrated water balance; and (5) dissemination of results.

Results: The results include a dynamic information system with integrated water balance data for the whole Basin to support an integrated management program, and quantified water supply and demand information identified by present and future Basin population, specifically including water for hydroelectric generation, agricultural activities, transportation, recreation and commercial activities, municipal use and sewage discharges.

Identified responsible institutions. Water resources management organisations, national institutions of each country, universities, and the UNESCO-IHP focal points will elaborate national water balances within the framework of this element.

Element II.1.2 Water quality and contamination evaluation and monitoring. The objective is to cooperate with the national institutions responsible for water quality and contamination monitoring to develop a regional knowledge base within the framework of the CIC, and to establish a common set of parameters and a protocol for the monitoring of water quality. This Element will include the following six activities: (1) strengthening existing monitoring systems (including the ones developed under GEF projects) and implementing shared databases and operational plans; (2) capacity building and network optimization plans; (3) elaborating contamination source inventories, analytical protocols and assessment forms, discharge databases, sewage treatment rules and permitting systems, protocols, and control of contamination in shared rivers; (4) applying existing mathematical models in the la Plata Basin, and implementing and identifying data needs in critical areas for the formulation of future scenarios; (5) preparing a proposed normative framework for water quality assessments in shared rivers; and (6) capacity building programs with workshops, seminars and courses, together with professional exchanges among the different responsible organisations, joint field work and intercalibration programs for participating laboratories.

Results: A water quality baseline for the Basin and a protocol for monitoring. A water quality monitoring network based on existing and strengthened national monitoring networks, and communication protocols for the main transboundary water bodies and courses. An inventory of contamination sources available in a database. Data gap analysis in critical areas for the formulation of future scenarios, based on the application of existing mathematical models. Completed contingency management plans, support structures, and technical information for the development of common policies on water quality, and equipping of stations and personnel.

Identified responsible institutions: This element will be executed by the Subsecretaría de Recursos Hídricos, Instituto Nacional del Agua, Secretaría de Medio Ambiente y Desarrollo Sostenible, Prefectura Naval and water resources organizations of the provinces of Argentina within the la Plata Basin; SENAMHI and Instituto de Investigaciones Químicas of the Universidad Mayor de San Andrés of Bolivia; Secretaría de Recursos Hídricos/Ministerio do Meio Ambiente, Agencia Nacional de Águas, IBAMA, Ministério das Cidades, Serviço Geológico Brasileiro (CPRM), organisations and institutions for water resources and environment of the Brazilian states within the la Plata Basin; Secretaría del Ambiente–SEAM, SENASA and Empresa de Servicios Sanitarios del Paraguay in Paraguay; Dirección Nacional de Medio Ambiente y Dirección Nacional de Hidrografía in Uruguay; and CARU and CARP.

Element II.1.3 Integrated Management of Groundwater. The objective is to develop information and preliminary guidelines for the integrated management of the surface and ground water resources of the la Plata Basin, based on the experiences of the Guarani Project and the execution of the Project for the Management of the Yrendá Toba Tarijeño Aquifer System (SAYTT) within the semi-arid *Chaco*, with the support of the ISARM Americas Program and with the cooperation of the Italian Ministry of Environment, and the European Union. This Element includes the following six activities: (1) development of a conceptual methodology for the integrated management of surface and ground waters in the la Plata Basin (including elaboration of a geo-referenced database of the main aquifers and schematic maps, at best possible scale); (2) integration of regional experiences; (3) strengthening of legal and institutional systems for the protection and management of groundwater; (4) identification of implementation criteria and methodologies for experience transfer, and validation of the proposed methodologies; (5) execution of a priority project for the SAYTT (see Annex 8 for detailed description of the project), including the formulation of a specific Transboundary Diagnostic Analysis and Strategic Action Plan; and (6) application of the conceptual framework for the integrated management of the transboundary aquifers of the la Plata Basin in the selected aquifers.

Results. An inventory of the la Plata Basin transboundary aquifer systems integrated into the CIC Information System. A proven methodology for the integrated management of surface and ground waters, based on the experience of the Guarani Aquifer and the SAYTT demonstration project. A specific TDA and SAP for the SAYTT, including its continued recharge and maintenance of its water quality. An assessment of priority aquifers for the implementation of the conceptual framework, and a characterization of selected transboundary aquifers.

Identified responsible institutions: National program executing agencies and National Project Units, INASLA and CRAS-INA from Argentina; national executing institutions of the Program, Servicio Geológico Técnico de Minas (SERGEOTECMIN) and the Departamento de Hidrogeología del SENAMHI in Bolivia; Secretaría de Recursos Hídricos/Ministerio do Meio Ambiente, Agencia Nacional de Águas, IBAMA, Ministério das Cidades, and the Serviço Geológico Brasileiro (CPRM) in Brazil; Secretaría del Ambiente (SEAM), Dirección General de Protección y Conservación de los Recursos Hídricos, the Boqueron Government, and the

Dirección de Recursos Hídricos del Chaco in Paraguay; and Dirección Nacional de Medio Ambiente and Dirección Nacional de Hidrografía in Uruguay.

Element II.1.4 Biodiversity and Contamination Management. The objective is to harmonize national biodiversity strategies within the la Plata Basin, consolidating the actions of the Basin countries under the United Nations Convention on Biodiversity. Joint actions of the five countries are envisioned to be carried out to preserve and manage biodiversity of the Basin, with a particular focus on wetlands, coastal ecosystems, and biological corridor conservation, sustainable fishing, and exotic species control. This Element includes six activities: (1) implementation of a system of protected areas for the protection of aquatic ecosystems and their associated ecotones, integrating ecological corridors (including habitat identification and implementation of a demonstration ecological corridor) with monitoring and control of transboundary contaminant flows to aquatic and terrestrial habitats; (2) sustainable management of fisheries resources and aquaculture (including development of responsible fisheries codes, fishing information systems, and potential aquaculture areas agreed among the five countries, monitoring systems and exotic species control protocols); (3) common actions to preserve and sustainable manage biodiversity according to the rules of the five countries implemented pursuant to their national strategies developed in terms of the Biodiversity Convention (the proposed actions will take into account the extensive coastal wetland corridor included in the la Plata Basin which links the Pantanal with the Delta del Paraná on the la Plata River, including the Parana hydrological system, as one of the world's most diverse and biologically productive wetland systems); (4) conservation of the riverine corridors and wetlands supported by key actions to promote public participation; (5) articulation and development of complementarities with existing GEF biodiversity projects in the Basin; and (6) conduct of the priority project in the Itaipu drainage area, *Cultivando Agua Boa*, including the management of solid wastes and recycling programs, youth gardening and participation of indigenous communities, cultivation of medicinal plants, and promotion of organic farming and adoption of sustainable agricultural and fisheries practices, leading to protection of biodiversity and environmental health throughout the region (see Annex 8 for detailed description of the project). This latter priority project will make use of a revolving fund, utilising revenues from water charges to secure investments in priority areas ("hot spots") within the drainage basin. This priority project will serve as the basis for similar **public-private partnerships** proposed for other areas of the Basin.

