

BERMEJO RIVER BASIN

Implementation of the Strategic Action Program for the Binational Basin of the Bermejo River

IMPLEMENTATION OF THE STRATEGIC ACTION PROGRAM FOR THE BINATIONAL BASIN OF THE BERMEJO RIVER



COUNTRIES: Argentina, Bolivia

IMPLEMENTING AGENCY: United Nations Environment Programme (UNEP)

REGIONAL EXECUTING AGENCY: Organization of American States/Office for Sustainable Development and Environment (OAS/OSDE)

LOCAL EXECUTING AGENCY: Binational Commission for the Development of the Upper Bermejo and Grande de Tarija River Basins

PROJECT DURATION: 2001-2006

WEBSITE: <http://www.cbbermejo.org.ar>

GEF GRANT: 11.04 US\$ millions

CO-FINANCING: 8.78 US\$ millions

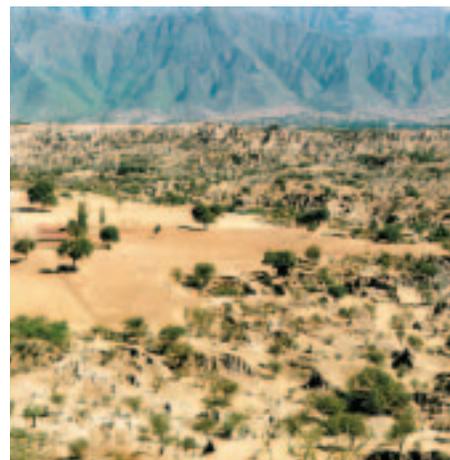
PROJECT COST: 19.70 US\$ millions

INTRODUCTION

The Bermejo River Basin, in southern South America, extends over some 123,000 km², 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/m³). Total discharge of sediment is around 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.

In 1995, the Binational Commission for the Upper Bermejo and Grande de Tarija River basins 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.

The transboundary diagnostic analysis and preparation of the SAP was conducted between 1997 and 2000. Activities included the identification of priority 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. As identified in the TDA, the main environmental problems affecting the basin include:

- **Soil degradation.** Studies showed that more than half of the binational basin is subject to erosion processes that range from significant to very severe, with more than 60% of the rangelands being overgrazed or improperly managed. Material produced by surface erosion alone and transported from the Upper basin amounts to 18.5 million m³/year. Total contribution of fine sediments from the Bermejo to the La Plata system is approximately 100 million tons per year.
- **Water resource degradation.** Pollution problems appear to be localized in the Bolivian section of the Upper Basin, where 68% of the surveyed sites had restrictions by bacteriological contamination.
- **Water scarcity.** 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 development potential of otherwise favorable agricultural production zones.
- **Biodiversity loss.** Severe or very severe deforestation is affecting 26% of natural forests, and 15% of its total area is at risk for major biodiversity loss. Twenty-four species of flora and fauna have already been categorized as vulnerable. Eighteen of these are at risk.

- **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.

- **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. Permanent and temporary migration of seasonal workers (which reaches 42% of the border population) constitutes an important transboundary symptom of prevalent poverty and unemployment.

The Strategic Action Program (SAP) put forward by both governments represents a comprehensive 20-year, US\$470 million proposal that seeks to address these major environmental issues and to promote sustainable development of the basin. To help lay the groundwork and initiate the implementation process, a small number of high priority actions were selected from each program component, and subsequently approved for GEF financing. Actions are grouped in four categories: (1) environmental protection and rehabilitation; (2) sustainable development of natural resources; (3) institutional development and strengthening and, (4) public awareness and participation. The activities and results obtained to date in each of these components, after 4 years of implementation, are explained below.

IMPLEMENTATION STATUS BY COMPONENT

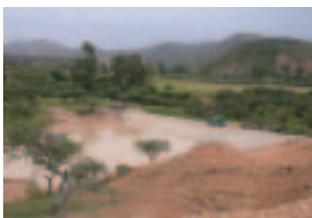
I. ENVIRONMENTAL PREVENTION, PROTECTION AND REHABILITATION

Actions undertaken under this component, including engineering works, equipment, and training, has brought more and better infrastructure, capacity, and information for the control of erosion, retention of sediments, consolidation of riverbeds, and prevention of floods. Water channels for drinking and irrigation have been extended in selected areas. Through a focus on watershed management, including training in water and soil management techniques, these actions have provided production alternatives and improved health conditions in impoverished communities, and helped to reduce soil erosion in critical areas. Integrated, community-based units have been created to serve the ecotourism market, helping to establish buffer zones and environmental corridors to reduce human impacts on areas of significant habitat value. Sustainable and cost-effective sanitation strategies have been successfully implemented, with high local impact and

replication potential. A binational hydrometeorological network has been implemented, including specialized equipment in provincial laboratories, allowing for precise quantification and monitoring of water quality, quantity, and sediment loads. Specific actions taken under this component are:

(a) Structural and nonstructural measures for soil conservation and erosion control in selected critical areas of the basin.

