

Proposal for Review

PROJECT TITLE:

STRATEGIC ACTION PROGRAM FOR THE BINATIONAL
BASIN OF THE BERMEJO RIVER

GEF FOCAL AREA:

International Waters

COUNTRY ELEGIBILITY:

Under 9(b) of the Instrument

TOTAL PROJECT COSTS:

US\$5.725 million

GEF FINANCING:

US\$2.99 million

**GOVERNMENT COUNTERPART FINANCING OF GEF
COMPONENTS:**

US\$2.51million

COFINANCING:

UNEP US\$150,000.

OAS US\$75,000

GEF IMPLEMENTING AGENCY:

UNEP

EXECUTING AGENCY:

OAS

LOCAL COUNTERPART AGENCY:

Binational Commission For the Development of the Upper
Bermejo and Grande de Tarija Rivers Basins

ESTIMATED STARTING DATE: (EFFECTIVENESS)

October 1, 1996

PROJECT DURATION:

Two Years

GEF PREPARATION COSTS:

PDF Block B Grant US\$231,000

SUMMARY

1. The proposed GEF project responds to a request of the Governments of Argentina and Bolivia for technical assistance in the formulation of a Strategic Action Program (SAP) for the Bermejo River Basin. The primary objective of the SAP will be to promote environmentally sustainable development within the basin, taking into consideration the program of investments being prepared by the Binational Commission for the Development of the Upper Bermejo and Grande de Tarija Rivers Basins. This is seen as the only solution for reversing the environmental degradation occurring to the land and water resources of the binational basin. In September 1995, the Governments' request for a GEF Project Development Facility, Block B (PDF/B) Grant in the amount of US\$ 231,000 was approved. It provided for the preparation of an international waters project with the following objectives:

- * 1. Conducting an environmental diagnostic survey of the basin to identify priority transboundary environmental concerns and related sectoral issues
- * 2. Formulating a Strategic Action Program for the Binational Basin addressing different GEF focal areas and seeking to solve priority transboundary environmental issues as part of the implementation of the water resource and environmental agreements between the countries
- * 3. Assisting the Governments of Argentina and Bolivia to incorporate transboundary environmental concerns, including biodiversity and land degradation protection, into their development policies, plans and programs for the basin
- * and, 4. Conducting pilot demonstration activities during the process of SAP formulation to gain information needed for management purposes.

A fifth objective focuses on public participation. This objective involves helping both countries to institute a system of public consultation on the implementation and development projects of general interest in the basin, so that they are environmentally sustainable and socially acceptable. This GEF International Waters project proposal is the result of the PDF activities.

2. It is to be anticipated that the project will identify specific investment projects and activities of a transboundary nature that will meet GEF criteria. During the formulation of the SAP for the Bermejo River Binational Basin, the comprehensive approach set forth in the International Waters Scoping Paper approved by the GEF Council will be used to develop mechanisms for the control of transboundary sedimentation, conservation of biological diversity, prevention of land degradation and the rehabilitation of degraded lands, enhancement of carbon sequestration potentials through sustainable agro-forestry, and implementation of environmentally-sound development proposals. Such actions are consistent with the GEF principle of linking project elements with the major cross-cutting issues addressed by the GEF,

with the priorities identified in the UNEP desertification studies which identified the Bermejo sin as a critical area, and with the UNEP Environmentally Sound Management of Inland Waters (EMINWA) integrated watershed management planning process.

3. Demonstration projects for the control of desertification, biodiversity conservation, carbon sequestration and transboundary sediment abatement have been identified.

They have been selected in order to collect information in the short term and test different measures for more widespread implementation later, and include: a) Their appropriateness with respect to the environmental character of the area, and their contribution to sustainable development; b) Their economic feasibility, preferably with low levels of investment; c) The adequacy of their components to the extension or transference of knowledge; and, d) The testing public participation methods in both, the planning and implementation of projects. Most demonstration projects require some additional work of definition and institutional organization, before they are started.

BACKGROUND

4. **Overview.** The Bermejo River Basin, shared by Argentina and Bolivia, is a regionally important part of the Plata Basin. The Bermejo River has the unique characteristic of linking two major geographic features of the southern tip of South America: the Cordillera de los Andes and the Paraguay-Parana Rivers, crossing completely the huge expanse of the Chaco Plains. Thus, it acts as a corridor allowing the connection of biotic elements of both the Andean mountains and the Chaco Plains. Radically differing weather conditions in the large basin (about the size of the Rhine 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 an exceptional habitat diversity along the course of the river. Erosion and sedimentation are serious issues: it has been estimated recently that the Bermejo Basin produces about 80% of sediments in the Plata River.

