

## STRATEGIC ACTION PROGRAM FOR THE BINATIONAL BASIN OF THE BERMEJO RIVER Executive Summary

### Introduction

The Bermejo River Basin, in southern South America, extends over some 123,000 km<sup>2</sup>, originating in the Andes Mountains of northwestern Argentina and southern Bolivia. The river, which flows some 1,300 km, links two major geographic features: the Andean Cordillera and the Paraguay-Paraná Rivers. It is the only river that crosses completely the huge expanse of the Chaco Plains, acting as a corridor for the connection of biotic elements of both the Andean mountains and the Chaco Plains. Radically differing weather and topographic conditions in the large basin promote an array of rain forests, humid valleys, and mountain deserts in the Upper Basin and dry forests as well as humid and gallery forests in the Lower Basin. There is exceptional habitat diversity along the water course.

Sediment loadings in the Bermejo waters are some of the highest in the world (8 kg/m<sup>3</sup>). Total discharge of sediment is on the order of 100 million tons/year. The greater part of the sediment is produced in the Upper Basin and flushed down during peak floods. The amount of sediment deposited along the course of the Lower Basin during floods regularly changes the course of the river, impeding a rational use of water and land resources. The population is estimated at 1.2 million, the majority being rural workers, small farmers, and indigenous communities, with the lowest levels of income, education, and sanitary conditions. The basin has a history of "extractive" exploitation of forests, which has resulted in diminished biodiversity and impoverished natural resources. Clearing of land for cultivation and widespread overgrazing has created problems of erosion and desertification, aggravating sediment mobilization that has contributed to downstream environmental degradation.

To promote development in the region, both governments have agreed to construct a series of multi-purpose water resources development projects in the Upper basin. Bidding for their construction has already been initiated. Other provincial and local projects are also underway or planned. In 1995, the two governments created a Binational Commission as a permanent legal and technical mechanism responsible for managing the Upper Bermejo and Grande de Tarija River basins, seeking to achieve the sustainable development of its area of influence, optimize the use of its natural resources, generate employment, attract in-



vestment, and provide for rational and equitable use of its water resources. In 1995, the Binational Commission requested GEF assistance for the preparation of a water resources management program in the binational watershed. This assistance, provided through a PDF Block B Grant, helped with the preparation of a project proposal for the formulation of a Strategic Action Program (SAP), seeking to solve the priority transboundary environmental problems affecting the basin, particularly soil erosion and sedimentation, water degradation, and biodiversity loss.

The preparation of the SAP, between 1997 and 1999, comprised the identification of priority transboundary environmental concerns and related sectoral issues; the implementation of pilot demonstration projects to assess the feasibility and relative costs of specific remedial measures; and the establishment of a comprehensive public participation and consultation process for the planning and implementation of development projects in the basin. This Executive Summary

summarizes the major findings and recommendations of the two year SAP planning phase.

The development of the SAP was the outcome of a highly transparent, public interaction process that has identified community-based mechanisms for the protection of the water resources of this Plata Basin tributary river system. The public was not only consulted throughout the SAP formulation process, but actively participated in it. The effort involved work by community level organizations, non-governmental institutions, official local, state and federal agencies, and the private sector. A total of 260 consultants were hired to produce specific studies, implement pilot demonstration projects, and collaborate in preparing the final reports. Overall, more than 70 different institutions have directly or indirectly participated in the process. There were 12 regional workshops or seminars involving approximately 1,300 participants. The workshops identified major problems, their causes and possible solutions. Also, as a result of these workshops, a series of working groups of government, civil society, and local experts were established to accompany the SAP preparation process. A Web page was established, which not only promoted access to a steady stream of preliminary reports and information about study conclusions, but also facilitated an interactive discussion forum for preliminary findings and recommendations

As a result of this process, an expectancy has been created among the riparian communities of greater citizen involvement in the management of the land and water resources of the Basin. While this expectancy differs in quality between the Bolivian portions of the Basin—where public participation has been an element of governmental planning for some time, under the law for popular participation—and the Argentine portions, the basic concept is one of public involvement in the sustainable use and protection of the Basin's land and water resources through a process of

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dialogue between decision-makers and local communities. The present project is proposed as a means of giving effect to this concept. It draws upon the results of studies and pilot demonstration projects completed prior to and during the process of completing the Transboundary Diagnostic Analysis (TDA) and develop-

ing the SAP, and seeks to facilitate actions by the governments of Argentina and Bolivia to promote sustainable development in the binational and interjurisdictional basin of the Rio Bermejo (CBRB).

To begin the process of implementing the developmental and environmental guidelines of the SAP, a small part of the total program included in the SAP was selected. They comprise a specific set of high priority, incremental activities that will lay the groundwork for the execution, on a participatory and sustainable basis, of the larger set of remaining strategic actions. Successful implementation of these actions will provide support to the efforts of local, regional, national, and binational institutions in starting to address the principal causes of the environmental problems affecting the Bermejo Basin--erosion, sedimentation, water scarcity and availability restrictions, water resource degradation, loss of biodiversity, losses due to floods and other natural hazard events, and diminished quality of life and endangered cultural resources--and will set the path toward the sustainable development of the CBRB.

The four components that together embrace all project activities are: (1) institutional development and strengthening for integrated planning and management; (2) environmental protection and rehabilitation; (3) sustainable development of natural resources; and, (4) public awareness and participation. These priority components have been identified through a process of broad-based public participation. Their activities and associated costs are detailed below.

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## THE BOTTOM LINE

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Major findings of the transboundary diagnostic analysis are listed below.

### Soil Degradation

- Studies found that more than 50% of the binational basin is subject to erosion processes that range from significant to very severe. While both erosion and desertification are clearly related to natural conditions of topography, soil susceptibility, and torrential rain patterns, it is evident that human activities have been decisive in accelerating both processes during the last 50 years. Studies indicate that more than 60% of the rangelands of the Bermejo Basin are either overgrazed or improperly managed.
- Small-scale sediment control methods tested in the Tolomosa subbasin produced cost-effective designs that could help reduce transboundary sediment load and achieve local benefits by providing irrigation for small farmers, improving local agriculture and/or protecting local reservoirs. Other soil management demonstration projects, carried out during the study in the Central Valley of Tarija in the Upper Basin, showed promise and may be replicable.
- Severe and very severe salinization is affecting primarily the semiarid-Chaco region. Desertification is already affecting 38% of the overall basin area, 18% under severe and very severe conditions.

### Water Resource Degradation

- While not yet a major transboundary problem, water quality protection and restoration is a growing concern as the Bermejo region develops. In the Bolivian section of the Upper Basin, where water-quality deterioration problems appear to be localized, 68% of the surveyed sites had restrictions by bacteriological contamination.

### Water Scarcity and Availability Restrictions

- Water supply is a serious problem in the Basin. The extreme water shortage during the dry season, affecting almost a third of the Basin area, not only diminishes the living conditions of an already deprived local population, but also limits the devel-

opment potential of otherwise favorable agricultural production zones. Irrigation is a clear economic as well as social priority.