- Construction of soil and gabion dikes (11) in the Mena (Tolomosa) sub-basin, reducing 33.400 m³/year of sediments in transit and controlling soil erosion in selected critical areas.



- Introduction, dissemination and training in sustainable agroforestry and cattle-raising management practices in Mena sub-basin (Tolomosa), seeking to reduce soil loss and increase productivity. Area under pilot project activities represents 60% of the total sub-basin area.
- Construction of gabion dikes (64) and structures to help reduce torrential erosion in the Huasamayo and Iruya

Subbasins. Estimated sediment retention of 232.000m³.

- Implementation of a binational environmental information system and monitoring network, including 14 remote stations (5 in Bolivia and 9 in Argentina), 2 operation centers, a Central Station and a supporting technical station.
- Implementation of small-scale irrigation works, regeneration of vegetative cover, and erosion control in the Calderas sub-basin. Summer crops increased 60%. Winter-spring production increased 90%.
- Technical assistance and training in soil management in Iruya and Calderas sub-basins.
- Introduction of sustainable production practices and application of techniques for the protection, conservation, management, and rehabilitation of natural habitats in the Yungas region (Toldos).

(b) Restoration of water quality in water courses along preestablished critical stretches

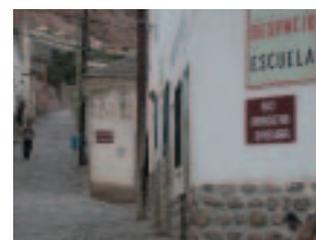
- Waste water pilot treatment plants built in Guadalquivir, Department of Tarija. Local financing obtained for replication of actions within the Department for an estimated value of US\$12 million.



- Waste water drainage network installed in communities of San Lorenzo and Canasmoro, Tarija.

- Water collection systems installed in Canasmoro, Lajas and Tomatitas, Tarija.

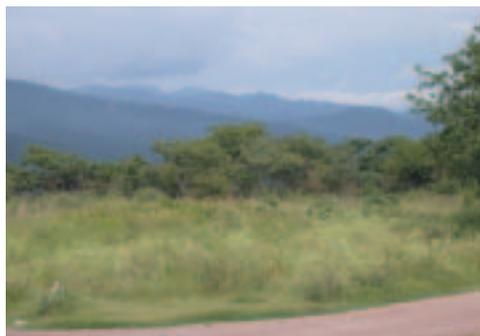
- Integrated waste management system implemented in Iruya, Salta with active participation of local communities.



- Equipment and training to strengthen water quality monitoring capacity in provincial water agencies of Chaco, Salta, Jujuy and Formosa (Argentina). Sixteen national and 3 binational site assessments conducted to analyze physical, chemical, and biological parameters of water and sediments.
- Pre-feasibility study for the implementation of environmental sanitation program in the Bermejo Triangle, including an analysis of the existing sewage and water treatment system, sources and degree of pollution in receiving waterbodies, and proposed solutions for wastewater treatment.

(c) Protection of biodiversity

- Implementation of alternative ecotourism activities in Calilegua National Park. Construction of visitor's center, design of tourist routes within the Park.



- Implementation of the Ecological Corridor Baritu-Tariquia-Calilegua. Completion of management plan, land-use plan, and project implementation proposal.
- Completion of management plan for Sama Biological Reserve.
- Completion of management plan for the Tariquia Reserve.
- In process a comprehensive biodiversity study for the Upper Bermejo Basin, aimed at improving the state of knowledge, determine the conservation status, identify principal problems affecting the biota, and propose lines of action for its conservation and management.

- Study for the evaluation of sub-Andean rangelands, in the Central Valley of Tarija.

II. SUSTAINABLE DEVELOPMENT OF NATURAL RESOURCES

Actions in this Component have promoted and disseminated alternative sustainable production methods, minimizing environmental degradation, and providing local populations with better economic opportunities. Progress to date includes:

- Technological packages for soil and water management designed and implemented in the irrigated areas and marginal zones of the San Jacinto Project, optimizing soil and water use, increasing crop productivity, and controlling soil erosion.
- Implementation of native forest nursery in Tilcara, Jujuy

- Trees and fruit crop production in Iruya, Salta.
- Technical assistance and implementation of sustainable practices for cattle-raising, forest exploitation, soil and water management, and introduction of alternative production in San Andres (Orán), Colanzulí and San Isidro (Iruya, Salta), and Laguna Yema (Formosa), including small-scale industries and artisanship.
- Introduced sound agro-silvo-pastoral systems and sustainable management practices in indigenous Wichi communities of Rivadavia and San Martín (Salta), and El Espinillo (Formosa).