5. Despite its potential, the basin is an economically disadvantaged area in both countries. It has a history of "extractive" exploitation of forests and natural pastures. Incomes are very low and a large proportion of the population is indigenous. An opportunity exists for the gradual substitution of new systems of production. Innovative methods of environmental management, agro-forestry and watershed management will be required and active participation of communities is needed to understand and adopt new practices. Poverty and the low level of education of the population are restrictions to any proposal for changes in the management of the basin. Although the area has been studied for many years, it is only recently that actions have been taken to implement development projects in this basin. For example, in the Upper Basin, Argentina and Bolivia have agreed on the construction of a series of multipurpose water resources development projects related to the general development of the region that could have potential impacts in the downstream biomes. Programming the economic and social development and managing the natural environment of the region in a careful and orderly fashion leading to sustainable development, is a challenge clearly recognized by both Governments. For such purposes, they have created by the treaty of June 9th, 1995, a Binational Commission for the Development of the Upper Bermejo and Grande de Tarija Rivers Basins, which is requesting GEF technical assistance. This Binational Commission has international legal status, full authority in technical, administrative and financial matters and legal capacity to acquire rights and assume obligations. The Binational Commission is totally financed by and acts on behalf of the Governments of Argentina and Bolivia, and has been given authority by both Governments to actively pursue all the actions required for the implementation of the present Program. Full text of the Treaty of June 9th, 1995, was added as an Annex to the PDF/B document, and is presented, in summary form, as Annex 2 to this document.

6. More than fifty institutions, government agencies and NGOs, participated in drafting this proposal, many of which are expected to participate in the execution of this project. This proposal is based on some twenty reports and detailed project documents prepared during the PDF/B process. In particular, the central government agencies involved in environmental matters and the local agencies working in environmental management and land tenure and use have participated actively in the PDF/B process. A full review of reports and basic documentation available in

different Government agencies of both countries, and contacts with those agencies, as well as with private sector representatives, academic institutions and NGOs, was the first task completed during the PDF/B process. This review identified specific gaps in knowledge and understanding of the transboundary pollution problems in the Bermejo Binational Basin which are addressed by this Program. In paragraph 34 there is a summary of the participation by all interested parties. Fourteen consultants (seven Argentineans, six Bolivians and one American) participated in the preparation of the present proposal. Copies of the reports of the consultants have been forwarded to the GEF Secretariat and its implementing agencies, and are available for consultation at the OAS headquarters in Washington, D.C.. The relationship between the intentions stated in the PDF/B Grant and the present proposal is fully developed in art IV, Project Description of this document. The proposal is consistent with the National Environment Program of Bolivia and has been prepared in constant consultation with the Secretariat of Natural Resources and Human Environment of Argentina.

7. Links with Regional Strategic Work. The Bermejo River is a part of the Plata System, the second largest waterway in South America, an important economic artery in the region. Potential impacts arising in the Bermejo Basin extend throughout the Plata System from the Andes to the coastal zone, and these impacts affect many other developmental activities throughout the Mercosur and Plata Systems, including impacts on the Paraguay-Parana Waterway and the Plata estuary. The proposed project would try to redress some undesirable priority problems related to land degradation, such as the excessive soil losses from the slopes of the Andes that lead to sedimentation and loss of beneficial uses downstream, that have characterized the history of the region, and address priority threats to the environment associated with development projects. It would identify pilot activities promoting sustainable use of natural resources, from both the economic and the environmental points of view. Support to some of those pilot activities is a part of this proposal.

8. The project complements other planned GEF projects which address broad development impacts in the Plata Basin or in neighbourareas. These include: 1. The GEF Uruguay Coastal Wetland Project which borders the Plata Large Marine Ecosystem (LME), which is the proposed project area for the Maritime Front Project being developed by the UNDP; and, 2. The GEF Patagonia Project in Argentina.

9. National and Regional Actions in the Bermejo River Basin. Within the framework provided by the Plata Basin Treaty and other binational integration and cooperation agreements, the Governments of Argentina and Bolivia have recently agreed on promoting the construction of a series of multipurpose (hydropower, irrigation, water supply and sediment control) projects for the development of water resources, and promotion of general development in the region.

10. The Financial Fund for the Plata Basin (FONPLATA) agreed, on December 7, 1992, and December 11, 1995, to finance feasibility studies for a series of multipurpose dams in the Upper Bermejo Basin, for a total of US\$ 918,820. Included in the studies were the preliminary evaluation of fourteen reservoir sites, market research for energy and agricultural products from areas to be irrigated, and the economic analysis of costs and benefits of an optimized system of dams. The objective of Phase I was selecting the sites with the greatest economic potential. It concluded selecting Las Pavas, Arrazayal and Cambari as the best reservoir sites.

Phase II is presently being carried out, also financed by FONPLATA; its purpose is making detailed topographic maps, analyses of building materials and environmental impact assessments at Las Pavas, Arrazayal and Cambari. Through an agreement with the Secretariat of Public Works of Argentina, additional geological and geotechnical studies are in progress in those three sites.