### Loss of Biodiversity and Biotic Resources

- The clearing of land for cultivation, and the intense selective exploitation of forest resources, have modified the natural endowment of the Basin. The study showed that severe or very severe deforestation is affecting 26% of its natural forests, and 15% of its total area is at risk for major biodiversity loss. Moreover, data shows an alarming increase in deforestation rates during the last three decades.
- Twenty-four species of flora and fauna have already been categorized as vulnerable. Eighteen of these are at risk.
- Pilot studies conducted suggest that community-extension programs aimed at promoting sustainable production alternatives, and the creation of integrated community-based units in the Basin to serve the ecotourism market, are viable means of preserving remaining areas of natural habitat in the region.
- Buffer zones should be used more extensively to reduce human impact on fragile ecosystems, and the creation of environmental corridors linking areas of significant habitat value was seen as a critical action. Favorable experience with these approaches in the Yungas Cloud Forest region of Argentina and Bolivia can be replicated in the Lower Basin.
- Further research is clearly needed on the biodiversity resources of the Basin, especially in its lower reaches. The study reaffirmed the importance of making a careful analysis of biodiversity issues within large river basins, particularly regarding biological corridors.

### Floods and Other Natural Hazard Events

- Natural disasters have severely affected both rural and urban infrastructure and economic production systems (mainly crop and cattle areas). Flood events, caused primarily by river overflows during the rainy season, severely affect 7% of the Basin area, including the city of Tarija in Bolivia. In

Chaco Province alone, more than 390,000 hectares were flooded during the 1983-84 season.

- Waterlogging, which occurs in the Lower Basin, affects 7% of the Basin area. Other natural events like drought, hail, and freezes occur primarily in the Eastern Cordillera, affecting agricultural production and forcing seasonal migration of rural populations.

### **Diminished Quality of Life and Endangered Cultural Resources**

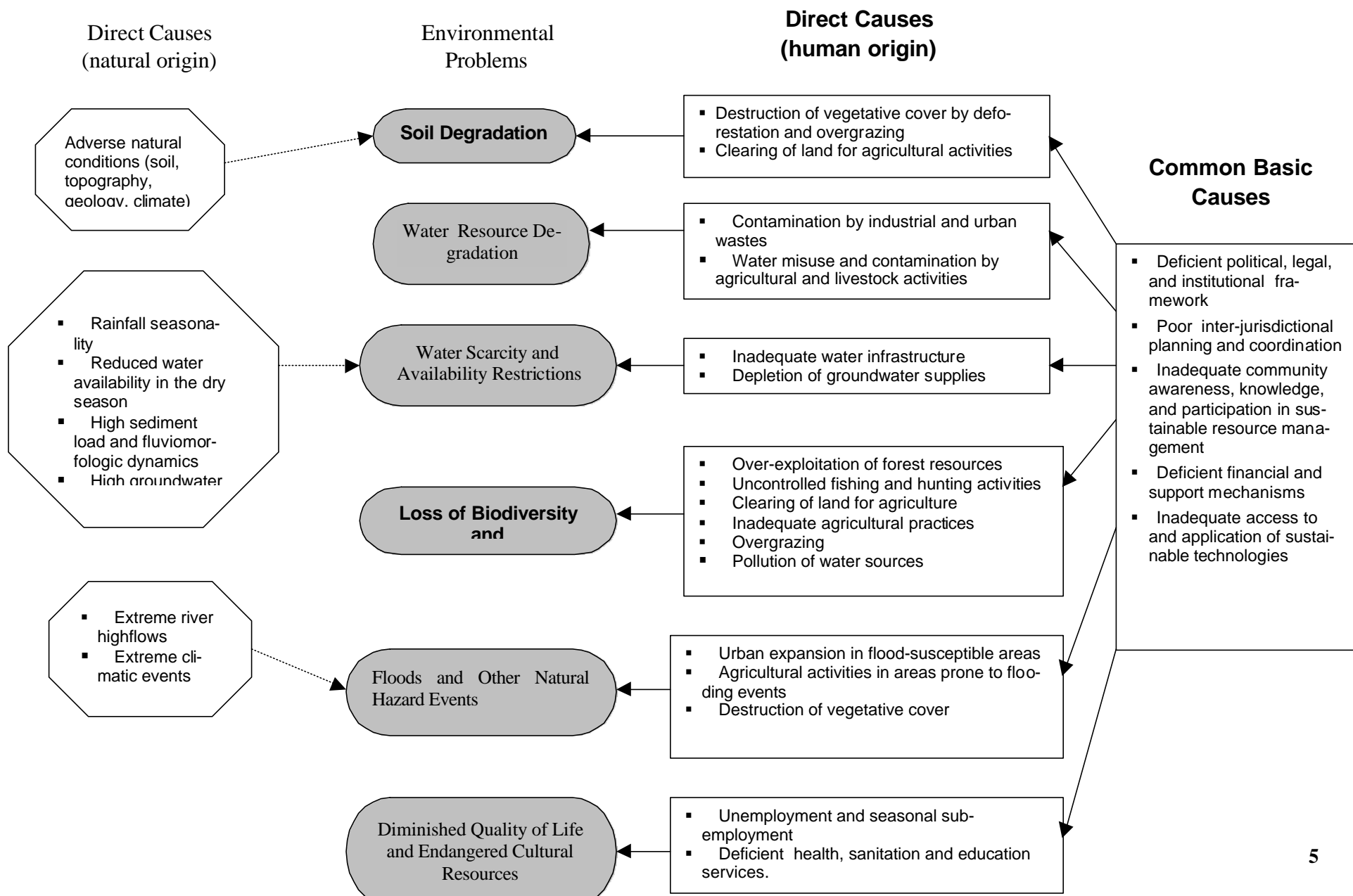
Moderate and extreme poverty is widespread in the basin, affecting particularly small farmers, native indigenous populations, and marginal urban centers. Data collected during the planning phase show over 40% of the population with unsatisfied basic needs. A large number of the population are illiterate, and most have no access to medical care.

- Permanent and temporary migration of seasonal workers constitutes an important transboundary symptom of prevalent poverty and unemployment. A socioeconomic survey conducted in Tarija, Bolivia, indicated that more than 32% of the population has gone at least once to Argentina in search of employment opportunities and better living conditions. These processes increase human pressure on the limited available natural resources, and promote unsustainable production practices.

