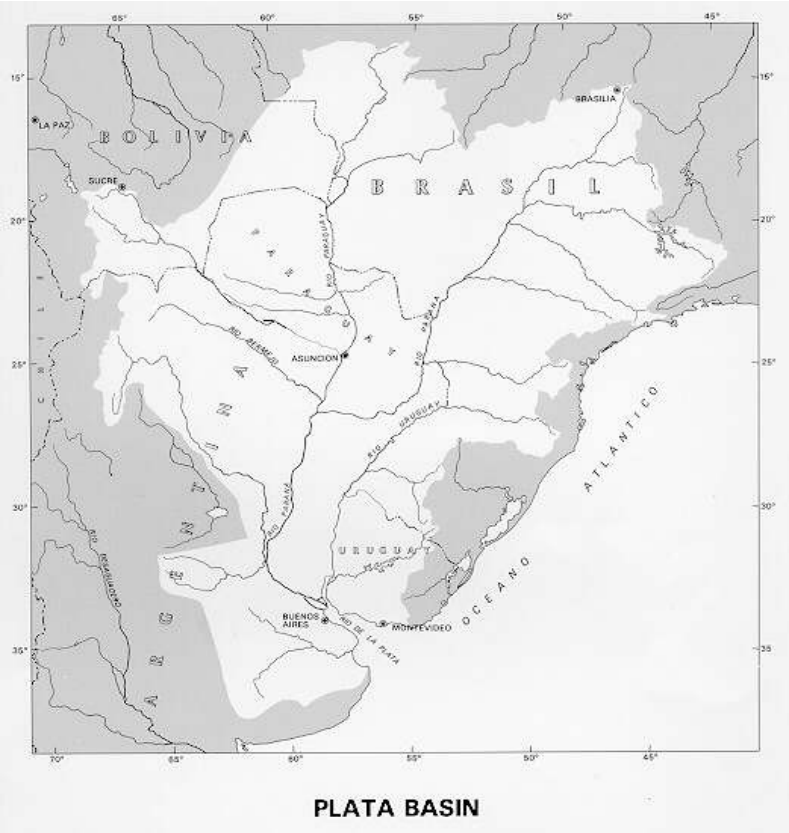
CONFRONTING THE CHALLENGES OF CLIMATE VARIABILITY AND CHANGE THROUGH AN INTEGRATED STRATEGY FOR THE SUSTAINABLE MANAGEMENT OF THE LA PLATA RIVER BASIN (LPB)[1]

Global importance of the La Plata River Basin

The La Plata River Basin (LPB), which extends over approximately 3.1 million km^2, is one of the largest river basins in the world and drains approximately one-fifth of the South American continent, including 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 (Map 1). Water and nutrients from the central regions of South America discharge through the La Plata River to the South Atlantic Ocean, creating in its maritime front, one of the richest and most diverse marine ecosystems in the world.

The LPB is comprised of three large river systems; the Paraná River, the Paraguay River, and the Uruguay River. The Paraguay River has an average annual flow of 3,800 m^3/s (at Pilcomayo Harbour); the Parana River has an average annual flow of 17,100 m^3/s (at Corrientes); and the Uruguay River has an average annual flow of 4,500 m^3/s. These last two rivers converge to form the La Plata River, which drains into the Atlantic Ocean, with an average output of 25,000 m^3/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 extensive area of biological diversity and productivity.

Important groundwater systems include the Guaraní Aquifer System (1,190,000 km^2), one of the largest aquifers in the world comprised of confined deep groundwater bodies and the Yrenda-Toba-Tarijeño Aquifer System (SAYTT), entirely contained within the La Plata Basin in the semiarid *Chaco* of Argentina, Bolivia and Paraguay. Climate change scenarios show an increasing

[1] Project being executed by the Governments of Argentina, Bolivia, Brazil, Paraguay and Uruguay, under coordination of the Intergovernmental Coordinating Committee for the La Plata Basin (CIC), in collaboration with the General Secretariat of the Organization of American States, through its Department of Sustainable Development, and the United Nations Environment Program (UNEP), as implementing agency for the Global Environmental Facility (GEF).

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.