11. On the basis of these analyses, the Governments of Argentina and Bolivia intend to call for international bids, offering the private sector the opportunity to build and operate some of the most promising reservoir projects under conditions yet to be defined. It is noteworthy that even though some of the projects may be located in territory of one of the countries, both Governments have made the commitment of considering the operation of those projects as binational. It means that conditions for sale of energy generated would be similar to those existing for nationals in each of the markets. A tentative date for the initiation of the bidding process is July 1996.

12. In addition to the binational initiatives, several provincial or local projects are underway or planned based on the present availability of water from the Bermejo. In Argentina, for example, projects for the supply of drinking water to urban areas in the Province of Chaco are being planned or implemented; the Laguna Yema irrigation project is being constructed in the Province of Formosa, although the final extent of this scheme is yet to be determined; and other river regulation activities are being considered in Salta, Chaco and Formosa provinces. In Bolivia, similar projects exist, including the San Jacinto irrigation scheme, portions of which have been constructed and further portions proposed. All of these actions have the potential, in combination, to seriously affect the Bermejo River to the detriment of both the economy and the environment of the Basin and downstream the Plata System. This project will help gain an understanding of possible transboundary concerns and help to guide the development projects so that they will be more environmentally sustainable.

13. **Geographic Characteristics and Global Biological Significance.** The Bermejo is a tributary of the Paraguay River, which in turn is a tributary of the Parana, flowing into the Plata River. The Plata Basin, a combination of three distinct major rivers, drains waters from some 3,100,000 km² - almost a fifth of the South American continent - to the Atlantic Ocean. Extending through the Tropic of Capricorn, the Bermejo River watershed covers some 190.000 km² , and has a length of some 1200 km, approximately the size of the Rhine basin.

14. The Bermejo has a unique characteristic: it is the only river that bridges the huge area of the Chaco Plains. Other major rivers in the region, such as the Timani, the Pilcomayo or the Juramento, flow into the groundwater system of the plains and do not maintain their identity as surface water systems. This fact has three consequences of great importance: a. There is exceptional habitat diversity along the water course; b. Being the only river spanning the plain, the Bermejo is an "exporter" of sediments, with a large influence on the sediment contents of the Paraguay-Parana rivers; c. The great diversity of habitats determines ideal conditions for maximizing biodiversity. Being a continuous course of water it acts as a corridor, allowing the connection of biotic elements of both the Andean and Chaco Plains ecosystems.

15. Contents of sediment in the Bermejo waters are some of the highest in the world (8 kg/m³). Total discharge of sediment is in the order of 100 million tons/year. The

greater part of the sediment is produced in the Upper Basin and dragged down during peak floods. A recent report of the World Bank estimates that 80% of the sediment in the Plata River originates in the Bermejo. In the Lower Basin there is an intense fluvio-morphological activity, determined by large seasonal variations in streamflow, the high contents of sediment and the extremely low hydraulic gradients and level topography. As a consequence it is fairly common to find processes such as the abandonment of river beds, or, as occurred last century, the capture of the Bermejo by the Teuco River. These processes have a strong influence on the dynamics of the riverine forests due to the severe changes they induce in water availability, and wreak havoc with fixed infrastructure such as roads, bridges and human settlements.

16. Population is estimated at 1.2 million, a large part of it indigenous. Indigenous people are among the poorest part of the population: temporary workers and small farmers, with the lowest levels of education and capital availability. Many of them make regular temporary migrations to obtain some monetary income. Some survive through subsistence hunting and fishing, and others supplement their incomes selling regional handicrafts. Land capability and use have been extensively researched during the PDF/B process; information on those subjects is presented in the reports of the consultants, referred to in paragraph 6 above.

17. From the economic point of view, the Bermejo River Basin has a great potential for development but at the present time it is an economically disadvantaged area. Levels of income, education and sanitary conditions are among the lowest. Some regional products have relative national importance; that is the case of wine, wine spirits and a variety of fruits in Tarija, cotton in Chaco and Formosa, fruits and vegetables around Oran, Salta, sugarcane in the Ramal area of Salta and Jujuy and in Tarija. Tannin production has lost the importance it once had in the Chaco region, being replaced by synthetic substitutes for leather tanning. Extensive livestock farming, including cattle, sheep and goats is a widespread activity in most of the basin. Recently, soybeans and rice have been introduced as crops with good economic potential, but seasonally intensive water demands in the case of rice.

18. **Environmental Threats and Priorities.** Human beings have intervened in a destructive fashion in the ecosystems of the Bermejo and exploited its forest resources for a century. Use of forestry resources and pastures has been carried out with a view to immediate economic return, not considering the sustainability of either the activity or the ecosystem. Forest use under extractive "mining" conditions has diminished biodiversity, and impoverished the resource, extracting in a systematic way trees of the highest commercial value. Natural regeneration of those species has been seriously limited. Something similar has happened with natural pastures. Overgrazing has been widespread since 1900. In some areas it has resulted in the total elimination of vegetative soil cover, creating problems of erosion and desertification. Both activities have aggravated the concerns over sediment movement in the river basin and have contributed to downstream environmental degradation.