### **Causal Chain Relationship**

The analysis of the causal-chain relationships provided information on the underlying basic actions that were originating and/or exacerbating the effect of each environmental problem identified. Basic causes (natural and man-made) specifically related to each of the priority environmental problems were identified and discussed in a participatory manner, through a series of regional workshops, seminars, and meetings of specialized working groups. For those causes of human origin, five appeared common to the priority environmental problems identified. These are: (1) deficient political, legal, and institutional framework; (2) poor planning and inter-jurisdictional coordination; (3) inadequate community awareness, knowledge, and participation in sustainable resource management; (4) deficient financial and support mechanisms; and, (5) inadequate access to and application of sustainable technologies for economic production. For basin stakeholders, these issues constituted a constant threat to the stability, conservation, and protection of their sensitive land, as well as an obstacle to the adequate management of natural resources and the formulation of sustainable development programs. Therefore, specific activities oriented to address each of these root causes were prioritized by the community and form the basis of the set of actions proposed in the SAP. Figure 1 presents a summarized causal-chain relationship diagram, indicating the basic common causes, and direct causes--both from natural and human origin--related to the identified priority environmental problems.

Figure 1. CAUSAL CHAIN RELATIONSHIP FOR PRIORITY ENVIRONMENTAL PROBLEMS



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## PROPOSED STRATEGIES

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As presented in the previous section, six transboundary priority areas for ecosystem-level conservation, rehabilitation, and preservation were identified in the TDA: (1) soil degradation, primarily due to erosion and desertification processes; (2) water scarcity and availability restrictions; (3) water degradation; (4) habitat and biodiversity losses and deterioration of terrestrial and aquatic biotic resources; (5) losses due to flood-related and other natural disasters; and, (6) deterioration of quality of life of the Basin population and loss of cultural resources. These issues are endemic throughout the Basin, and most have both a natural and an anthropogenic component.

The analysis of their basic and direct causes was the subject of an extensive public consultation process, the results of which defined the strategic actions included in the SAP. To this end, a comprehensive list of current and planned programs and projects related to sustainable development and environment for the region was compiled during the initial stages of the SAP formulation process. Through consultation, those most relevant to the solution of the identified problems were selected, and included as part of the final SAP. To help shape specific action proposals, pilot demonstration projects were conducted in various representative areas during the planning phase.

The SAP has been envisioned by Basin stakeholders as a long-term action plan, designed not only to address the root causes of the critical environmental degradation processes affecting the basin, but also to promote the sustainable development of Basin communities. The program leading toward sustainable development is composed of 136 projects, to be implemented in a 20-year period, at a total investment of US\$470 million. More than 70% of this amount (or US\$331 million) corresponds to water resource development projects, mainly structures for irrigation and drinking-water supply, reflecting a long-awaited aspiration of the Basin communities. The strengthening of Basin institutions, the building of agency and organizational capacity, and the integration of environmental concerns into economic development activities are also key elements of the program.

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In many instances, while the root causes of the priority environmental problems remain unchanged along the water-course, the specific character and manifestation of the issues varies in degree between and among the five ecoregions delineated within the Basin. For example, soil deg-

radation in the montane portions of the Basin often results in sediment-related problems in the savannah portions. These include diminished opportunities to use the water resources of the Basin in a sustainable manner, impairing public health and welfare; loss of and damage to infrastructure and economic development potential; and undesirable biological impacts on both terrestrial and aquatic flora and fauna. Such issues also involve policies and practices at all levels of society that result in a fragmented and sectoral view of the Basin that exacerbate the localized and basin-wide manifestations of these impacts.

On the basis of an evaluation of these issues and their relative magnitudes, and taking into consideration the interrelationships between the issues and their manifestations within the Basin, four priority actions to address these issues were identified in the SAP. These actions include:

- Institutional strengthening and implementation of an effective legal framework for integrated land and water resources planning/management within the Basin;
- Prevention of environmental degradation and rehabilitation/protection of degraded environments;
- Implementation of projects for sustainable water use and natural resource management; and
- Implementation of a program of consultation and public participation for environmental protection and management. Table 1 presents the long-term SAP and its components.

**Executive Summary**

**Table 1. Strategic Action Program for the Binational Basin Of The Bermejo River (Long-Term)**

ENVIRONMENTAL PRIORITIES	STRATEGIC ACTIONS	ACTIVITIES	COSTS (\$x000)
Soil Degradation	❖ Institutional Development And Strengthening For Integrated Planning And Management	<ul style="list-style-type: none"> <li>▪ Strengthening of the Binational Commission</li> <li>▪ Development, harmonization and enforcement of the legal framework</li> <li>▪ Sectoral and jurisdictional coordination and articulation.</li> <li>▪ Development of an Environmental Information System for the Basin</li> </ul>	<p style="text-align: right;">720.0</p> <p style="text-align: right;">714.0</p> <p style="text-align: right;">195.0</p> <p style="text-align: right;">1,840.0</p>
Water Scarcity and Use Restrictions		<ul style="list-style-type: none"> <li>▪ Formulation and implementation of integrated basin management plans, environmental and land use zoning</li> <li>▪ Institutional strengthening.</li> <li>▪ Development of economic instruments and financial mechanisms</li> </ul>	<p style="text-align: right;">1,100.0</p> <p style="text-align: right;">1,900.0</p> <p style="text-align: right;">558.0</p>
Water Resource Degradation	❖ Environmental Protection And Rehabilitation	<ul style="list-style-type: none"> <li>▪ Biodiversity and natural heritage protection.</li> <li>▪ Strengthening and consolidation of the system of protected natural areas</li> </ul>	<p style="text-align: right;">2,936.0</p> <p style="text-align: right;">28,258.0</p>
Loss Of Biodiversity And Biotic Resources		<ul style="list-style-type: none"> <li>▪ Mitigation plans for flooding and other natural disasters.</li> <li>▪ Contamination prevention and control, rehabilitation of water bodies.</li> <li>▪ Prevention and control of erosion and sedimentation</li> </ul>	<p style="text-align: right;">41,925.0</p> <p style="text-align: right;">18,387.0</p> <p style="text-align: right;">6,790.0</p>
Floods And Other Natural Hazard Events	❖ Sustainable Development Of Natural Resources	<ul style="list-style-type: none"> <li>▪ Development and implementation of integrated water management plans.</li> <li>▪ Sustainable management programs of natural resources at basin level.</li> <li>▪ Appropriate technologies, management practices and production methods.</li> <li>▪ Sustainable water resources development and utilization projects</li> <li>▪ Research for natural resources development and management.</li> </ul>	<p style="text-align: right;">20,090.0</p> <p style="text-align: right;">250.0</p> <p style="text-align: right;">7,260.0</p>
		<p style="text-align: right;">331,872.0</p> <p style="text-align: right;">2,030.0</p>	
Diminished Quality Of Life and Endangered Cultural Resources	❖ Public Awareness And Participation	<ul style="list-style-type: none"> <li>▪ Strengthening of public participation in planning and implementation of actions for the development and management of natural resources.</li> <li>▪ Environmental education and training programs for citizens.</li> <li>▪ Dissemination of sustainable technologies for production.</li> <li>▪ Access to and public dissemination of information to support decision making processes</li> </ul>	<p style="text-align: right;">1,190.0</p> <p style="text-align: right;">1,160.0</p> <p style="text-align: right;">970.0</p> <p style="text-align: right;">150.0</p>
<b>TOTAL COSTS</b>			<b>470,295.0</b>

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## SHORT-TERM ACTION PROGRAM

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From each of the four strategic areas of the SAP, a small number of basic actions have been selected to provide the necessary legal and institutional framework for the entire program, consolidate participatory mechanisms, and execute specific preventive and remedial actions. The short-term SAP, to be implemented in a four-year period, is considered to be of immediate priority, and will catalyze the implementation of specific actions necessary to address priority transboundary problems identified during the SAP formulation process and to promote the sustainable development of the binational Basin. The activities, and the components of each, are presented below and summarized in Table 2.