Results: A harmonized Basin-wide regional strategy for biodiversity conservation consistent with the objectives and requirements of the Biodiversity Convention, implemented in a demonstration ecological corridor. Elaboration of an agreed monitoring system for exotic species, and implementation of sustainable fisheries management measures in the five countries. Reconstruction and protection of riparian and wetland corridors, and dissemination of information on their benefits and services. Program activities will result in socio-economic assessments based on biodiversity conservation, and identification of economic opportunities associated with such conservation. In the case of the *Cultivando Agua Boa* priority project, a replicable public-private partnership program, based upon the foregoing results, will be demonstrated.

Identified responsible institutions: National Project Units, the Itaipu, Yacireta and Salto Grande binational organisations, National Environmental Secretariats, National Fishery Institutions, and civil society organizations involved through the Public Participation Fund (see Component V).

Element II.1.5 Control of Land Degradation. The objective is to compile available soils information, integrated at a coherent scale, within the la Plata Basin, and to synthesize assessments and analyses among the five countries, as a basis for harmonized action, including identification of degraded critical areas integrating water and soil concerns. Existing related

information from on-going projects (i.e., Bermejo, Pantanal, Gran Chaco and Pilcomayo) will be utilized to the fullest extent possible. The Element will include eight activities: (i) elaboration of common agreed actions in the la Plata Basin, complementing the National Action Programs against Desertification; (ii) harmonization and dissemination of existing best practices at the Basin level; (iii) elaboration of a common soils map showing the extent of degraded areas, soil suitability, regional erosion susceptibility (erosion risk) and potential for impacts on water resources; (iv) identification of water resources; (v) identification and quantification of machinery, agrochemical and extreme events impacts on soil use, monitoring of erosion rates and quantification sedimentation loads to dams and infrastructure works; (vi) conduct of a priority project in the critical ecosystem of *Selva Misionera Paranaense*, including the formulation of a diagnostic analysis of the current situation and proposed measures to mitigate erosion and rehabilitate lands, with corresponding monitoring systems; (vii) conduct of educational and public participation activities; and (viii) articulation and complementation of actions with existing projects related to the issue within the la Plata Basin.

Results: Results will include a geo-referenced database, including land use, soil suitability, and erosion vulnerability layers. Based on an analysis of these data, a Land Degradation map, identifying high risk areas, will be prepared along with a proposal for priority actions. A project design for the ecosystem of *Selva Misionera Paranaense* region, including experiences and good practices drawn from the priority project and other GEF projects (Bermejo, Gran Chaco, and Upper Paraguay.)

Identified responsible institutions: Riparian national institutions dealing with land management issues; National Project Units, INTA and INA, and Provincial institutions in Argentina; MDS in Bolivia; EMBRAPA in Brazil; MAG-SEAM in Paraguay; and RENARE-MGAP, INIA and UDELAR in Uruguay.

Element II.1.6 Identification of Sustainable Development Opportunities. The objective is the development of sustainable practices for the management of common issues in two or more Basin countries, through coordination of activities with shared objectives. This Element concentrates on the identification and preparation of projects in two areas actively undergoing development and having opportunities for the mobilization of financing for inclusion of sustainable development principles in the following two activity areas: (1) projects that promote clean technologies and the capture of greenhouse effect gases that mitigate the climate change and (2) projects that promote ecotourism and navigation among the islands, coastal waters and wetlands of the Uruguay River, validating cultural and historical resources through the utilization of equipment constructed in the Lower Uruguay River. Existing treaties and Conventions signed will be analyzed and identified within the Framework Program to promote and/or facilitate the accomplishment of these transboundary actions.

Results: Formulated projects promoting clean technologies and practices that capture greenhouse effect gases to mitigate climate change, and recreational development and ecotourism projects to be implemented in the Lower Uruguay River.

Identified Responsible institutions: Country Environment Ministries, social and production organizations, Ministries of tourism and marine transportation, international tourism agencies and civil organizations.

The Sub-component will be executed throughout the 5-year Project period. Detailed information is presented in Annex 8.

Total US \$20,832,731 (GEF, US \$ 4,491,500; counterpart, US \$ 14,731,231; co-financing, US \$1,610,000).

Sub-component II.2: Pilot Demonstration Projects

Objective: Pilot demonstration projects seek to provide local management experience, test the feasibility of the proposed measures, and determine the actual costs of specific interventions hence are in some form equivalent to pseudo “feasibility” projects. They are focused on the resolution of critical problems, in selected areas and sub-basins. They will be carried out by local committees with the participation of key governmental and non-governmental organizations. These projects have the financial support of multilateral regional banks and mechanisms—FONPLATA and CAF, with a significant investment at the local scale. Four pilot demonstration projects are proposed. The outcomes of this sub-component will develop, document and disseminate feasible and cost-effective land and water management measures to address priority transboundary concerns within the la Plata Basin, and provide the basis for sustainable use of the land, water and biological resources in the Basin as input for the SAP formulation including for its adaptation measures plan.

Element II.2.1 Pilot project to Control Contamination and Erosion in the Pilcomayo River (Countries involved: Bolivia/Argentina/Paraguay).

The purpose is to generate local management experience in reducing mining contamination and soil erosion, and sedimentation and water course sediment deposition in the Pilcomayo River. It includes a group of actions at the local level (Cuenca de Cotagaita in Bolivia) to preserve the integrity of the water resources system of the Pilcomayo River basin, improving water quality and erosion control, and replicate the experience. The project will contribute to improved knowledge of critical transboundary issues related to water quality and soil erosion, transport and sedimentation, taking into account the transboundary effects on Argentina and Paraguay located downstream. See Annex 8 for detailed information.

Element II.2.2 Pilot project for a Hydrological Alert System at the confluence of the Paraguay and Parana Rivers. (Countries involved: Argentina, Paraguay and Brazil)

A monitoring and alert system for risk management (prevention, contingency and rehabilitation) in the metropolitan axis of Resistencia-Corrientes (Argentina) and Pilar (Paraguay) is envisioned. It contemplates adaptations/actions to address the hydrological effects of climate variability and change, to prevent flood and drought-related disasters and implement mitigation actions in partnership with Civil Defense authorities. The alert system contemplates notifications of extreme hydrological events, contaminant spills and preparation of contingency plans. It also contributes to improved knowledge of transboundary critical issues related to hydrological extremes, contingency planning and water quality. See Annex 8 for detailed information.

Element II.2.3 Pilot project to Resolve Water Use Conflicts in the Río Cuareim/Quarai Basin (Countries involved: Brazil and Uruguay)

The proposal is to generate local experience to improve integrated water resources management capacities in this basin, seeking to harmonize use at the national and transboundary levels. This project will encourage participation by local stakeholders and the existing Binational Commission for the development of the basin in the conservation and/or improvement of environmental quality through the rationale use of water by solving actual conflicts, including those involving water use for irrigated crops and specifically rice. This project informs critical transboundary issues by developing knowledge on water use conflicts and the impacts of irrigated land. See Annex 8 for detailed information.