19. Development and sustainable use of natural resources are not mutually exclusive terms in the Bermejo River Basin. Both are required and change in how development is accomplished is needed to provide a sustainable future for the residents. The present level of degradation of natural resources (both severe soil erosion and desertification) in the Lower as well as in the Upper Basin, results in low levels of

productivity of lands. Low levels of income force temporary migrations of many local farmers, seeking additional revenue, and resulting in the general neglect of farms and farmed land. Under the present subsistence systems of production, simultaneous attention to economic profitability and environmental protection is difficult to achieve.

20. International Waters Impacts. Irregularity of flow and the production and transportation of sediments create transboundary difficulties for the development of the basin. The extensive amount of sediment, deposited along the course of the lower basin during floods, changes the course of the river continuously, impeding a rational use of land and land resources. Aquatic biodiversity is influenced by the excessive sediment load. There is a potential for navigation, but due to the variability of flow and large transportation of sediments, the use of that potential is impossible until the erosion/sedimentation problems are resolved. The potential further impacts of the creation of new hydraulic structures could result in a significant redistribution of sediments of the system by altering the deposition and scour patterns already established, as is the case in the San Jacinto project, where sedimentation is filling the reservoir almost three times faster than originally calculated, thus creating a "hot spot" needing attention. These schemes, and other water resources oriented projects described in paragraph 9, could also affect the quantity of water in the system, and impact the biodiversity and degree of land degradation occurring in the basin. This project will help to ensure that binational cooperation will be achieved in addressing these problems.

21. Transboundary Impacts. The frontier zone between Argentina and Bolivia has a remarkable level of commercial activity. Of the three main frontier points where commerce and movement of travelers occurs, the one between Aguas Blancas and Bermejo is located in the Bermejo Basin; it is the seat of movement of important volumes of goods and passengers. Transboundary trade is typical of towns with similar conditions in most of South America; local businessmen and populations obtain the benefits accruing from relative price differentials, mostly in food and staple products. Migration of Bolivian nationals into Argentina, temporarily as well as permanently, is an important transboundary impact creating needs for transportation infrastructure, housing, and essential resources that encourage or contribute to land degradation, unsustainable development, and demands on the water resources, generating pollution loads which alter the quality and character of the river system, which are transmitted downstream. Binational actions are needed to address these issues.

PROJECT OBJECTIVES

22. **Background.** The proposed GEF project will result in the formulation of a Strategic Action Program for the Integrated Water Resources Management of the Bermejo River Binational Basin. The project is designed to identify priority transboundary concerns and needs within the Basin and to assist in developing a watershed-based approach for integrating environmental and development concerns into the planning programs of the two Governments, with a view toward protecting and maintaining the essential ecological structure and functioning of the entire system, including its downstream components.

23. This project proposal is being compiled at a time when the Binational Commission is considering the construction of several multipurpose dams on international stretches of the Bermejo or on tributary rivers located in either one of the countries, near the borders. Based on a report funded by FONPLATA, a final decision has been made as to the sites to be selected: Las Pavas and Arrazayal, on the international course of the Bermejo, and Cambari on the Grande de Tarija River, in Bolivia; the total cost of construction of which is estimated to be about US\$ 460 million (see Annex 1). These dams will change the present flow dynamics of the Bermejo River, creating opportunities for agricultural development primarily downstream in Argentina, urban development and infrastructure. Anticipating and mitigating the impacts of these changes on the Bermejo River Binational Basin in an holistic manner, beyond the minimum requirements for environmental impact assessment, would be an integral part of the proposed Strategic Action Program planning process. The preparation of the SAP will be consistent with GEF Operational Strategy, as stated in Chapter 4, Box 4.1. Main stages of the preparation will be: (a) Transboundary water-related environmental analysis; (b) Analysis of the Relationship of the SAP to national environmental planning and economic development documents; (c) Establishment of clear priorities (such as priority preventive and remedial actions, cross-cutting issues and linkages to other focal areas, etc); (d) Establishment of a realistic baseline; and, (e) Determination of agreed incremental costs.

24. **Transferability/Replicability.** Production and transportation of sediments are characteristics defining the behavior of the Bermejo River. Analysis of the potential for control of erosion and sedimentation in the Upper Basin may have premium returns in promoting sustainable development in the rest of the basin. It may also result in gaining knowledge and practice on watershed management applicable to other areas with comparable conditions in the Andean region. Studies on erosion and sedimentation in the watersheds of the Valley of Tarija and in the Tolomosa River are included as special activities within the proposal.