### COMPONENT I: INSTITUTIONAL DEVELOPMENT AND STRENGTHENING

Activities undertaken within this component specifically address weaknesses within the current organizational base, identified during SAP formulation, that hinder the effective, holistic management of the water resources of the BRBB. This will ensure the institutional capacity to implement the new laws, regulations, and procedures necessary for the longer-term success of the watershed management measures by helping to increase participation in decision-making within the Basin, and enhance and underpin the ability of the Binational Commission not only to carry out its current mandate but also to assume additional responsibilities relating to information sharing and coordination among stakeholders. The activities will include the following:

#### Activity 1.1. Development and strengthening of the institutional framework

This activity is intended (1) to deepen and broaden activities initiated during the SAP formulation stage with respect to implementation of the project and the coordination role of the Binational Commission, including its institutional development as an agency for the Basin, (2) to promote regional coordination and programming, and (3) to address weaknesses in the complex institutional framework that currently impede a comprehensive vision of the Basin and the integrated and sustainable management of its resources. This

activity is intended to develop and broaden the participatory framework, including mechanisms for specific participation by provincial governments, the Prefecture and municipalities of Tarija, and to strengthen the capacities of the institutions that represent them. The estimated cost of Activity 1.1 is US\$1,824,500. Actions under this activity include:

- *Institutional development and strengthening of the Binational Commission for the integrated management of land and water resources of the Basin.* To foster institutional development at the binational level in the Bermejo Basin that will permit integrated and participatory planning and management of the Basin's land and water resources.
- *Institutional development for the integrated management of the Basin at the interjurisdictional level in Argentina.* To support the institutional development of the Regional Commission for the Bermejo River with a view to establishing an inter-jurisdictional entity for the Bermejo Basin in Argentina.
- *Institutional strengthening and capacity building for governmental and civil society organizations.* To strengthen the capacities of governmental and civil society organizations, within the Bermejo River Basin that have responsibilities for, or involvement in, the sustainable management of natural resources.

#### Activity 1.2. Development of a holistic regional legislative, economic, and environmental framework

By designing and implementing legal and financial instruments and harmonizing standards for water-quality management and land use in the basin, this activity will serve to inform and involve water resource professionals and others in the diagnosis and correction of environmental problems identified in the Bermejo Basin. The estimated cost of Activity 1.2 is US\$1,929,500. It includes the following specific actions:



Table 2. *Proposed Short-Term Action Program (4 Years)*

	ACTIVITIES	COSTS (US\$000)	COMPONENTS
INSTITUTIONAL DEVELOPMENT	Development/strengthening of the institutional framework	1,824.5	<ul style="list-style-type: none"> <li>▪ Strengthening of the Binational Commission</li> <li>▪ Strengthening of COREBE</li> <li>▪ Strengthening of government and civil society orgs.</li> </ul>
	Development of a holistic regional legislative, economic and environmental framework	1,929.5	<ul style="list-style-type: none"> <li>▪ Harmonization of regional and jurisdictional legal frameworks</li> <li>▪ Environmental zoning for land-use regulation in selected areas</li> <li>▪ Economic instruments for sustainable water use</li> <li>▪ Incorporation of environmental &amp; social costs in project evaluation</li> </ul>
ENVIRONMENTAL PROTECTION AND REHABILITATION	Soil management and erosion control in critical areas	2,134.2	<ul style="list-style-type: none"> <li>▪ Sediment control in the Tolomosa River basin</li> <li>▪ Integral mgnt. of natural resources in the Santa Ana River basin</li> <li>▪ Integrated management of the Iruya River basin</li> <li>▪ Soil loss prevention in the Huasamayo sub-basin</li> </ul>
	Consolidating protected areas and protecting biodiversity	1,786.0	<ul style="list-style-type: none"> <li>▪ Ecotourism activities in piedmont transition forests</li> <li>▪ Carbon fixation in the Yungas</li> <li>▪ Implementation of the Baritú-Tariquía biological corridor</li> <li>▪ Management plan for Sama and Tariquía biological reserves</li> <li>▪ Evaluation of sub-Andean rangelands</li> <li>▪ Study and implementation of the Teuco National Park (Chaco region)</li> <li>▪ Biodiversity study</li> </ul>
	Protection and restoration of water quality	326.5	<ul style="list-style-type: none"> <li>▪ Environmental clean-up of the Guadalquivir River (pilot-scale waste-water treatment plants in rural communities)</li> <li>▪ Assessment and design of water-pollution control strategies in the Bermejo Triangle</li> </ul>

SUSTAINABLE DEVELOPMENT OF NATURAL RESOURCES	Implementation of a planning framework for integrated water resource management	2,675.9	<ul style="list-style-type: none"> <li>Regional integrated program for water resource management, erosion and pollution control, and protection of natural areas</li> </ul>
	Sustainable practices for rehabilitation of degraded areas in the Chaco and Yungas regions	2,393.1	<ul style="list-style-type: none"> <li>Training and promotion of sustainable resource management techniques in the humid and sub-humid Chaco</li> <li>Diversification of production alternatives to reduce human pressure on natural forest resources in the Yungas region</li> </ul>
	Community extension programs for sustainable production and natural resource management	340.2	<ul style="list-style-type: none"> <li>Survey, assessment, validation and extension of traditional natural resource management practices in representative areas of the Bermejo River basin</li> <li>Promotion of sustainable production activities and natural resource management in indigenous and native communities</li> </ul>
	Sustainable agriculture and soil conservation practices along the San Jacinto project area	243.0	<ul style="list-style-type: none"> <li>Pilot project for testing and dissemination of soil and water management techniques in irrigated farming along the San Jacinto water reservoir area (Upper Bermejo)</li> </ul>
AWARENESS & PARTICIPATION	Environmental education programs	1,166.0	<ul style="list-style-type: none"> <li>Implementation of environmental awareness and training programs on sustainable resource use for different ecological regions of the Bermejo basin</li> </ul>
	Public participation program	532.3	<ul style="list-style-type: none"> <li>Information dissemination, consultation workshops, and establishment of suitable mechanisms for public participation in the Bermejo river basin</li> </ul>
	Information system for the Bermejo River basin	2,081.6	<ul style="list-style-type: none"> <li>Creation and implementation of an environmental information and monitoring system</li> </ul>
	<b>TOTAL COSTS</b>	<b>17,432.8</b>	