Element II.2.4 Pilot project for the **Biodiversity Conservation in the Regulated Parana River** (Countries involved: Argentina, Brazil and Paraguay).

The experience to be gained will contribute to the strengthening of integrated water resources management capacity in the Parana River basin, at the confluence of the Parana and Paraguay Rivers and Saltos del Guayrá, where two of the most important transboundary dams are located: Itaipu and Yacyretá. This project will complement the on-going efforts of Itaipu Binational. A management plan to preserve aquatic resources will be developed. A documented framework to harmonize legislation and strengthen local stakeholder capacity is anticipated, and will contribute to better understanding of transboundary issues related to biodiversity alteration and sustainable use of fisheries resources. See Annex 8 for detailed information.

Identified responsible institutions: The direct coordination and supervision will be carried out by local experts in each country under the direct supervision of the Project Technical Coordinator. Technical Advisors will be contracted for specific tasks including technical report preparation, conduct of meetings, dissemination of press releases and support to public participation.

This Sub-component will be executed during the first 3 years of the Project period. Further detailed information is presented in the Core Document and in Annexes 8 and 8Bis.

Total US \$ 11,152,051 (GEF: US \$ 1,000,000; counterpart, US \$7,351,051; co-financing, US \$ 2,801,000).

Sub-component II.3: Strategic Action Program Preparation.

Objective: A Strategic Action Program (SAP) for the la Plata Basin, technically sound and agreed, will be prepared to advance and better define priority actions identified in the FSAP, based upon a TDA focused on critical sub-basins and issues. This Sub-component is comprised of two Elements: (i) compilation and analysis of the technical and scientific elements of the activities executed in Components I and II, above, with consideration of the experience of pilot demonstration projects executed in Sub-component II.2; and (ii) additional specific studies on priority issues not included in previous components.

Element II.3.1 TDA and SAP Preparation. The preparation of the TDA and SAP integrates the results of all the Project activities, and builds upon all existing subbasin TDAs and SAPs and the results of the PDF-B. It is supported by public participation workshops, meetings of the Thematic Groups, the National Project Units, Inter-ministerial meetings, and other consultations and studies.

Activities: The conclusions and experiences of Components I, II and III will be evaluated, including the particular experiences gained in the pilot projects, priority demonstration projects, and other GEF-IW projects under execution in the Basin, which will provide more accurate information on the local management of and solutions to the main problems facing the Basin. Workshops and technical meetings will be conducted to formulate the TDA and SAP documents. The TDA will encompass the results of the forecasting modelling and scenarios as well as the results of the climate change vulnerability assessment as solid scientific inputs to the basin wide TDA. The feasibility and cost of structural and non-structural interventions will be analyzed. The feasibility and cost of structural and non-structural interventions will be analyzed. The Component will also look at the formulation of a financial strategy for securing funding for SAP implementation considering *inter alia* the use of financial instruments, including mechanisms such as revolving loan funds, water pricing, and public-private partnerships, and application of value to ecosystem services. Non-structural interventions to be evaluated could include, *inter*

alia: consideration of alternative, sustainable livelihoods and/or production methodologies (such as use of aquaculture to protect and preserve stocks of native fishes with high economic value, for example); and implementation of clean technologies and alternative energy sources.

Results: The outcome will be a strategy (SAP) for the sustainable utilization of the Basin's land and water resources including a financing plan for the implementation of the proposed actions, with identification of partners, donors and investors.

The SAP including a climate adaptation component or menu of adaptation measures will be formulated through a comprehensive multi-stakeholder participation process; negotiated and endorsed at the country level through the national inter-ministerial committees; and endorsed and promoted at the regional level through the CIC. It will also be supported by the various meetings of the Thematic Groups, and the National Project Units. Although, the SAP formulation is an iterative process and formulation of outlines for the TDA and SAP will be from the onset of the project, this Component will be executed during the final 4 years of the Project period.

Element II.3.2 Specific studies. The objective of the specific studies activity is to fill in gaps in the knowledge base relating to critical issues identified in the FSAP but not included in the previous Components. The results of such studies will support the preparation of a detailed TDA and SAP. These studies will address, *inter alia*: (i) navigation and sustainable development limitations in the Basin and their management; (ii) potential hydroelectric development projects and possible use of clean energy and technologies as alternative energy sources; (iii) transboundary environmental sanitation in the Basin and its impact on human health (e.g., the role of inadequate sanitation and stormwater management practices in stimulating and sustaining cyanobacterial blooms); and (iv) the contributions of dams to water security in the region.

Results: Complementary studies conducted in support of the TDA and SAP. Identification of potentials and possible problems associated with navigation, energy and power development, environmental health and water security in the la Plata Basin.

Identified responsible institutions: The execution of Sub-component II.3 will be performed by National Executing Organisations with the support of the International Technical Coordinator at the SG/CIC, and in cooperation with the National Project Units.

Financing: This sub-Component will be carried out during the last four years of the Project. **Total US\$ 4,713,500 (GEF, US \$ 1,045,000; counterpart, US \$ 2,968,500; co-financing, US \$ 700,000).**

COMPONENT TOTAL: US \$ 36,698,282 (GEF, US \$ 6,536,500; counterpart, US \$25,050,782; co-financing, US \$5,111,000).

Component III: Managing the effects of climate change and variability on sustainable development.

Overall Objective: Component III is composed of one Sub-component which focuses on foundational activities required to support adaptation to climate change and variability within the la Plata Basin. The objective of this Component will be to develop capacity for integrated water resources management including enhanced capacity for adapting to climate variability (related to

El Nino/La Nina periodicities) and climate change, as recommended in the Second National Communications of Paraguay, Argentina and Brazil.¹³

Sub-component III.1 Adaptation to climate variability and change: A hydro climatic forecasting system for the la Plata Basin. This Sub-component is a “foundational” activity pursuant to the UNFCCC and will increase knowledge, and technical and operational capacity within the five countries of the la Plata Basin to predict more accurately the hydrological effects of climate variability and change, particularly to mitigate flood and drought disasters and to help adapt current and future sustainable development activities to future climate and hydrological regimes, as set forth in the National Communications of the five Basin countries and in the Second National Communications of Argentina and Brazil.

As set forth in the applicable National Communications and Second National Communications prepared pursuant to the UNFCCC, this Component will: (i) develop and apply climate-based hydrological models integrated at the Basin level; (ii) develop and adapt regional climate models to the la Plata Basin; (iii) develop sub-regional projections of climate scenarios and their associated hydrological responses, directly related to adaptation to climate variability and change; (iv) utilize soil coverage classifications prepared using remote sensing and data systematization for modelling of soils, vegetation and aerosols (aerosol and vegetation biophysical parameters) necessary as inputs to regional hydrological and climate models; (v) assess vulnerability, identifying flooding zones and hydrologic risks on an agreed map base; (vi) assess potential impacts of climate change on hydroelectric power generation and development, and evaluate urban and rural vulnerability and agricultural impacts; and (vii) generate adaptation strategies to climate change for agriculture, hydro-power generation, water supply, and urban development (with regard to flood control).