The LPB is one of the most important river basins in the world, with a great number, variety, and degree of endemism in fish species (in the Paraguay River sub-basin), and an abundance of native birds (the Parana River sub-basin). Mineral resources, forests, and soil fertility make the La Plata Basin an attractive population region that favours economic development, sustaining 70 percent of the GDP of five countries that share the Basin. Present populations exceed 100 million people, with 57 cities having more than 100,000 inhabitants each — including capital cities as Buenos Aires, Brasilia, Asuncion, and Montevideo and large megalopolis as Sao Paulo, in Brazil. The Argentine, Paraguayan, Brazilian and Uruguayan economies have a strong agriculture and livestock component, as well as a significant level of industrial and service production. Agriculture and mining activities represent an important source of income within the Bolivian part of the LPB.

This economic development profile demands communication and multimode transportation systems, of which the hydrological systems are a fundamental component, interconnecting production, supply and consumption centres and harbors, and through which products are exported to different countries. The extensive navigation system of the La Plata Basin is favoured by the Southern Common Market (Mercosur) agreement[2]. The Paraguay-Paraná Waterway increased the fluvial transport of goods from 700,000 tons at the beginning of 1990 to 13 million tons in 2004, due to lower costs relative to alternative transport means. In the near future, this tonnage is expected to reach 50 million tons.

The important hydrological potential of the LPB, 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. More than 60% of this hydrological potential is already being 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. The slight increase in runoff foreseen in long-term climate forecasts could offer great opportunities for a coordinated approach to dam management.

The LPB lies in a complex climatic region. Climate, modified by short-term events associated with the El Nino/La Nina cycles associated with the thermal oscillations of the Southern Oceans (ENSO) is a determining factor in this heterogenic hydrological system. Relatively scarce rainfall and high evaporation levels define the arid and semiarid zones (Gran Chaco Americano) in the northwest part of the LPB, while heavy rainfall and runoff, exacerbated in part by deforestation characterize the northeastern zones. The great Pantanal wetland plays a key role in the storage of runoff produced by rainfall in the Alto Paraguay River sub-basin, delaying for almost six months the maximum flows to the Parana River, thereby minimizing downstream flooding.

The economic and social impacts of flooding are sources of major concern as available data for the last 20 years show that the flooding on the Parana River has become more frequent, more

[2] Treaty establishing a common market between the Argentine Republic, the Federal Republic of Brazil, the Republic of Paraguay and the Eastern Republic of Uruguay, signed in the city of Asuncion, Paraguay on 26 March 1991.

intense and of longer duration. These changes in the hydrology of the LPB are certainly related to changing climate factors, which, in turn, are exacerbated by increasing urbanization and changes in land use.

The LPB 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, which leads to problems with navigation and 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 International Waters (IW) project. In the Upper Paraguay-Pantanal area, there are significant wetland conservation problems related to increases in sedimentation, while in the *Gran Chaco* soil degradation is the principal issue being addressed through integrated land and water resources management projects being carried out with GEF support. In addition to these GEF-related initiatives, more than 20 institutions or agencies have been created with direct responsibility for implementing water resources use and management strategies in the La Plata Basin.

Threats and Barriers Identified.

Between 2003 and 2005, a GEF/UNEP PDF-B project supported activities to agree a common **VISION** for the sustainable development of the LPB. The project was prepared under the leadership of the Intergovernmental Coordinating Committee for the La Plata Basin (CIC) with executing support from the Department of Sustainable Development of the OAS. These activities have allowed for the completion of a macro-diagnostic analysis of the LPB that identifies the main transboundary problems and their causes. The condition of the hydrological system was confirmed through a wide-ranging participatory process

The diagnosis revealed that strong anthropogenic interventions have accelerated the natural dynamic resulting in severe environmental impacts which complicate development efforts, increase social problems, and threaten the environmental sustainability of the LPB. The baseline framework identified nine critical risks facing the countries and communities of the LPB as follows:

- **Extreme hydrologic events linked to climate variability and change,** particularly in terms of the more frequent, longer in duration, and more intense floods and extensive droughts that periodically affect some LPB communities as a result of the El Nino/La Nina cycles.

- **Gaps in climatic data** and climate knowledge were identified with clear implications for efficient and effective modelling of climatic variability and for designing effective mitigation and adaptation strategies. The addition of gases, such as carbon dioxide, into the atmosphere from forest fires and crop burns (slash and burn practices) was identified as elements contributing to climate change.