PROJECT DESCRIPTION

25. Proposed Project Activities correspond to the six activities identified in Part I of the Proposal for the PDF, Block B Grant. The six activities are designed to provide information for, and permit formulation of, a Strategic Action Plan for the Bermejo River Binational Basin, and are concentrated in three principal task areas as set forth below. Detailed descriptions and budgets of each of the proposed work program

elements have been supplied to the GEF International Waters focal points in each Implementing Agency and the GEF Secretariat. Work program elements have been selected on the basis of recommendations originated during the PDF/B process described in paragraph 6 above.

TASK AREA I: TRANSBOUNDARY DIAGNOSIS. Task Area I, the transboundary diagnosis, is designed to provide for the collection and analysis of additional field data relevant to the diagnosis of the priority transboundary pollutants of concern. These data will contribute to the sound scientific and technical basis for the remedial actions identified in the SAP process. This task area consists of two principal activities that will permit quantification of existing pollutant movements, thereby updating and consolidating older data, and provide for the forecasting of additional, potential future pollutant sources and movements that might affect the system. Based on analysis conducted as a result of PDF activities, the proposed work program elements in this latter Activity target specific, representative locales where specific data and information are required.

26. Activity 1: Analysis of regional problems in matters of water, erosion and sedimentation in the entire Bermejo Basin and its area of influence; assessment of their relevance for the Binational Commission and countries: and proposal of activities that are best executed through regional coordination, based on available groundwork and the results of work by national agencies.

1. Work Program Element 1.1: **Transboundary Pollutant Movement.** (US\$ 250,000) This project will determine the regional impact of sediment transport on the Paraguay-Parana Waterway, the delta of Parana and the Plata River. In the Upper Basin of the Bermejo River, the operation of dams will change the patterns of water and sediment flows, affecting conditions downstream. The study will utilize an existing computerized simulation model of the Waterway developed by the National Direction of Ports and Waterways of Argentina, under various operational scenarios for the system of dams. In addition, possible measures to ensure environmental sustainability such as a guaranteed minimum flow release or downstream riverside buffer strips will be explored (See Task Area III, Activity 4).

27. Activity 2: Assessment of major present and emerging transboundary environmental problems in the basin and its area of influence.

1. Work Program Element 2.1: **Stream Classification.** (US\$ 70,000) This is a project to establish criteria and parameters of classification of water courses within the Upper Bermejo Basin and optimize use and quality control. Work to be done consists of sampling of water courses, laboratory analyses, processing and evaluation of data, classification of water courses, definition and regulation of water courses and preparation of guidelines for use and conservation of water resources.

1. Work Program Element 2.2: **Erosion Control-Santa Ana/Camacho.** (US\$ 150,000) This project consists of updating of existing studies and experiences for control of erosion, land reclamation, and management of natural resources. The studies are: Analysis of soils, vegetation, cattle management, and agriculture, and a

social-economic survey; Formulation of a plan for the management of natural resources and erosion control; Identification of demonstration areas, and botanical species suitable to the area.

1. Work Program Element 2.3: **Land Tenure-Tarija Valley.** (US\$50,000) This study is to determine the use and ownership of eroded land within the Tarija Valley. Work required will consist of: a cadastral survey of the land; a census of owners of eroded land; legal characterization of property; and usage and conservation of land. This is important in order to establish legal information as to avoid greater damage to soils, and to establish property of land where projects are to be developed.

1. Work Program Element 2.4: **Range Management-Tarija Valley.** (US\$ 50,000) This is a project for zoning of natural grazing fields in accordance to their potential. It will establish sustainability criteria, limiting the number of cattle allowed in each grazing field. In order to do so, it is necessary to prepare an inventory of natural flora and fauna, evaluation of the potential for raising cattle in the area, detailed cartography indicating zoning and natural units of grazing fields, and establishment of strategies for the control of quantity of cattle grazing in the area.

1. Work Program Element 2.5: **Land Use in the Lower Bermejo River.** (US\$600,000) This study will focus on two areas, defined by the fluvio-morphological character of the river: a. The Western Sector, of some 21.000 km², has the character of a braided river, flowing within a very wide plain and changing periodically its course; and, b. The Eastern Sector, some 5.000 km², where the river flows within a relatively narrow bed, meandering and eroding continually its margins. The results of this study would be the identification of strategies, policies and actions solving or mitigating some of the priority environmental problems originated in the severe fluvio-morphological activity of the river. Another result would be to improve practices of utilization of flood waters presently used by farmers. Those results would facilitate the formulation of a program of sustainable development in the region, i.e. the SAP. The study would involve local Universities and NGOs. Needs for protection of critical wetland habitat will be identified, and measures for protection explored.