- *Development and harmonization of political and legal frameworks for sustainable management of water resources in the Basin.* The purpose of this activity is to promote action to establish common environmental quality objectives and policies, and to foster the participatory formulation and implementation of a regional regulatory framework that will address basic aspects in the management of shared water resources and make possible the integrated management of water and other natural resources. It will also encourage the development and harmonization of jurisdictional frameworks, particularly those relating to environmental legislation, water codes, environmental impact assessment standards, public participation and access to information.
- *Environmental zoning and land-use regulation.* To encourage land-use regulation as a basic tool of regional planning that will contribute to sustainable management of natural resources. To this end, the project will identify and assess the technical, institutional, legal, and political aspects that must be taken into account by national and subnational governments in establishing the basic instruments governing land settlement and economic activities as a function of the carrying capacity of natural resources.
- *Strengthening and developing economic instruments to promote sustainable use of water.* To design and achieve consensus on strategies, at the regional level, for incorporating financial and economic instruments to reflect the economic value of water. These strategies will be designed as complementary to other regulatory instruments governing natural resources in the Bermejo Basin region and will constitute genuine sources of financing for integrated management of water and other natural resources.
- *Development of strategies for incorporating environmental and social costs into project management and decision-making.* The purpose of this activity is to design, formulate, and validate regional criteria, instrumental strategies, and recommendations for generalized incorporation of environmental and social costs into the evaluation of development projects, using methodologies that will assign proper value to natural resources and services.

## COMPONENT II: ENVIRONMENTAL PROTECTION AND REHABILITATION

Component II is designed to extend the implementation of feasible measures of basin management identified during formulation of the SAP. Together with the institutional initiatives to be undertaken as part of Component I, the three activities programmed for this component will deal with specific transboundary aspects identified in the TDA. In particular, action is planned on soil management, the consolidation of protected areas, basic natural resource studies, and the maintenance of the quality of the Basin's water resources.

### Activity 2.1. Soil management and erosion control

The TDA identified several regions and sub-basins of the Bermejo Basin, such as those within the Central Valley of Tarija, the sub-Andean or *Yungas* regions, the Iruya River basin, and the Rio Grande basin, as critical in terms of current or threatened erosion, current and potential contribution to the production and transport of sediments, and loss of productive soils. The SAP calls for structural and non-structural measures (tree planting for carbon fixation, farming and ranching practices, regulatory frameworks, environmental regulation) to control soil loss and provide production alternatives through a focus on watershed management. This activity will extend and transfer the implementation of feasible measures for erosion control in the Upper Bermejo Basin identified and proved effective during the SAP formulation phase to promote greater use of soil management practices that minimize degradation and the risk of destabilization. The results of these efforts will encourage broader application of these management practices, contributing to sustainable land use (essentially for farming) and conservation of areas that, although not yet significantly altered, are at risk of land degradation. A key feature of this activity will include the mitigation of erosion in critical zones. The output of this activity will include the application of recommended soil conservation and erosion control measures to limit the loss of soil. The estimated cost of Activity 1.2 is US\$2,134,200, and includes the following specific actions:

- *Sediment control in the Tolomosa River Basin.* This activity consists of three components: (1) control of sediments in transit, through the construction of five earthen dikes, 10 gabion dikes with riprap protection, and an enclosed area of 160

hectares for natural vegetation regeneration; (2) a protected forest area of 80 hectares; and (3) management and conservation of 600 hectares of farmland and rehabilitation of dry-land farming areas in the Mena River subbasin. This pilot project is intended to control sediments in transit and to apply erosion control techniques to reduce silt-ing in the San Jacinto reservoir, the principal water source in this area, and loss of arable soils. The project will draw upon experience with erosion control practices gained during the formulation phase of the SAP.

- *Integral management of natural resources in the Santa Ana River Basin.* This activity consists in a series of works regulating water flow in microbasins tributary to, and in the main channel of, the Santa Ana River. These works will promote sustainable use of land and water resources within the Basin for irrigation and soil management through the application of conservation and rehabilitation practices; the restoration of vegetation; livestock management; and the consolidation of grassroots institutions through public participation. The initial stage will see the execution of a pilot project in the Gamoneda River subbasin. Integrated basin management techniques will be developed and applied with a view to ensuring environmental sustainability and improving the living conditions of the local population.
- *Integrated management of the Iruya River Subbasin.* The Iruya River contributes nearly 50 percent of all sediments transported by the Bermejo into the Plata River system. It is in this subbasin that management measures and practices for controlling the production and transport of sediments will have the greatest influence in controlling land degradation at the regional level. The objective of this activity, therefore, is to supplement developments already being undertaken by COREBE to identify, evaluate, and implement methodological approaches and techniques for preserving ecosystems still in their natural state and restoring those disrupted by human activity that have a determining influence on the stability of the landscape and on the phenomena of surface erosion and landslides that are characteristic of this region.
- *Management of the Rio Grande Basin: Systematization of the Huasamayo River subbasin.* This is the first component of a program for the sustainable management of the Rio Grande Basin, the purpose of which is to avoid or reduce the torren-

tial erosion from which it currently suffers. This activity will develop a comprehensive plan to control soil loss within this subbasin based primarily upon actions of a structural kind, but also including non-structural management measures.

### **Activity 2.2. Consolidating protected areas and protecting biodiversity**

In accordance with the conclusions of the SAP, this activity will promote the creation of integrated, community-based units within the Bermejo Basin to serve the ecotourism market, will help to establish buffer zones and environmental corridors to reduce human impacts on areas of significant habitat value, and will sponsor specific studies on natural resources, including a pilot demonstration project on carbon fixation.

This activity will also help to transfer experience gained in two other natural areas of the Yungas cloud forest region of Argentina and Bolivia and to design strategies for extending them to other natural areas of the lower basin. The results of the project will be the introduction of management programs for the development of protected areas and buffer zones in the vicinity of the national parks and reserves of Calilegua, Campo El Rey, Baritu, Tariquia, and Sama, and will promote ecotourism as a form of sustainable development in those areas, within a framework of sustainability and protection of biodiversity. The estimated cost of Activity 2.2 is US\$1,786,000. Specific projects under this activity are the following:

- *Introducing alternative forms of ecotourism in piedmont transition forests in the vicinity of the National Parks of El Rey and Calilegua.* This activity consists of two elements, distinct but intimately linked to each other. Element A includes the monitoring and evaluation of alternative ecotourism uses in the area surrounding the El Rey National Park, initially identified during the SAP formulation stage. Element B consists of identifying, designing, and implementing alternatives for sustainable use of the buffer zone surrounding the Calilegua National Park for ecotourism purposes. Both of these components envision, among other things, the introduction of ecotourism as a sustainable alternative to traditional productive practices, by incorporating the montane selvas, in particular the transition forests, into the tourism market and by encouraging conservation-oriented

management practices that will consolidate the buffer zones surrounding existing protected areas.