- **Water quality degradation** resulting from organic and chemical contaminants linked to unregulated mining and industrial activities, and sewage water discharges and pollution mainly from agriculture activities with intensive agrochemical use have the potential to reduce the utility of the waters of the La Plata Basin. In addition, lack of common or shared standards and instrumentation to determine quality parameters, and limited control and monitoring networks in the five countries have not allowed for a coherent and comprehensive water quality regime to emerge.

- **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 use of the waters of the La Plata Basin for human consumption, but also the health of its ecosystems.

- **Biodiversity alteration**, in particular in fluvial and coastal ecosystems including wetlands, resulting 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 LPB.

- **Unsustainable management of fisheries resources**, due to overexploitation or lack of capture protection measures to limit incidental catches of non-target species, has important ecological and economic consequences for the La Plata 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 La Plata River, and create further ecological modifications affecting human and natural uses of the aquatic systems. Unsustainable abstraction of groundwater and the salination and contamination of groundwater resources can have similar impacts throughout the LPB, especially in the semi-arid *Chaco* (Argentina, Bolivia, and Paraguay).

- **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.

- **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 natural crises such as floods and droughts, can exacerbate the social, economic and environmental consequences of such disasters.

- **Unsafe water and environmental sanitation conditions** caused by contamination and deterioration of water quality can affect human and ecosystem health. Further bacterial blooms are further aggravated by agricultural runoff, industrial discharges, and anthropogenic river flow modifications.

The Macro-Transboundary Diagnostic Analysis, conducted during project preparation process, enabled the identification of the principle existing barriers that potentially limit an effective response to these challenges by the LPB countries and that must be overcome or mitigated. These barriers include:

- **Lack of planning capacity to manage the diverse demands for shared resources** basin-wide, exacerbated by the fact that responsibility for various components of the system is distributed among different juridical structures in federally and centrally governed LPB 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, which in turn fosters 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 regarding water quality and land management.

- **Weak institutions** and low levels of support for assigned competencies limit agency and societal responses to the identified challenges. The CIC has sound planning, management and coordination mandates, but is limited by its weak technical capacity. The national organizations that are working on issues of common concern focus on national priorities, and have not used the CIC to its fullest potential to address activities of a transboundary nature. Furthermore, some asymmetries were identified in implementing an integrated management policy within the LPB as a whole, due to the diversity of national objectives and their differing legal and institutional frameworks. Lack of organized stakeholder participation to support sustainable water resources management is a common feature in the five countries.

- **Lack of an integrated water resources management vision** reinforces sectoral biases, and scant information from existing meteorological stations in key regions of the LPB limits awareness of the connectivity that is inherent in the component waters of the La Plata Basin. The protection and management of aquifers in the five countries is especially weak and disconnected from the protection offered to surface water resources.

- **Inappropriate land and soil use**, resulting from the expansion of the agricultural frontier, and the 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 increased transport of particulates and their deposition in rivers, lakes, and dams.

- **Technological limitations on agricultural production** resulting in deforestation, "slash and burn" 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 LPB scale.

- **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 had an adverse impact on fish migrations, biological cycles and ecosystem tropical zones. Similarly, the introduction of exotic species, like the "*mejillón Dorado*," to provide nutrients in the nutrient-poor tropical zones 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 LPB. These

latter impacts affect the livelihoods of disadvantaged communities which depend upon the La Plata River for their 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 intensive urbanization experienced over the last decade has increased impervious surfaces and imposed (partial) canalization and 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.

Scales for action

While the threats and barriers summarized above are common throughout the LPB in general, scale and intensity of their impacts vary considerably between sub-basins. Consequently, the mitigation of the more significant impacts on both humans and ecosystems require regional-level actions as follows:

- At the **Upper Paraguay River Basin:** the enormous Pantanal wetland acts as a great dam in the headwaters of the La Plata system, retaining large and increasing amounts of sediment originated from agriculture on the highlands. Sediment is a great threat to the richness of the species in 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.

- At the **Lower and Middle points of the Paraguay River:** Notwithstanding the volume of the upper basin flows a negative hydrological balance exists at these points of the River. Along the main river course, floods frequently affect the City of Asuncion, capital of Paraguay. This portion of the Paraguay 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 is a major source of contamination arising from mining activities. The Bermejo River transports 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 *Gran Chaco Americano* is located on the western side of the LPB in an important semiarid region that overlies the Yrendá-Toba-Tarijeño Aquifer System (SAYTT).