1. Work Program Element 2.6: **Management of Forage-Humid Chaco, Province of Formosa.** (US\$ 80,000) This is a project of strategic value in the humid and sub-humid areas of the Chaco. In this area there are some two million hectares of land infested by vinal, affecting predominantly middle sized and small farmers. The objective is to determine the costs of utilizing practices for the control of vinal under farm conditions, and establishing the economic benefits to the farmer of the recuperation of productive levels in cattle ranching. The Experiment Station INTA-El Colorado has developed management procedures for vinal utilizing water from seasonal waterbodies. Use of those procedures is the only way to ensure protection of the habitat for numerous species of local flora, especially those of natural pastures. A small group of farmers will introduce those practices in their farms. The Experiment Station of INTA-El Colorado provides extension services and general supervision and monitoring of the project assuring adequate management of the waterbodies.

TASK AREA II: PUBLIC PARTICIPATION AND PILOT DEMONSTRATIONS. Task Area II, providing public participation and demonstration projects, is designed to provide for the collection and analysis of the information on the feasibility and relative costs of certain remedial measures identified during the PDF Activities as well as a means of transferring such experiences to the public at large. By involving the Basin communities in practical, "hands on"-type involvement in the identification and field testing of remedial measures, as well as in a dialogue process, actions formulated through the SAP process will have the advantage of benefiting from actual community insights and experiences, and of being acceptable to the communities as sustainable alternatives to presently-destructive practices. This task area consists of one principal activity and four work program elements that target specific ecoregions--in the form of four representative sites--within the watershed.

28. Activity 3: Conduct of a Reforestation and Land Management Needs Survey by Binational Commission and possible donors. This include a compilation of erosion, desertification problems and determining options for solving them. Limited pilot projects to determine costs and test methods for stakeholder participation will be conducted with a view to developing carbon sequestration projects and recommendations for activities designed to promote sustainable livelihood and resource use in the damaged binational basin. Information collected from the early experiences of the demonstration projects will be used in formulating the SAP.

1. Work Program Element 3.1: **Transition Forest-Salta**

1. (US\$ 55,000) Transition forests are being converted to agricultural use, mainly soybean production, creating a threat to their existence. No area of this unique ecosystem is presently protected. The objective of the project is to obtain the participation of local farmers in the conservation of selected areas, through the adoption of management practices compatible with the conservation of forests and resulting in a productive and sustainable use in a pilot demonstration.

1. Work Program Element 3.2: **Tolomosa Watershed.** (US\$ 500,000) This is a demonstration project for land reclamation, control of sediments, reforestation and sustainable management of soils and water. It will be executed by the San Jacinto Association. The feasibility study for this project is concluded, the full project consists of 91 small dams for retention of sediments; 3145 ha to be fenced for forest protection; management and conservation of soils in 2949 ha. The amount requested only covers the execution of a demonstration project to determine full project costs, and effectiveness of measures in sediment abatement.

1. Work Program Element 3.3: **Sustainable Development. - Yungas, Salta.** (US\$ 90,000) This project, to be developed by a group of small farmers in an area in the vicinity of Los Toldos, will draw upon the experience of the Laboratory for Ecological Research in the Yungas (LIEY-University of Tucumán). Main objectives

will be monitoring results of methods of agro-forestry and cattle management in forests, evaluating costs and benefits of operation and determining costs of extension activities. Methods to be evaluated in this demonstration project have been successfully tested on an experimental, laboratory-scale basis in the Los Toldos area in a project previously executed by LIEY and supported by the German Technical Cooperation Agency (GTZ).

1. Work Program Element 3.4: **Removal of Constraints-Dry Chaco and Humid Chaco. Province of Chaco.** (US\$ 80,000) The area of application is Comandancia Frías and Fuerte Esperanza (Dry Chaco), covering some 10,000 ha, and in San Martín (Humid Chaco). The adoption of practices of sustainable use of natural resources are constrained by both the lack of land title and the poor quality of surface and groundwater during the dry season in the Dry Chaco and by floods in the Humid Chaco. The objective will be to determine costs of removal of those constraints, and the benefits of introducing adequate management practices.

TASK AREA III: DEVELOPMENT OF THE STRATEGIC ACTION PROGRAM. Task Area III, development of the Strategic Action Program, is designed to provide for the synthesis of data and experiences, feasibility assessments and cost analyses developed in the two preceding task areas. Included in the three principal activities within this task area are working program elements that address the legal, institutional, and human and natural resources bases essential for implementation of the remedial actions identified through the SAP process. The seven work program elements, based upon wide-ranging consultations as described in paragraph 6, explicitly provide for the cooperative development of a comprehensive Strategic Action Program by both the public and private sectors, based on a multi-sectoral, holistic approach to environmental management and economic development in this Basin, as provided for in Chapter 18 of Agenda 21.