- *Carbon fixation in the Yungas.* During the first phase of this project, this activity will investigate the current ecological status of natural habitats in the Yungas (upper basin of the Bermejo River) and the design of a pilot project for protection, conservation, natural resource management and rehabilitation of degraded habitats in this ecologically sensitive portion of the Basin. A second and more important element of this activity will be to implement this pilot plan in a selected representative area. The project will be located in one of the major water-supply zones of the Basin and will be aimed at increasing the carbon-fixation capacity of the area through the use of sustainable production practices, the regulated use of natural resources, and the application of techniques for the protection, conservation, management, and rehabilitation of natural habitats.
- *Implementation of the Baritu-Tariquia biological corridor.* The purpose of this activity is to ensure the physical continuity of the protected areas currently included in the Baritu Park in Argentina and the Tariquia Reserve in Bolivia. Through the integrated management of the natural resources of these protected areas, a representative portion of the Tucumán-Bolivian selva will be protected. The activity includes the legal and administrative consolidation of the biological corridor and the implementation of an integrated management program for natural resources in the corridor through actions of protection, economic support, education and environmental health education, research, and institutional strengthening. The corridor area includes the Tariquia Reserve, the Baritu Park, and the intervening zone on both sides of the border.
- *Zoning and management plan for the Sama and Tariquia Reserves.* This activity consists of undertaking the ecological and socioeconomic studies necessary to establish core guidelines and concrete actions for managing the biological reserves of Sama and Tariquia, in a manner consistent with their objectives, and characteristics. The project will develop a proposal for delimiting and reclassifying these reserves, dividing the territory into zones according to their ecological, economic, and social characteristics, and preparing a management plan for both reserves. The activity implements lessons learned during the formulation phase of the SAP, and extends the underlying technical and

sociological concepts initially identified in the program with respect to the Tariquia-Baritu Ecological Corridor.

- *Zoning for the future Teuco National Park.* This initiative is intended to protect units of the dry Chaco, and is seen as a fundamental step towards establishing the Chaco Biological Corridor identified in the regional biodiversity protection and management plan. The area to be zoned covers 250,000 hectares in the provinces of Formosa and Chaco. This area is drained, for the most part, by the Bermejo and the Teuco rivers. The project will attempt to define the real potential of the sector as a protected natural area and to establish objectives for its conservation, to provide appropriate zoning for the area, to establish recommendations for its management, and to formulate and propose policies for establishing a protected area
- *Biodiversity study.* This activity is intended to improve the state of knowledge about biodiversity in the Upper Bermejo Basin, to determine the conservation status of the principal ecosystems, to identify problems affecting the biota, and to propose lines of action for its conservation and management. The activity will be based on earlier studies conducted during the formulation phase of the SAP, and on other existing studies in the region.
- *Evaluation of sub-Andean rangelands.* This is a second and supplementary phase of the pastures study of the Central Valley of Tarija that was initiated during the formulation stage of the SAP. The study extends zoning of the natural pasture lands in the sub-Andean ecoregion (Upper Bermejo Basin), on the basis of ecological and socioeconomic criteria, quantifying their current condition, their management, and their limitations and potential, and identifies possible sustainable development strategies. Before such strategies can be developed and implemented, basic information for developing sustainable management plans is required on the natural rangelands in this ecoregion.

### **Activity 2.3. Protection and restoration of water quality**

This activity is intended to restore the quality of water in the critical stretches identified during the SAP formulation phase, particularly in the watercourses classification study. Implementation of the cleanup of the Guadalquivir River, planned during the formula-

tion phase of the SAP, will imply additional support to the efforts of the local institutions that will be responsible for carrying out the core activities under this plan. It will be supplemented by a similar planning study of watercourses in the vicinity of the city of Bermejo, another critical point of pollution of the water resources in the Upper Basin. In so doing, this activity will extend and refine the lessons learned in the Guadalquivir subbasin. It will ultimately have a beneficial effect for the entire Rio Bermejo basin. This activity will be complementary to the establishment of a water-quality monitoring network for the whole basin, already undertaken. The estimated cost of Activity 2.3 is US\$326,500, and includes the following specific actions.

- *Environmental cleanup of the Guadalquivir River.* Involves the implementation of two, pilot-scale wastewater treatment plants in small rural settlements, including the adaptation and dissemination of feasible wastewater treatment technologies; the establishment of a pollution control system for subterranean aquifers; and the formulation of a monitoring plan for waste waters. This activity will assist in the environmental cleanup of the Guadalquivir River, within the context of an activity that takes an integrated approach to this environmental problem identified during the Transboundary Diagnostic Analysis.
- *Environmental cleanup study for watercourses in the Bermejo Triangle.* The activity will consist of analyzing the existing sewage and water treatment system, evaluating the sources and degree of pollution imposed upon the receiving waterbodies, and proposing solutions for treating wastewater from the city and the sugar industry. In addition, it will propose solutions for eliminating solid wastes and other pollutants that also degrade the environment, and be accompanied by specific legal provisions relating to the application of environmental controls. The expected outcomes are (1) a diagnosis of the environmental situation of watercourses, primarily those of the El Nueve and El Cinco gorges and the Bermejo and Grande de Tarija rivers, which are affected by industrial and organic pollution; and (2) the formulation of the final design of an environmental cleanup plan for these watercourses.

### **COMPONENT III: SUSTAINABLE DEVELOPMENT OF NATURAL RESOURCES**

Component III will encourage the adoption of alternative production modes that will be environmentally friendly or that will at least minimize environmental degradation, while at the same time providing greater economic opportunities for the local populace, in a context of integrated management of water resources and planning for the basin as a whole. The initial action under this component will be to formulate an integrated management program for the Basin's water resources, which will draw upon, and at the same time establish, a regional framework for execution of the remaining activities.

#### **Activity 3.1. Implementation of a planning framework for integrated water resource management**

This activity is intended to incorporate and strengthen regional practices, procedures, and capacities for programming and planning, thereby addressing one of the basic causes of environmental problems in the basin as identified by the SAP. In particular, it calls for the formulation and development of an integrated water resource management plan comprising information gathering and dissemination, studies, analyses, sharing of experiences, demonstrations, and evaluations conducted to date or to be undertaken as part of the first stage of the SAP. The results of this activity will provide an agreed planning framework for sustainable management of land and water resources, within a regional regulatory context negotiated and supported through a broad process of public participation. The estimated cost of Activity 3.1 is US\$2,675,900. It includes one specific action:

- *Program for Integrated Management of Water Resources in the Bermejo River Basin.* The purpose of this project is to integrate all the actions undertaken during the first stage of the SAP, within a programming framework for the integrated management of the basin's resources, and to place development initiatives in the context of preventing erosion and pollution and conserving nature. This framework will serve as a basis for decision-making, and will establish a threshold of sustainability for development projects undertaken by the various jurisdictions, either alone or jointly. It will serve as a basis for giving programming

content to actions that will be included in other stages of the SAP, either subsequent or complementary. Activities relating to project coordination and administration, contract monitoring and supervision, and the formation of a basic technical team will use a substantial portion of the financing provided for this project.