In addition, within the context of a multi-purpose dam operation strategy, and consistent with the applicable National Communications and Second National Communications prepared by the Basin countries pursuant to the UNFCCC, this Component will: (i) facilitate operation of an atmospheric and micrometeorological observation system; (ii) develop a climate database with free public access; (iii) prepare a data management and remote sensing data assimilation plan for use in forecasting systems; (iv) prepare an atmospheric monitoring system in a pilot zone, involving weather and climate forecasts with field measurements at a pilot scale for appropriate adjustments to the regional climate models; (v) optimize short term forecasting systems associated with currently available national alert systems, with the construction of an operational rainfall estimation system for the basin, compatible with, complementary to and enhancing already existing alert systems; (vi) implement long term forecasting systems within the existing forecasting systems by sub-basin; (vii) elaborate and implement contingency plans for transboundary risk management through a technical cooperation network; and (viii) involve the Basin stakeholders at all time thereby ensuring awareness and informed decision making capacity in adapting to climate change and variability.

Results: The Integrated Hydro meteorological-climatic Forecasting System at the Basin level developed through this component will generate meteorological, hydrological and climatic

¹³ The five Basin countries have adopted a National Communication (NC) pursuant to the requirements of the United Nations Framework Convention on Climate Change (UNFCCC), with Argentina and Brazil completing their Second National Communications (SNCs), setting forth not only national responses to climate change and variability but also proposing a regional approach to this shared concern. The activities set forth herein are wholly consistent with the regional approach and recommended strategy of institutional strengthening, capacity building, and scenario-response generation identified in the NCs and SNCs of the Basin countries. GEF support of these actions is identified in decisions 6/CP.7 and 7/CP.7 of the Convention of the Parties (COP).

forecasts and scenarios that will contribute to enhanced capacity within the Basin to anticipate floods, droughts, and extreme events (related to El Nino and La Nina periodicities), inform regional land use and economic development programs, and permit the Basin countries to anticipate and adapt to climate change and variability related impacts. In addition to a long-term model-based forecasting and evaluation system, this Component will also coordinate the formulation of a climate change vulnerability assessment and will facilitate the pilot scale application of monitoring and response systems, including associated alert systems and data dissemination systems. This Component will promote multi-stakeholder participation throughout its activities, as outlined in Component I above. As a result, the basin and its stakeholders will be scientifically well equipped and will have a better understanding of the adaptation needs and required structured responses to enable society at all levels to better adapt to the anticipated climate change. The outcome will thus inform the formulation of the basin wide TDA and SAP including a menu of adaptation measures.

Identified responsible institutions: This Component will be executed by the National Project Units, National Meteorological Units (SMN, CPTEC/INPE/MMA, INEMET/MAPA, SENAMHI), Defense Ministries, and Organisations responsible for hydroclimatic forecasting (CIMA, UBA, INTA, INA, SIFEM, LART, FICH, ANA, EMBRAPA, Universidad Federal de Río Grande do Sul, IPH, INPE, SEDEC, USP, UFPR, Universidad de Asunción, Universidad de la República, IMFIA, SNE, DRENARE, DINAMA, ANNP), among others.

Total US \$ 17,496,550 (GEF, US \$900,000; counterpart, US \$ 5,800,900; co-financing, US \$ 10,795,650).

4. Risks, Sustainability and Replicability

Risks. The SAP presents an opportunity to integrate diverse development variables, including legislation to provide a harmonized legal framework among the countries, to give a solid base for the program sustainability. The diverse, heterogeneous and different jurisdictions involved in the five countries, as regards water resources and climate, constitute a risk even though some activities have been designed to improve this situation and minimize the risk. In the federal countries of the Basin, there is a further risk that the failure of the provincial or state governments to adopt and implement the SAP may negate the actions of the federal authorities in certain areas of activity where the provincial or state governments have constitutional jurisdiction. Failure of the countries—and their administrative units where applicable—to approve the proposal would not allow the project to go forward; however, the strong commitment of the Basin countries. Involvement of the appropriate governmental and nongovernmental stakeholders, and the development of inter-ministerial coordinating mechanisms addressing sectoral concerns within the framework of Integrated Water Resources Management in the la Plata Basin, is designed to minimize this risk.

In spite of the strong interest of the Governments and the CIC, another risk factor is the geographic extent of the Basin, which is a limitation to effective and efficient participation and the active involvement of the stakeholders in the Project execution. The extent of the Basin and the complexity of the Project imply risks, which constitute a challenge for Project implementation. Strong linkages with civil society, professional bodies, and relevant governmental bodies will minimize this risk. Further, the upstream-downstream orientation of the Basin countries could potentially introduce risks from unilateral actions where the national interests of the countries are concerned. Harmonization of legislation, introduction of mechanisms to coordinate actions, and a strengthened CIC provide avenues for minimizing this risk.

From the financial point of view, a possible risk is the lack of effective integration of co-financing. As the GEF partially finances the Project activities, the availability of counterpart resources to co-finance different activities is a risk. Formal agreements between responsible institutions and the CIC prior to the beginning of Project activities will limit these risks.

Finally, it is understood that the level of risk associated with Project execution is very low, considering the great interest of the countries, institutions and organizations involved as well as the existing expected interest at the international level. Nevertheless, the inclusion of institutional strengthening and capacity building elements within this project are designed to reduce this risk by ensuring that the five basin countries have at least a basic ability to implement the strategies identified as an output of this program.

Sustainability: The Program has been conceived to be implemented over 15 years, in three successive 5-year stages. The baseline remains weak in the face of the problems related to the dimensions of the Basin, and this needs to be resolved. GEF support and other cooperation catalyzed toward the resolution of these concerns within the Basin are likely to be a critical factor in the sustainability of this effort. With this perspective, efforts toward sustainability by the countries and the CIC are key factors in managing the project and have been integrated into the work methodology since the preparation of the FSAP. The financing ability of the member States has been a constant preoccupation of the CIC. For this reason the countries legal institutions form the basis for execution of the Project as well as the most important objective for institutional strengthening to ensure sustainability.

The advance in the integrated sustainable management of the Basin, within the framework of the CIC, will result in enhanced governance capabilities. Development of legal and institutional actions, as well as technical and operative potentials, to work within an integrated vision among the Basin institutions responsible for various sectoral issues will facilitate development of effective economic instruments and a responsible climate for civil participation. This is the baseline upon which the future sustainability of the SAP is founded: relevant technical capacity, student scholarships, assistances (horizontal cooperation), and a “Basin spirit” within the participating institutions as a result of this Project. The Foreign Affairs Ministries and responsible institutions of the five countries will support the economic and financial structures of the actions to be executed under the project.

The Thematic Groups to be formed in each country by the National Coordination Units will act as Inter-ministerial Technical Committees to facilitate the integration and involvement of the different Ministries and governmental institutions. The civil organizations involved through the promotion of the active participation in the FSAP and its activities are key elements for the social sustainability.