29. Activity 4: Analysis of water resource development projects in the basin and how they can be designed and operated to protect biodiversity and the water environment of the region. This will include upstream and downstream analysis for sharing water resources for sustainable development, and will lead to a water resources and sustainable development element of the SAP, including: (i) Evaluation of transboundary environmental impacts of projects in the Upper Bermejo and Grande de Tarija Rivers Basins; (ii) Continued coordination and consultation with agencies of the Governments of Argentina and Bolivia, civil institutions including NGOs, scientific and academic institutions, etc.; (iii) Incorporation of the Plan for Environmental Action for the Upper Bermejo River Basin as a complement to the feasibility studies; (iv) Strengthening the ongoing regional coordination and programming framework. The Binational Commission, with assistance of implementing/executing agencies, will identify needed actions for strengthening its regional role to address its responsibilities, including institutional structures, regional monitoring and analysis capabilities, its role as promoter and manager of development, relationship with other levels of government, etc., for incorporation into the SAP. Specifically, the Binational Commission will be responsible for coordinating the activities of the government agencies and NGOs participating in the SAP process, and in the execution of individual work program elements. Computer-based

information networks will be used to link the Commission, national inter-ministerial committees, and different levels of government in conducting the project.. If there is interest, NGOs and universities might also be hooked into the network.

1. Work Program Element 4.1: **Hydrometeorological Network.** (US\$ 150,000) This is a project for the design of a complete binational hydrometeorological network and the rehabilitation of the existing network in the Upper Bermejo River Basin, in order to obtain reliable and continued data needed for monitoring the basin. This is a priority project for designing what type of network is required to meet binational needs.

1. Work Program Element 4.2: **Environmental Law.** (US\$ 30,000) In Bolivia this study will promote the establishment of a legal framework harmonizing laws for sustainable development in critical eroded areas, creating legal conditions for policies, actions and interventions by landowners and public and private institutions within the basin. The project will be one of the first activities in implementing the Treaty on Environment between Argentina and Bolivia (a summary of which appears as Annex 3), and will determine how that agreement will be implemented in this basin. The results of this study will be an updating of existing legal dispositions, the analysis of reasons impeding sustainable development, proposals for complementary or alternate regulations, and proposals of laws that will: a. Stop the process of subdivision of agricultural parcels; and, b. Allow the intervention of the Government in eroded areas. In Argentina, results expected are a continued support to provincial and federal initiatives to regulate natural resource use, standards and methods of control of the environmental quality. The use of environmental zoning will be explored in the binational basin.

1. Work Program Element 4.3: **Environmental Corridor-Baritu/Tariquia.** (US\$ 50,000) This study will focus on the optimization and conservation of flora and fauna through the formulation of joint policies between Baritu and Tariquia to preserve biodiversity, the equilibrium of the ecosystem, management of information and to restore the natural conditions that will allow the conservation of the reserves. Work needed is an analysis of the legal and political regulations of Baritu and Tariquia; an inventory and ecological complementarity of both reserves; formulation and analysis of alternatives for the installation of a biological corridor; and evaluation of the physical, legal and biological feasibility of the corridor. Also links will be made to lower basin corridor needs and to critical habitat identification elements.

30. Activity 5: Preparation of a socioeconomic survey and review of regional environmental practices and their relations with population. It will emphasize public participation in the management of priority ecosystems with recommendations for activities designed to promote sustainable livelihood and resource use in the context of the SAP. Also included would be pilot projects in how to involve citizens and community groups in the sustainable development of the basin. The new popular participation program in Bolivia will be strengthened to work in the basin and approaches will be shared with colleagues in Argentina, including: (i) Preparation of issues papers on social issues and convening of a workshop in each country; and (ii)

Conduct social assessment (with pilot participatory rural appraisals) in the early part of the project (for funding, see work program element 6.2).

1. Work Program Element 5.1: **Transboundary Migration.** (US\$ 80,000) This is a study to determine the temporary and permanent transboundary migrations so as to establish the role of migrations in the use, conservation and sustainable development of natural resources within the Bermejo Basin. Work needed is compilation of statistical information and social-economic conditions of the transboundary migrations; social, economic, cultural and anthropological surveys, establishment of patterns of temporary and permanent migrations; and an analysis of the relation among the migration with management and use of resources. This study takes into consideration the relation of human resources with integral management of the basin.

1. Work Program Element 5.2: **Environmental Education-Formosa.** (US\$ 40,000) The purpose of this project will be to promote a program of environmental education through forest cultivation in selected schools and communities in Eastern Formosa. Forests in this area are affected by a process of degradation due to poor management practices. The objective of this project will be to show the local population that costs of management practices are justified by the productive recuperation of native forests.