**Activity 3.2. Implementation of sustainable management practices that will contribute to the rehabilitation of degraded areas**

The Transboundary Diagnostic Analysis identified human pressures on natural forest resources as a direct cause of the loss of habitat and biodiversity in the montane systems of the upper basin. At the same time, the fluvio-morphological dynamics resulting from the transport of sediments originating in the Upper Basin and unsustainable approaches to the management of natural resources in general, and of the land in particular, associated with farming activity, have been identified as immediate causes of the problems of lack of access to water resources and degradation of soils in the Chaco, an area of great regional importance in terms of habitat and biological diversity. The SAP recommended both structural and non-structural measures to address erosion risks in the upper basin and to control the deposit of sediments, to moderate excessive fluctuations in water flow, and to limit the negative impacts of the invasion of exotic species in this part of the lower basin. The activity will extend and transfer feasible approaches to sustainable economic development resulting from experience during the SAP formulation stage, in the form of pilot projects. These will in turn help to mitigate environmental problems arising from the degradation of forests and soils by human activity. The estimated cost of Activity 3.2 is US\$2,393,100. Specific actions include:

- *Sustainable management alternatives for natural resources in the humid and subhumid Chaco.* This essentially involves the promotion of sustainable resource management techniques, on the basis of experience gained during the formulation stage of the SAP. Some of the major issues to be addressed by the activity are the restoration of degraded environments in the lower basin, management of forage in humid and subhumid areas, productive restoration of *vinalares*, sustainable management of the agro-silvo-pastoral potential of

subtropical zones, sustainable soil management and conservation, and management of excessive and deficient water flows.

- *Productive diversification under conditions of sustainability in the Yungas.* This activity is intended to take advantage of the pilot experiment in the community of Los Toldos by expanding its area of application, pursuing aspects that were passed over during the SAP formulation stageX such as sustainable exploitation of the forest on an experimental scale, management of pasture lands and livestock, and the development of small-scale traditional crops to supply a highly selective marketXto generate employment opportunities through existing activities or promising new ones, such as ecotourism. These actions are intended to reduce human pressure on natural forest resources by diversifying the productive options open to rural families in ways that will reduce their transformation of the forest, integrate them into the regional market, generate local employment opportunities, and promote sustainable land-use techniques within the parameters of multiple use of mountainous areas of the Upper Bermejo River Basin.

**Activity 3.3. Evaluation of traditional subsistence practices in agriculture and fishing**

The Transboundary Diagnostic Analysis found a high incidence of subsistence-level exploitation of natural resources in some areas of the Bermejo Basin. Given the high population growth rates and the vulnerability of the natural resource base in these areas, these levels of exploitation are clearly unsustainable. The SAP therefore recommended efforts to promote sustainable forms of production and subsistence based on a community approach. This activity will identify current subsistence practices in these communities and will introduce programs designed to encourage the adoption of sustainable water and soil management practices. Using the knowledge gained during the formulation stage of the SAP, this activity will contribute to the protection of water and soil resources, including native fauna, particularly fish, in the natural ecosystems of the Bermejo River, while at the same time helping to satisfy the demand for food, fuel, and shelter in rural communities. The estimated cost of Activity 3.3 is US\$340,200. Specific actions include the following:

- *Implementing water and natural resource management practices that are consistent with traditional practices in the basin.* The purpose of this activity is to recognize the value of traditional cultural manifestations typical of the region with respect to managing water and other natural resources so that subsistence communities will adopt them as valid practices for sustainable management. To this end, a cultural survey of the region will be undertaken. The most promising manifestations will be applied in pilot projects, with the participation of the communities concerned, and an action program will be prepared and implemented to promote the appreciation, dissemination, and application of traditional practices and manifestations most suitable for the sustainable management of natural resources.
- *Sustainable rural development in indigenous and native communities.* This activity is intended to improve living conditions among native Wichi and native communities, through sound management of agro-silvo-pastoral systems and greater awareness of sustainable resource management.

#### **Activity 3.4. Sustainable development of natural resources**

Under this activity, a demonstration project will be undertaken in areas recently brought under irrigation within the San Jacinto project area in an effort to optimize soil and water use, control soil loss in and around areas under cultivation, and at the same time enhance the productivity of economic activities. The results of this experiment will be extrapolated to other zones with similar characteristics within the upper basin. The estimated cost of Activity 3.4 is US\$243,000. It includes the following strategic action.

- *Systematization of irrigated areas of the San Jacinto project.* This activity includes the development and implementation of technological packages for soil and water management in irrigated farming areas and the management of marginal lands within the project's area of influence. The project calls for optimizing soil and water usage in order to enhance the productivity of farming, and to control erosion in lands next to cultivated areas. The experience gained will be disseminated to other irrigated areas that are similarly vulnerable to soil loss.

## **COMPONENT IV: PUBLIC AWARENESS AND PARTICIPATION**

This component embraces activities to identify and coordinate the interests of people and organizations with economic and/or institutional responsibilities in the Basin, including the agricultural and industrial sectors. Access to information is an essential part of this process of encouraging local stakeholders to take an interest in sound management of the Basin's natural resources. To this end, a central element of this component will be to inform the local citizenry through an integrated program of environmental education, institutional transparency, and exchange of information among communities, organizations, and government entities.

### **Activity 4.1. Environmental education programs**

The SAP identified the need for environmental education programs as a key element in support of sustainable programs for protecting and rehabilitating the environment and promoting economic development. This activity continues and extends this community focus throughout the Bermejo Basin. It will also contribute to the development and distribution of curricula and materials for use in training teachers and will include community and private sector initiatives in the scope of education programming. One element of this activity is specifically designed to improve educational opportunities in the most vulnerable communities. The results of this activity will be not only an increase awareness among communities in the basin, but will also a better understanding of ways to improve their living standards and bringing about positive environmental change at the local level. The output of the activity will include the preparation of appropriate curricula at the different educational levels, publicity materials for promoting public awareness, and materials and manuals for use in teaching and teacher training. The estimated cost of Activity 4.1 is US\$1,166,000, and includes the following specific action:

- *Sponsoring environmental education activities in the basin.* This activity will implement a comprehensive program of efforts to promote environmental education (awareness, training and formal and informal education) relating to the sustainable use of water and other natural resources,



geared to the different ecological regions of the Bermejo Basin, and promote awareness and understanding among the various stakeholder groups--social, political and economic--about the environmental consequences of improper use of natural resources and the impact of human activities, through workshops, seminars, meetings, bibliography, manuals, brochures, the mass media, etc. The activity builds upon the experiences gained in the pilot demonstration project carried during the SAP formulation phase.