Replicability. The results of the SAP formulation Phase (2007-2011) will be disseminated through government institutions, nongovernmental institutions, universities and other stakeholder entities participating in the activities. The strengthening of the CIC, including the institutions related thereto in each of the five countries, will permit the development of information transfer mechanisms, to ensure dissemination of new knowledge, active coordination and horizontal cooperation among countries and organizations involved in the integrated management of the water resources of the Basin.

The outcomes and results of the pilot demonstration projects and priority projects will identify feasible and cost-effective interventions able to be replicated elsewhere in the Basin. It is expected that representatives of the communities participating in the three priority projects and four pilot demonstration projects (Component II) to be executed with local communities will form a consultative committee able to assist other communities in replicating successful interventions, a consortium of expertise able to participate meaningfully in local decision making, and a case study in successful public-private partnership that could serve as the basis for “lessons learned” from this project to be highlighted through the IWRN and IW-LEARN networks.

Outside of the la Plata Basin and within the region, the Project experience is to be transferred through the institutions related to natural resources management and, particularly, to water resources (such as the Inter-American Water Resources Dialogue process and the IWRN, as well as through the Foreign Affairs Ministries of the five countries). The CIC will be a key instrument in transferring that experience within the region, by signing cooperation agreements with other multinational basin institutions.

The integration of the Project information and communication system with other similar networks will constitute another important element in the dissemination and transfer of experience in order to replicate the institutional arrangements, sustainable practices, technologies and methodologies elsewhere in the Basin and Region. Through the IWRN Net Nodes, and the Internet-based Information and Communication Systems to be developed under Component I, the results and products of this Project will be transferred to and through IW-LEARN for wider dissemination within and outside of the region.

5. Project Implementation Arrangements

The arrangements for the execution of the FSAP include the strengthening of the CIC, which according to the Treaty of the la Plata Basin is the organisation designated to “coordinate and follow up” program execution. According to Article III of the Statute creating the CIC, the CIC “considers, approves and implements” activities, including activities such as this Project and the operation of the Decision Support System–included in Component I (Digital Map, Documentation Centre, Institutional Mapping tool, and an interactive digital space for communication and public participation).

The arrangements for Project execution (2007-2011) are based on those used during the PDF Block B phase and are included in the functional structure of the CIC (see organizational chart below.)

The **Steering Committee (SC)** will be established as the highest authority for the decision-making of the Project. The SC will be responsible for the execution, oversight and decisions over the work plan and budget of the Project. At its first meeting, the Steering Committee will consider a proposal for the Operational Strategy of the Project prepared by the Director of the Project, and will adopt a final version. The SC will be formed by the Political Representatives and the Technical Representatives to the CIC from each of the five riparian countries, and a second technical representative selected by each country according to the priority issues identified in the FSAP. Representation of the national environmental institutions will be secured through one of the two technical representatives. A representative of UNEP, acting on behalf of the GEF Implementing Agency, and a representative of the DSD/OAS, acting on behalf of the international executing agency, will also be part of the SC; both, with no voting rights. A representative from each co-financing agency approved by the CIC may also be invited to participate. The Project Director, the International Technical Coordinator (ITC,) and the National Coordinators will participate in the meetings. The ITC will act as the Secretary of the meetings. The United Nations Development Program (UNDP) and The World Bank could be invited in an *ex-officio* capacity. The SC, as the main project authority, shall consider and approve annual operation plans and budgets, as well as quarterly and annual technical and financial progress reports to be presented by the executing agency in agreement with the Secretary General of the CIC (SG/CIC). If any of the countries considers it necessary, the SC will present their decisions to the CIC. The SC will seek consensus of its members. UNEP, as responsible agency before the GEF, will endorse the budget, work plans, terms of reference, and contracts proposed for the Project execution.

The **Coordinating Unit of the Project** is comprised of the UNEP/GEF, SG/OAS, the Director of the Program, and the Technical Coordinators (international and national). The International Technical Coordinator will coordinate and supervise all the technical activities and will elaborate the project reports, in particular the TDA and SAP. The coordination of counterpart activities in country organisations will be jointly carried out with the national coordinators to ensure the best possible articulation with national programmes and organisations.

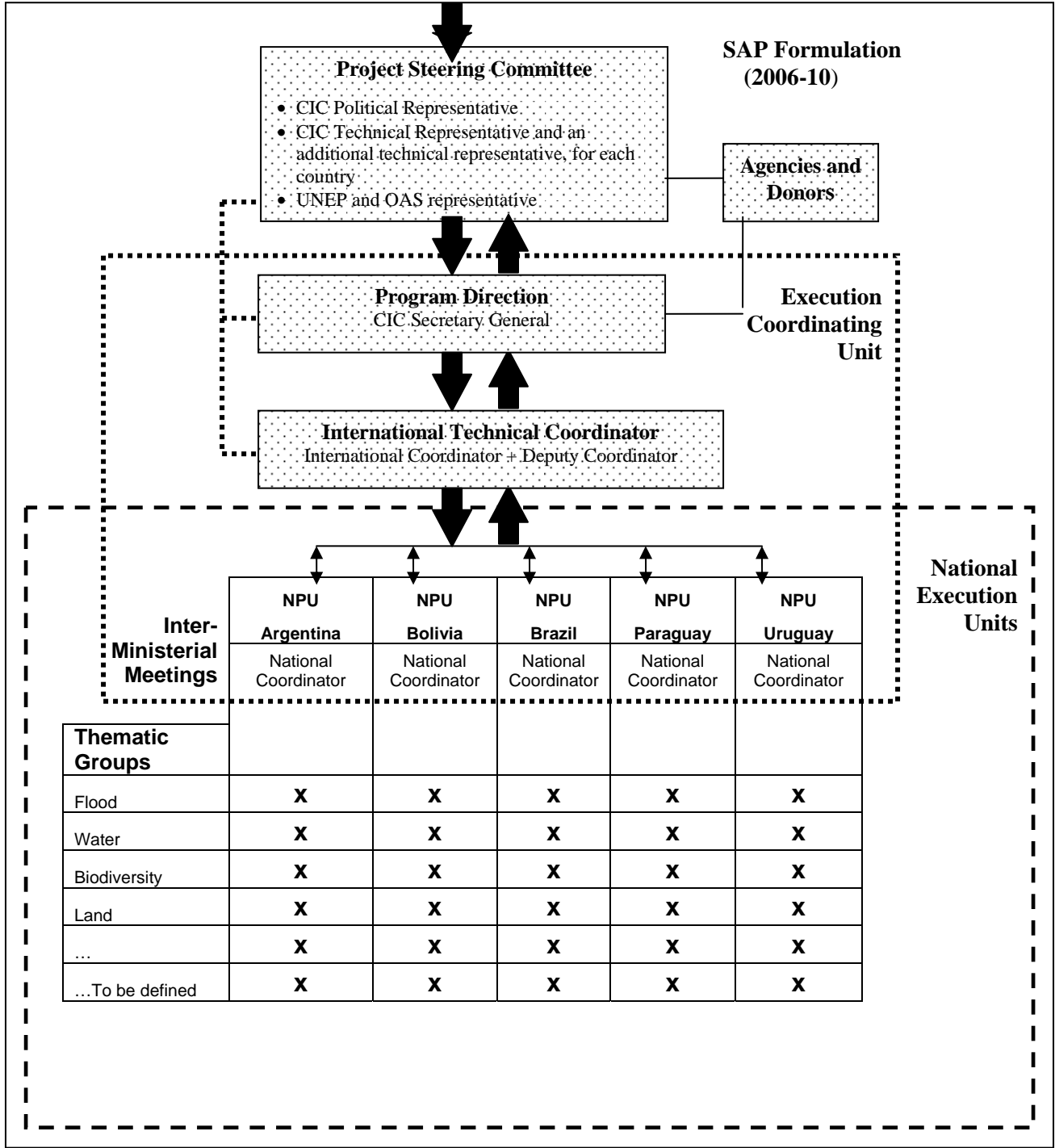
The SG/CIC will serve as **Project Director**, with the execution ensured by the national institutions coordinated through the NPUs, whose Technical Representatives will serve as **National Coordinators** of the Project. The National Coordinators will convene and coordinate the meetings of the **Inter-ministerial Working Groups (IWGs,)** which are part of the NPUs. In addition, **Thematic Groups** have been established in each country for addressing specific and sectoral issues. These Thematic Groups in the five countries met during the PDF-B phase to