- At the **Upper Paraná River, upstream** of ITAIPU dam: the sub-basin has the highest number of dams, which has diminished river flow. The high deforestation rates expose the soils, making them more vulnerable to erosion. In the last decade, production 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 Sao Paulo and Brasilia, adds to all these factors accelerating the euthrophication process of the Upper Parana River.

- At the **Lower and Middle Paraná 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 there is no common and joint management policy. This portion of the La Plata River 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.

- At the **Upper Uruguay 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 south. This portion of the LPB is subject to a variety of agricultural land uses, with rice, soybean 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.

- Al the **Lower Uruguay River** conflicts between the use of water for irrigating rice fields was identified, affecting city supplies and ecological flows, particularly in the Cuareim-Quarai River 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 **Río de La Plata** is the last part of the LPB's waterways, through which the Parana and Uruguay rivers discharge into the South Atlantic. Its main feature is the confluence with oceanic water and the high nutrient levels 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 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 Nino/La Nina cycles had a dominant influence on the hydrology of the La Plata Basin. These scenarios were examined over 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 LPB. These changes in rainfall can affect land use and soil loss, and upset the delicate balance between precipitation and evaporation in the enormous plains of the LPB. At the basin level, these changes can increase the risk of flooding, especially when rainfall consistently exceeds historical levels. These scenarios are based on a variety of climate models, all of which demonstrated a consistency of output suggesting a trend toward increasing precipitation.

As a consequence of increasing concentrations of greenhouse gases in the atmosphere, surface temperature in the region is expected to increase by between 2°C and 5°C leading to increased evaporation, which is likely to offset the increase in precipitation to the extent that the models forecast a greater likelihood of drought in the LPB, especially in the *Gran 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 sudden or erratic. The increase in the periodicity in precipitation, coupled with the reduction in available moisture due to higher evaporation and reduced runoff, can significantly impact human economic activities dependent on

rainfall and runoff. In particular, the likely reduction in mean annual runoff has the potential to reduce hydroelectric power generation and by extension social and economic development, as suggested by the data from the Parana River Basin in north-eastern Argentina presented below.

Table 1: Reduction in annual runoff and economic impact, Parana River Basin, north-eastern Argentina

Year	Parana River Basin, mean annual runoff (m3/sec)	Area affected (millions of hectares)	Economic losses ($US millions)	Number of people affected
1982–83	50,882	4.0	1,790	177,035
1992	48,790	3.0	905	133,106
1997–98	33,000	18.5	17,502	121,348

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 been utilized to develop these scenarios. To this end, acquisition of more complete data on current hydro meteorological conditions in the La Plata Basin forms an important element of this project. These data will contribute to the development of La Plata Basin-specific models.

Project Rationale and Objectives

The sustainable development and management of the LPB concentrates the efforts of all five countries to take advantage of the opportunities and overcome the barriers to resolving the critical transboundary issues. Coordination and cooperation between the country-level actions is one of the main objectives of the CIC. The Project contributes to the fulfilment of that promise, constituting a first step in ensuring a holistic LPB-wide integrated approach to its integrated management.

The overall **project objective** is to strengthen transboundary cooperation among the riparian country governments of Argentina, Bolivia, Brazil, Paraguay, and Uruguay to ensure management of shared water resources of the LPB in an integrated sustainable manner, within the context of climate variability and change, while capitalizing on development opportunities.

The **project outcome** is the riparian governments' ability to coordinate actions and investments in the LPB for sustainable utilization of water resources within the context of climate variability and change. This basin-wide project builds on existing projects and programs coordinated and executed by the CIC under the La Plata Basin Treaty, and provides context for linkages between previous GEF-supported efforts within the LPB.

The **result 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 water resources, and initiate 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. These multiple approaches reflect the complexities of the LPD, the regional distribution of priority concerns, and the diversity of ecosystems, while

recognizing the unifying role of the La Plata River and the connectivity of the upstream and downstream portions of the hydrologic system.

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 Framework Program.

The Project Structure and Proposal

The proposed Project includes four Components.