III. INSTITUTIONAL DEVELOPMENT AND STRENGTHENING

Activities undertaken within this component addressed the identified institutional weaknesses that hinder the effective, holistic management of the water resources of the binational basin. Specific actions seek to ensure institutional capacity to implement laws, regulations, and procedures necessary for sustainable watershed management, to increase participation in decision-making within the Basin, and to strengthen the Binational Commission in assuming additional responsibilities relating to information sharing and coordination among stakeholders. Achievements to date include:

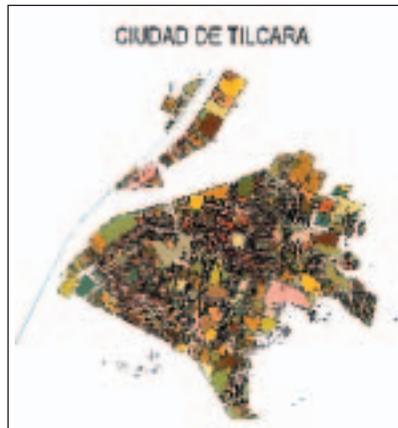


- Institutional strengthening of government agencies responsible for water resource management and environment, including the Environment and Production Secretariat of Jujuy, Water Provincial Administration of Chaco, Subsecretariat for Ecology and Natural Resources of Formosa, and the Sustainable Development and Environment Secretariat of Salta.

- Creation and implementation of the Binational Commission Regional Office in Salta province, allowing for more effective regional coordination, programming, and monitoring.
- Equipment and training for the Binational Commission Regional Office.
- Creation and implementation of the Regional Coordination Committee, composed of representatives of the Governments of Chaco, Formosa, Jujuy and Salta in Argentina, and the Tarija Prefecture and basin municipalities in Bolivia.

- Strengthening of the National Technical Office for Bermejo and Pilcomayo River Basins in Bolivia.
- Eighteen (18) Memorandum of Understanding and Collaboration agreements signed between the Binational Commission and other regional, national and provincial institutions; public and private universities; academic and scientific institutions; civil society.
- Land-use planning and environmental zoning of the Department of Tarija, in collaboration with the Ministry of Environment of Bolivia, the Tarija Prefecture, and the National Technical Office for the Development of the Bermejo and Pilcomayo River basins.

- Land-use planning and participatory territorial zoning in Jujuy (Tilcara) and Salta (Los Toldos and Iruya), to help guide the occupation and development of fragile ecosystems.



- Creation and implementation of a Regional Advisory Committee, integrated by Basin Universities, academic institutions, technical and scientific organizations, the private sector, stakeholders and NGO's interested in natural resource management and environmental issues within the basin.

holders, providing access to information, and encouraging active community involvement in the management of the Basin's natural resources. Also, the project initiated implementation of a comprehensive and integrated environmental education program relating to the sustainable use of water and other natural resources, both through formal education processes (incorporating environmental variables in academic curricula),

IV. PUBLIC AWARENESS AND PARTICIPATION

This component has helped identify and coordinate the interests of basin stake-



as well as through workshops, seminars, meetings, manuals, brochures, media, etc. Progress to date include:

- Implementation of an environmental education plan in the basin provinces, through the establishment of formal agreements with the Ministries of education of Salta, Jujuy, Chaco, and Formosa. This has resulted in the incorporation of sustainable development concepts into the formal educational curricula of 500 elementary and primary schools, and providing training to 2,400 teachers.
- Design and implementation of a Communications Plan for the Binational Commission, seeking to generate awareness and promote the participation of stakeholders in sustainable water management practices throughout the basin.
- Developed an environmental education program for the Department of Tarija (Bolivia), in collaboration with the Juan Misael Saracho Autonomous University.

- Signed interinstitutional agreement between the Ministry of Education, the Tarija Prefecture, and the National Technical Office for the Development of the Pilcomayo and Bermejo River basins for implementation of the implementation of the environmental education program in the Department of Tarija.



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This document has been prepared by the Office for Sustainable Development and Environment of the General Secretariat of the Organization of American States, as the regional executing agency for the Bermejo Project, in collaboration with the United Nations Environment Programme (implementing agency for the Global Environment Facility), and the Binational Commission for the Development of the Upper Bermejo and Grande de Tarija River Basins. The document is intended to provide general information on the status, preliminary results and follow-up activities regarding project implementation, and do not necessarily reflect the opinion of the Binational Commission, the United Nations Environment Programme, the Organization of American States, or the GEF.