coordinate actions of transboundary nature, included in the FSAP formulation. They will continue to meet as required.

The Secretary General of the CIC, as the Project Director, is co-responsible to the SC and CIC for the project execution. In particular, he is responsible for the execution of activities in Component I related to legal issues and the institutional strengthening of the CIC. UNEP and GS/OAS will support Project execution. GS/OAS, due to its historic involvement in the Basin, traditional partnership with UNEP in similar projects within the region, and its role in implementing activities under related projects, will act as Executing Agency and manager of the funds provided to the project by UNEP on behalf of GEF, consistent with UNEP financial reporting requirements. UNEP as the GEF Implementing Agency will be responsible for overall project supervision to ensure consistency with GEF and UNEP policies and procedures, and will provide guidance on linkages with related UNEP and GEF-funded activities. The UNEP DGEF will monitor implementation of the activities undertaken during the execution of the project and will be responsible for clearance and transmission of financial and progress reports to the Global Environment Facility. UNEP retains responsibility for review and approval of the substantive and technical reports produced in accordance with the schedule of work.

Each country will create a **National Project Unit** (NPU) to secure participation of responsible institutions and organizations within each country to carry out the different project activities. The Project execution in the five countries will be performed by the National Coordinators. The technical representatives of each country in the CIC will be the National Coordinators, responsible for their respective NPUs. The National Coordinators are responsible for the coordination of the execution of the activities in their national territories, articulation of participation in the inter-institutional program, and collection and delivery of needed information. The Project will contract local experts selected by the ITC and National Coordinators, with the approval of the OAS and UNEP. The NPUs will coordinate the thematic groups with the participation of diverse governmental institutions related to the various issues and prioritized areas of the FSAP—such as the alert system, and management of land use and soil degradation, water quality, biodiversity, navigation and electric power generation, amongst others—in each country. Young professionals with scholarships may support the NPU as the need arises. (see point 1.2).

CIC – La Plata Basin



6. Relationship with other Projects (GEF and others).

An OAS-led study of the la Plata Basin in the 1970s and again in the 1980s identified potential opportunities and limitations for economic and social development. It noted the Basin's great hydroelectric potential and the strategic importance of using the tributaries of the Basin for navigation. Critical areas were identified, such as the Pilcomayo River and the Bermejo River basins, with great soil erosion rates and sedimentation concerns, and the Pilcomayo River, with serious environmental impacts due to mining activities, and recognised as "hot spots." The hydrological analysis of the Basin showed the importance of the Pantanal both in terms of its hydrological role and biodiversity value. The first GEF-IW projects in the region were informed by the OAS studies. Although these projects were in many aspects very successful, they lacked of a coordination framework. This project provides the linkages and context for these ongoing and previous efforts. The active GEF funded projects in the Basin are:

- **Strategic Action Plan for the Bermejo River (SAP-Bermejo).** The Binational Commission for the Bermejo River and Upper Tarija River (Argentina-Bolivia) is executing a project designed to promote sustainable environmental development of the basin and mitigate natural erosion phenomena exacerbated by human activities. The basin generates 80% of the sediment loads to the la Plata estuary limiting navigation and increasing transportation costs, to the detriment of the development of MERCOSUR. Total Cost: US \$ 25,726,000 (GEF US \$ 11M).
- **Implementation of Integrated Management Practices for the Water Resources of the Pantanal/Alto Paraguay.** The government of Brazil through the Agencia Nacional de Aguas (ANA) is actively working in the development of a program for the integrated management of the water resources of the Upper Paraguay River Basin. Land use changes in this Basin affect the world's greatest wetland, the Pantanal, and its biodiversity. This natural reservoir regulates the whole hydrology of the la Plata Basin, retaining water during six months and minimizing potential flooding downstream. Total Cost: US \$ 16,403,000 (GEF US \$ 6,615,000).
- **Environmental Protection of the la Plata River and its Maritime Front, to prevent and control contamination and habitat restoration - FREPLATA.** The la Plata River and its maritime front, shared by Argentina and Uruguay, have an enormous biological diversity. This is the rationale for a GEF project designed to improve knowledge and protect this important ecosystem. Total Cost: US \$ 8,119,036 (GEF US \$ 5,682,290).
- **Environmental Protection and Sustainable Development of the Guarani Aquifer System.** Groundwater of the Guarani Aquifer System, which is largely coincident with the la Plata Basin, is being protected with GEF support in agreement with the four countries which share it: Argentina, Brazil, Paraguay and Uruguay. Total Cost: US \$ 26,760,000 (GEF US \$ 13,400,000).
- **Sustainable Land Management in the Transboundary Ecosystem of the Gran Chaco Americano.** This project although still in the PDF-B stage will be developing a Sub-regional Action Program for the sustainable development of the Gran Chaco Americano, within the legal framework of the Convention to Combat Desertification. This Project is being developed by Argentina, Bolivia and Paraguay and will help enhance the knowledge of this semi-arid region and provide remedial actions as input to the Plata TDA/SAP process. Total Cost: US \$ 14,000,000 (GEF US \$ 6,000,000).

In addition to those mentioned above, other projects, such as for example the EU funded Master Plan for the Pilcomayo River basin, are also being executed, all without an integrated framework

to ensure coherent efforts and an efficient use of human resources and financing applied. Hence again the proposed Plata initiative will look into coordinating all existing efforts under a consolidated management framework.

7. Project financing and incremental costs

The total budget of the Project is US \$ 61,291,962 (excluding PDF-A and B grant) with the GEF grant amounting to US \$ 10,730,000 and co-financing amounting to US \$50,561,962. The detailed financing information per component is presented in Table I. The total government counterpart is US \$ 25,271,077 corresponding to in-kind contributions from: Argentina US \$ 7,756,270; Bolivia US \$ 4,095,542; Brazil US \$ 6,652,702; Paraguay US \$ 4,729,493; and Uruguay US \$ 2,037,070.