Component I aims at "**Strengthening Basin-wide Cooperation Capacity for Integrated Hydro-climate Management"** to establish the technical and legal conditions necessary for providing the participating institutions with the management capacity for the formulation of an Strategic Action Program (SAP), and its subsequent implementation. The intention is to develop a harmonized legal framework for the LPB for integrated water resources management based upon plausible climate change scenarios, and to provide planning, coordination and oversight. The main actions to be developed are:

1. Harmonizing the Institutional and Legal Framework:
    - Strengthening Technical Institutional and Capacity Building for integrated management of the LPB.
    - Strengthening the Conceptual of Legal Frameworks.
    - Implementing CIC-LPB-Decision Support System.
2. Promoting Stakeholder Participation, Communication, and Education, thruout:
    - Public Participation Program.
    - Public Awareness Education Program.
    - Implementation of a Public Participation Fund (PPF) for the IWRM, for the Protection of the large wetland corridors of the Paraguay, Paraná, Uruguay, and La Plata Rivers and for adaptation to the effects of climate change and variability, implementation of clean technologies.
3. Monitoring and Evaluation of the Plan, as an integral part of Project Management.

Component II which constitutes the heart of the project aims to promote **"Integrated Water Resources Management**" in the LPB, and will provide the diagnostic and feasibility analyses, implementation costs, and technical information necessary to formulate a SAP for the LPB. The achievement of this objective will involve synthesizing and compiling information gathered from scientific investigations, feasibility studies, and institution/capacity assessments into a management strategy for the LPB. This Component includes elements necessary for the development and implementation of the principles of integrated water resources management in the La Plata Basin by:

- Preparing an **Integrated Water Balance** for the LPB, with HIP-UNESCO support and methodology.
- **Assessing and monitoring the water quality** 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 monitoring water quality.

- Including **integrated groundwater management,** to develop information and preliminary guidelines for the integrated management of surface and ground water resources of the LPB, 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.*
- Promoting LPB **ecosystem management** to harmonize national biodiversity strategies within the LPB with a particular focus on wetlands, coastal ecosystems, and biological corridor conservation, sustainable fishing, and exotic species control.
- Controlling **land degradation** to harmonize national actions related to the control of land degradation within the LPB, consolidating regional strategies under the United Nations Convention on Desertification.
- Promoting clean technologies and capturing greenhouse gases to mitigate climate change and promote ecotourism and navigation among the islands, coastal waters and wetlands of the Uruguay River.
- Implementing **Pilot Demonstration Projects** and scaling-up strategies to provide local management experience, test the feasibility of the proposed measures, and determine the actual costs of specific interventions, focusing on the resolution of critical problems in selected areas and sub-basins, including: i) Pilot demonstration for **Biodiversity Conservation in the Regulated Parana River,** ii) Pilot demonstration for a **Hydrological Alert System at the confluence of the Paraguay and Parana Rivers;** iii) Pilot demonstration to **Resolve Water Use Conflicts in the Río Cuareim/Quarai Basin,** and, iv) Pilot demonstration to **Erosion Control in the Cotaigaita** micro basin of the Pilcomayo River.

Component III, related to **Hydro-climatic Models and Scenarios for Adaptation in LPB** focuses on foundational activities required for supporting adaptation to climate change and variability within the LPB. 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 Argentina, Bolivia, Brazil, Paraguay and Uruguay. Under this Component a series of LPB-wide climate scenarios will be considered as a "foundational" activity pursuant to the UNFCCC, to increase knowledge and technical and operational capacity within the five countries of the LPB 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.

Component IV will be instrumental for the preparation of a **Transboundary Diagnostic Analysis (TDA) and the Strategic Action Program (SAP)** and to better define priority actions identified in the Framework Program.

Project's Execution Arrangements and Costs

The project will be executed over a five year period (2008-2013), effective September 1st, 2008. It is anticipated that project execution arrangements could help to catalyse other related efforts as the European Commission, FONPLATA (LPB Development Fund), and UNESCO-IHP, emerged as the most important CIC partners at the time the Project was prepared.

The execution of the Framework Program will be undertaken by water management institutions in each of the five participating countries of the LPB, under the direction of the CIC Secretary-General and within the framework of the CIC. The Department of Sustainable Development of

the OAS, in its capacity as a technical specialised body of the OAS was selected as the regional executing agency for the GEF/UNEP funds.

The total cost of the Project is US$62 millions with US$11 million coming as a grant from the GEF, and US$51 million as co-financing and counterpart financing from the five participating countries.

Department of Sustainable Development
Organization of American States
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