#### **Activity 4.2. Public participation program**

The formulation process for the SAP has generated expectations among stakeholders in the Basin, who recognize that public participation in establishing priorities and implementing new practices is essential for improving the management of water and environmental resources. The basic elements for ensuring the commitment of local stakeholders are information, education, and the establishment of suitable mechanisms for public participation. To this end, the activity will seek to stimulate public participation in environmental management of the Rio Bermejo basin by disseminating information to communities and organizations through a variety of means, including public hearings, community-based legislative initiatives, environmental education courses, consultation and mobilization workshops, capacity strengthening programs, and use of the mass media (radio, television, Internet, newspapers). This information will help to build a basic awareness so that individuals, organizations and businesses will become engaged in the decision-making process. The estimated cost of Activity 4.2 is US\$532,300.

#### **Activity 4.3. Creating an information system for the Bermejo River Basin**

The SAP identified the need to acquire and disseminate information at two levels within the basin: technical information among water resource professionals at all governmental levels involved in the use and management of waters of the Bermejo River, and information of more general interest for the public and other interested entities in the Basin. This information will foster institutional transparency, stimulate informed participation in community decision-making, and help to standardize practices among professionals and jurisdictions. A prerequisite for establishing the

information system will be to identify potential sources of information, nodes, and users in the Basin. The estimated cost of Activity 4.1 is US\$ 2,081,600, and includes the following specific actions:

- *Access to information in support of public participation.* The purpose of this activity is to prepare recommendations and strategies for establishing and applying mechanisms to ensure that civil society has access to information on water, natural resources and development projects, including the identification of the necessary regulatory frameworks and institutional structures. The current situation within the region will be analyzed, and guidelines will be formulated to ensure the flow of information and to identify focal points for providing that information. Case studies will be used to assess technical, institutional and legal possibilities and difficulties for establishing one or more selected mechanisms, and on this basis general recommendations will be formulated and strategies will be proposed for generalized implementation across the different jurisdictional levels of the basin.
- *Developing networks and mechanisms of articulation among the various economic sectors and jurisdictional authorities in the basin.* The purpose of this activity is to promote the development of networks and other mechanisms for sectoral and interjurisdictional articulation as instruments for coordinating efforts at sustainable management among the different economic sectors and among the various jurisdictional authorities in the basin. To this end, priority interest groups and appropriate articulation mechanisms will be identified, examined, and recommended. Selected activities of articulation and coordination will be conducted in regional workshops.
- *Developing and implementing an environmental information and monitoring system for the Bermejo River Basin.* This activity will consolidate the implementation of an environmental information system for the basin as a whole, embracing activities in the area of generating, acquiring, processing, and storing information on the status and use of the basin's natural resources. To this end, an environmental monitoring network will be designed for the Basin, to cover data on climate, sediments, the volume and quality of water in the different rivers of the Basin, the state and dynamics of vegetation cover, the process of soil erosion,

socioeconomic aspects, and other items. A GIS database will be established and information will be made available to different users. Efforts will also be made to strengthen and coordinate activities among the responsible entities.

## **COSTS AND FINANCING**

The total cost of the project is estimated to be US\$17,433,000. In addition, more than US\$500 million is included for investment in the Bermejo River Basin, as reimbursable loans that are now administered by FONPLATA, CAF, the Inter-American Development Bank, the World Bank, and bilateral governmental cooperation agencies. These funds may be considered as part of the financial baseline, according to the present agreements. It is assumed that these investments represent the total value of the national benefits produced by the project and that they will be specifically applied to deal with such aspects as effluent treatment, flood management, and domestic water supply. Funding would be contributed by the governments of Argentina and Bolivia, local provinces and prefectures, and other public and private sources in support of new initiatives. Financing by international institutions is being sought to complement and/or help catalyze implementation of specific project activities. The GEF is being approached to fund incremental costs, particularly for activities related to the development of an effective organization for the basin, mitigation and prevention of soil degradation processes, and reduction and control of water quality degradation.

## **RISKS AND SUSTAINABILITY**

In terms of SAP objectives, the principal risk facing development efforts in the Bermejo Basin is that environmental considerations will not be adequately incorporated into projects, programs, policies and activities in the manner needed to ensure sustainability, within a comprehensive vision of the basin. This could give rise to undesirable environmental effects, such as damage to the natural resource base, flooding, pollution of ecosystems, and loss of productive units. To ensure sustainability, there will have to be appropriate institutional development to ensure proper regional planning and coordination, with direct partici-

pation by the competent jurisdictions and consultation of all stakeholders in the basin. Efforts will be made to develop and strengthen the binational and regional organizations involved, the relevant provincial government agencies in Argentina, those of the prefecture of Tarija in Bolivia, and non-government organizations as well, so that they can take an active part in the consultation process. The intent will be to develop and harmonize the regional regulatory framework and that of the various jurisdictions in a manner consistent with the principles and policies of the SAP. This in turn will rely on complementary programs of information and education supported by the schools, universities, and NGOs. Comprehensive programs for environmental zoning and land-use planning will also be important in this process.

There is a risk that national governments will not accord enough importance to the need to open binational and regional organizations to participation by the competent jurisdictional players or equip them to take on the functions of basin-wide entities embracing the entire Bermejo River Basin. There is also a risk that provincial governments will fail to complete and harmonize their environmental legal frameworks. The result of such failure would be that the mechanisms and regulations essential for the integrated management of the basin's natural resources would not be adopted. A further risk is that the public participation program will fall short of its goal for lack of response, and the inadequacy of local capacities and resources.

Experience gained during the program formulation stage suggests that significant progress is being made in instilling an awareness of the need to incorporate environmental issues in development programs and projects and to foster participatory decision making about projects, based on broad public information and consultation. Progress has also been made in the use of coordination and participation mechanisms at the governmental and nongovernmental level, thereby strengthening the regional vision of the basin and encouraging a joint interjurisdictional approach to issues of general interest relating to shared resources. This suggests that the risks discussed above can be minimized through the explicit commitment and support of the various stakeholders for this Strategic Action Program.

One other important risk relates to the lack of adequate human and financial resources allocated by national and regional institutions to the implementation of the priority activities defined in the SAP. Faced with such a great demand on their resources, they will

have to resort to various financing procedures such as: international lending and technical cooperation, donations from multilateral cooperation agencies, bilateral cooperation agreements, and participation by private banks in undertaking private-sector projects within the strategies proposed. These funds will constitute the principal source of financing for ensuring that counterpart contributions are adequate to the budgets and resources currently available and planned for the future. Both sources of funding will help to minimize

the financial risks during implementation of the Strategic Action Program and will support the management of the Basin and help to develop practical approaches to the stewardship of its environmental resources. Moreover, account must be taken of other sectoral projects financed with national and international funds in the area of natural risk management, sanitary and storm sewer effluents, and water quality control infrastructure that are now under way or in the pipeline.