As per Table II, co-financing also includes: **1)** US \$ 6,400,000 from **CPTEC/INPE/MMA**—for regional climate projections with a global climate model developed in the region and implementation and strengthening of forecast centres; **2)** US \$ 650,000 from **CLARIS**—the Europe-South America Network for Climate Change Assessment and Impact Studies for climate scenario generation for the la Plata; **3)** US \$ 1,240,000 from **ITAIPU Binational** for software capacity building and provision of technology for the Parque Tecnológica ITAIPU, for implementing projects in the biodiversity corridors, in fisheries, sustainable resource management and monitoring, and in invasive species control to be developed in the Parana III and drainage sub-basins of the Itaipu Dam including implementation of a quality water network in Itaipu Dam and its tributary streams; **4)** US \$ 28,000 in kind from **UNESCO**, through the transboundary aquifers programme (ISARM-Américas) for the Toba Aquifer; **5)** US \$ 250,000 in kind from **UNESCO** International Hydrological Program (IHP) for the formulation of the hydrological balance; **6)** US \$732,500 from the **Pilcomayo Commission** involved in the integrated management and master planning project for the Pilcomayo River for the implementation of a water quality network in the Pilcomayo River; **7)** US \$ 200,000 from **CARU** under the Ecological Monitoring Project looking at the establishment of a water quality alert system, incorporating water quality stations in the Uruguay River into the Monitoring Network of the la Plata Basin, and for land use assessment looking at the expansion of agricultural frontiers in the la Plata Basin; **8)** US \$ 200,000 from **JICA/SEAN-SENASA** through the water quality network and contamination monitoring program; **9)** US \$ 2,451,000 from **FONPLATA - CAF** for the implementation of the pilot demonstration projects; **10)** US \$ 225,000 in kind from **OAS**; **11)** US \$ 300,000 from the **Technical Office of Pilcomayo and Bermejo Rivers** in Bolivia; and **12)** US \$ 7,500,000 from **ITAIPU Binational** for the *Cultivando Agua Boa* program.

With respect to incremental costs, the total estimated cost for the alternative scenario is US \$80,028,641. The baseline is estimated at US \$ 15,243,571. The difference between alternative and baseline, totalling US \$64,785,070, represents the incremental cost of Project execution, and reflects the order of the global benefits accruing to the environment. This is proposed to be supported by the GEF (US \$ 10,730,000), with co-financing (US \$ 16,222,150), and counterpart contributions (US \$ 34,339,812), details of which are set forth in Annex A.

Table I. Component budget with source of financing

	GEF	Government Counterpart	Other Counterpart	Co-Financing	TOTAL
Component I					
Strengthening basin-wide cooperation	1,823,000	2,823,850	0	315,500	4,962,350
Technical and Institutional Capacity Building	1,129,500	2,299,750	0	225,500	3,654,250
Harmonization of Conceptual, Legal and Institutional frameworks	60,000	79,500	0	0	139,500
Decision Support System	634,000	444,600	0	90,000	1,168,600
Public Participation	650,000	366,280	0	0	1,016,280
Communication and Promotion of Public Participation	200,000	162,791	0	0	362,791
Education for Responsible and Conscious Public Participation	250,000	203,489	0	0	453,489
Public Participation Promotional Fund (PPPF)	200,000	0	0	0	200,000
Project Management and Evaluation	820,000	298,000	0	0	1,118,000
Project Management	720,000	0	0	0	720,000.00
M & E	100,000	298,000	0	0	398,000.00
Total Component I	3,293,500	3,488,130	0	315,500	7,097,130
Component II					
Integrated Water Resources Management	4,491,500	7,231,231	7,500,000	1,610,000	20,832,731
Water Quality and Contamination Assessment and Monitoring	1,391,500	1,851,338	0	760,000	4,002,838
Integrated Management of Groundwater: SAYTT	1,100,000	1,827,568	0	0	2,927,568
Integrated Water Balance	400,000	1,483,525	0	250,000	2,133,525
Biodiversity Management	900,000	665,000	7,500,000	600,000	9,665,000
Control of Land degradation	450,000	1,082,000	0	0	1,532,000
Identification of Sustainable Development opportunities	250,000	321,800	0	0	571,800

	GEF	Government Counterpart	Other Counterpart	Co-Financing	TOTAL
Pilot Demonstration Projects	1,000,000	6,782,316	568,735	2,801,000	11,152,051
Biodiversity (Parana River)	250,000	2,595,000	0	1,000,000	3,845,000
Forecasting System (Paraguay-Paraná)	250,000	2,558,300	0	641,000	3,449,300
Use Conflict (Cuareim-Quaraí)	250,000	282,616	0	610,000	1,142,616
Mining Contamination (Pilcomayo)	250,000	1,346,400	568,735	550,000	2,715,135
SAP Formulation	1,045,000	1,968,500	1,000,000	700,000	4,713,500
TDA and SAP Preparation	945,000	1,968,500	0	700,000	3,613,500
Specific studies	100,000	0	1,000,000	0	1,100,000
Total Component II	6,536,500	15,982,047	9,068,735	5,111,000	36,698,282
Component III					
Adaptation to climate variability and change					
A hydroclimatic forecasting system for the la Plata Basin	900,000	5,800,900	0	10,795,650	17,496,550
Total Component III	900,000	5,800,900	0	10,795,650	17,496,550
TOTAL	10,730,000	25,271,077	9,068,735	16,222,150	61,291,962

Table II. Program Co-financing Detail

Co financing sources			
Name of co- financier	Type	Amount in USD	Status
Government in-kind co-financing			
Argentina	In-kind	7,756,270	Confirmed in endorsement letter
Bolivia	In-kind	4,095,542	Confirmed in endorsement letter
Brazil	In-kind	6,652,702	Confirmed in endorsement letter
Paraguay	In-kind	4,729,493	Confirmed in endorsement letter
Uruguay	In-kind	2,037,070	Confirmed in endorsement letter
Total Government in kind co-financing		25,271,077	
Other			
CPTEC/INPE/MMA -Brazilian Research Center <i>(II.1 –Hydroclimate Forecast)</i>	In-kind	6,400,000	<u>Confirmed</u>
A Europe-South America Network for Climate Change - Assessment and Impact Studies” CLARIS <i>(II.1 – Hydroclimate forecast)</i>	In-kind	650,000	Letter of interest
ITAIPU BINATIONAL <i>(II.2 – Water quality, biodiversity and Soil degradation)</i>	In-cash	1,240,000	<u>Confirmed</u>
UNESCO-ISARM Américas <i>(II.2 – Groundwater)</i>	In-kind	28,000	<u>Confirmed</u>
UNESCO – IHP <i>(II.2 – Water Balance)</i>	In-kind	250,000	<u>Confirmed</u>
PILCOMAYO – European Union Cooperation <i>(II.2 –Water Quality and Contamination)</i>	In-kind/in-cash	732,500	<u>Confirmed</u>
CARU <i>(II.2 – Water Quality and Contamination)¹⁴</i>	In-kind/in-cash	200,000	To be confirmed
JICA/SEAM-SENASA <i>(II.2 – Water Quality and Contamination)</i>	In-kind/in-cash	200,000	To be confirmed
FONPLATA - CAF <i>(III – Pilot Projects)</i>	In-cash	2,451,000	To be confirmed
OAS <i>(I –Legal/Institutional Strengthening)</i>	In-kind	225,000	<u>Confirmed</u>
Technical Office of Pilcomayo and Bermejo Rivers – Bolivia	In-kind/in-cash	300,000	<u>Confirmed</u>
PROSUR IAI CRN-055 “Program for the study of regional climate variability, their prediction and impacts in the MERCOSUR area” <i>(II.1 Hydroclimate Forecast System)</i>	In-kind	155,650	<u>Confirmed</u>
GEWEX / CLIVAR La Plata Basin experiment (LPB) <i>(II.1 Hydroclimate Forecast System)</i>	In-kind	3,000,000	<u>Confirmed</u>
National Agency for Scientific and Technological Promotion – Argentina (07-12246) Study on the ocean and atmospheric dynamics of the La Plata River estuary with an integral numeric modeling system. <i>(II.1 Hydroclimate Forecast System)</i>	In-kind	100,000	<u>Confirmed</u>

¹⁴ Cost of water-quality sampling campaigns for the next five years.

Co financing sources			
Name of co- financier	Type	Amount in USD	Status
National Agency for Scientific and Technological Promotion - Argentina (07-12402) Climatic trends and scenarios in Argentina. <i>(II.1 Hydroclimate Forecast System)</i>	In-kind	120,000	<u>Confirmed</u>
National Agency for Scientific and Technological Promotion-Argentina (07-14420) "Scientific and technological bases for the study and forecast of mesoscale precipitating systems over Argentina. Support for a flood alert system" <i>(II.1 Hydroclimate Forecast System)</i>	In-kind	140,000	<u>Confirmed</u>
CIMA - UBA Climate variability in different temporal scales over South America. <i>(II.1 Hydroclimate Forecast System)</i>	In-kind	15,000	<u>Confirmed</u>
UBACYT-UBA Distribution of extreme precipitations in a context of nonstationary climate. <i>(II.1 Hydroclimate Forecast System)</i>	In-kind	15,000	<u>Confirmed</u>
ITAIPU Binational , "Programma Cultivando Agua Boa" <i>(II.2 Integrated Water Resources Management)</i>	In-cash	7,500,000	<u>Confirmed</u>
Comibol <i>(III Contamination (Pilcomayo River))</i>	In-kind	340,666	<u>Confirmed</u>
Pilcomayo <i>(III Contamination (Pilcomayo River))</i>	In-kind	228,069	<u>Confirmed</u>
Waterway's Intergovernmental Committee (CIH) <i>(Component IV)</i>	In-kind/in-cash	1,000,000	<u>Confirmed</u>
Total other co-financing		25,290,885	
Grand total co-financing		50,561,962	

8. Monitoring, Evaluation and Dissemination

The project will follow the standard UNEP procedures for Project Monitoring and Evaluation (administrative, technical and financial) which include quarterly and half-yearly progress reports; quarterly and annual statements of expenditures, including co-financing and counter-part contributions; a mid-term review (MTR); and a final evaluation. The MTR will be performed within the next quarter after project execution had reached the mid-term; that is, between the 30th and the 33rd months of project execution, regardless the level of execution and disbursement. The final evaluation will take place once all funds have been disbursed and all activities completed.

In addition to Project Monitoring and Evaluation activities, the project will include activities aimed at assessing the effectiveness of the Framework Strategic Action Program (FSAP) implementation in achieving its goal. The purpose of this assessment is to identify corrective measures and/or changes in the FSAP in order to achieve more effectively and timely the Development Objective set forth by the participating countries, as agreed in the Vision for the la Plata Basin, addressing the main transboundary issues and associated global benefits identified in the Macro-TDA.

The Project will further refine the Monitoring and Evaluation plan, supported in a M&E system based on the Logical Framework (Annex B). This refined Plan will be formulated by the Project Technical Unit in close consultation with the CIC, OAS and UNEP and will be approved by the Steering Committee. The M&E system will make use the software developed by the Brazilian Water Agency in support of the GEF Sao Francisco and Upper Paraguay River Basin and

Pantanal projects. This software will permit evaluation of the fulfilment of the project milestones. The indicators will be useful tools for monitoring, and considered as a continuous evaluation process of Project advancement and achievements.

The M&E system will institutionally strengthen the different Executing Program Units, supplying auxiliary equipment to develop training and capacity building activities for the responsible personnel in collaboration with the National Technical Units. The software implementation together with training and capacity activities will ensure a feedback process for decision makers. In particular, the M&E system will enable the provision of an “early alert” of the need for project modification (adaptive management) and the rapid design of corrective measures.

The M&E system will interconnect the National Technical Units with the International Technical Coordinator of the Project and Executing and Implementing Agencies to interchange monitoring data on the components and replicable pilot demonstration projects. Dissemination of project progresses, results, best practices and experiences will be catalysed by the strong public participation as per the public participation strategy as described above (see also Annex D), together with the activities undertaken under the “Public Participation Fund.”

9. Remark

Additional information on each of the proposed activities can be found on the web as follows.

www.cicplata.org -> Programas y Proyectos -> Programa Marco -> PDF-B

COMPONENT/ ACTIVITY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Component I					
Integrated Water Resources Management					
Technical Institutional and Capacity Building	■	■	■	■	■
Harmonization of Conceptual, Legal and Institutional frameworks	■	■			
Stakeholder Participation					
Communication and Promotion to the Public Participation	■	■	■	■	■
Education for Responsible and Conscious Public Participation	■	■	■	■	
Public Participation Promotional Fund (PPPF)					
Coordination of Project Activities					
Technical Coordination	■	■	■	■	■
Decision Support System	■	■	■	■	■
Administration – OAS/DSD	■	■	■	■	■
Monitoring and Evaluation	■	■	■	■	■
Component II					
Integrated Water Resources Management					
Water Quality and Contamination Evaluation and Monitoring	■	■	■	■	■
Integrated Management of Groundwater: SAYTT	■	■	■	■	■
Pilot Demonstration Projects					
Biodiversity (Parana River)	■	■	■	■	
Forecasting System (Paraguay-Paraná)	■	■	■	■	
Use Conflict (Cuareim-Quarai)	■	■	■	■	
Mining Contamination (Pilcomayo)	■	■	■	■	
Integrated Water Balance	■	■	■	■	■
Biodiversity Management	■	■	■	■	■

COMPONENT/ ACTIVITY	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Control of Land degradation		■	■	■	■
Identification of Sustainable Development opportunities		■	■	■	■

SAP Formulation	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
TDA and SAP Preparation		■	■	■	■
Specific studies		■	■	■	

Component III	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Adaptation to climate variability and change: A hydroclimatic forecasting system for the Basin					
Medium, long-term climate change	■	■	■	■	■
Short term forecast - floods and drought		■	■	■	■

■ Indicates development of the activity

■ Indicates maintenance or update