31. Activity 6: Creation of appropriate inter-ministerial committees within each country to address priority transboundary environmental issues. The project will seek to assess and facilitate agreement on priority actions to address International Waters issues, such as the nature of project interventions, global risk, cross cutting significance (land degradation, biodiversity), etc., including: (i) The identification of these priority issues and activities in to allow project formulation for solutions to priority regional problems before the completion of the comprehensive SAP; (ii) Completion of the comprehensive SAP, including detailed regional planning and an overview of long term coordination of GEF activities with the Binational Commission and detailing how the water resources development and environmental agreements between the two countries will be carried out in this basin; (iii) Elaboration of GEF-eligible project/program concepts as identified in the SAP, to be prepared as annexes to the SAP document. Such project/program concepts could be both national and regional in scope; (iv) Development of a Program of Public Awareness and Regional Information involving Workshops and Seminars at two levels will be programmed, directed at two different markets: a) For interested parties of the private sector in the project area, with the objectives of facilitating local participation in projects and programs, and of receiving feedback and promoting local initiatives, and b) For all the Plata Basin countries, inviting the participation of interested Government and private sector participants in order to encourage a wide discussion of the SAP.

1. Work Program Element 6.1: **Formulation of the Strategic Action Program.** (US\$ 665,000) Formulation of a SAP is the main activity. It consists of the identification and harmonization of development initiatives in the Bermejo Basin, followed by an strategic integration and rationalization of those initiatives and

proposals for sustainable development in the region. It will include an environmental evaluation of the basin, emphasizing the analysis of transboundary problems, and a socioeconomic survey reviewing environmental practices and their relation with the education, health, income and organization of local population, and the identification and coordination of organizational arrangements. Support to Government efforts at introducing environmental considerations into the laws and regulations at the national and regional levels is a part of SAP. Costs for SAP formulation include consultants fees, seminars and meetings with parties interested in the development of the Bermejo Basin in both countries and support activities, as detailed in the consultants reports referred to in paragraph 6. A practical result of the SAP would be the explicit incorporation of the focal areas of interest of GEF into regional development programs, looking for methods and procedures for the solution of priority transboundary environmental problems and obtaining global benefits. A pilot program promoting the participation of local population in the evaluation and implementation of sustainable development projects would be tested as part of the project and future use of these methods would be another practical result of the SAP formulation.

1. Work Program Element 6.2 **Public Participation**. (US\$ 150,000) This is a program of seminars, courses, workshops and publications designed to engage the active participation of the many communities living in the Bermejo River Basin, in order to increase the awareness of inhabitants in relation to environmental concerns, avoid the disruption of the ecological balance and promote the protection of their habitats. This is linked with Activity 5.

RATIONALE FOR GEF FINANCING

32. **Urgent Global Priority.** The proposed project meets GEF eligibility criteria by addressing critical transboundary threats to the ecological viability of a regionally important transboundary watershed, and urgent biodiversity conservation needs that, if not addressed, would result in sustained and probably irreversible damage to important valleys, subtropical forests and soils. It would promote the consideration of sustainability criteria in actions to be carried out, such as construction of multipurpose reservoirs for power generation, irrigation, water supply and sediment control, leading to environmentally-sustainable development of the region.

33. Critical decisions are being programmed for the development of the Bermejo River Basin. Once those decisions are implemented they will affect the environment and lives of people for many years. Some impacts of development may have undesirable, perhaps irreversible, side effects if environmental concerns are not taken into consideration. A Binational Commission has been created. It needs to be strengthened to enable it help change development practices in the basin to include environmental sustainability and reduction of transboundary impacts. Thus, now, when decisions are being made, is the appropriate time to consider environmental sustainability and incorporate global environmental considerations into planned development activities. The Bermejo River Basin offers a singular opportunity: being an area where important development projects are programmed, it is possible to influence some of those programs from the start. This means that undesirable side effects may be prevented from the very beginning, providing a watershed scale example for emulation elsewhere in semi-arid montane regions.

PARTICIPATION AND SUSTAINABILITY

34. **Participation.** As noted above, formulation of the Bermejo River Basin SAP proposal, including its proposed GEF components, has involved extensive and broad-based participation by representatives of local and national Governments, academic and research institutions, private sector representatives and non-governmental organizations. The participation process was facilitated by a series of consultative meetings and seminars, conducted in Resistencia, Formosa, Salta and Jujuy, in Argentina, and Tarija in Bolivia. At the regional level two workshops were programmed. One was held in Salta, on December 14 and 15, 1995, and one is to be held in Tarija, in May, 1996. Preparation of the proposal involved the participation of several Universities, governmental agencies and NGOs based on the watershed or close to it. The GEF project preparation Task Force met in Buenos Aires on October 15, 1995, in Washington D.C. on March 6, 1996, and finally revised the present document in April, 1996. Public participation is built into the demonstration project and in development of the SAP. During final preparation of the present proposal several meetings and consultations were held with representatives of the GEF Secretariat and all three implementing agencies. Valuable comments were received and they have been considered and discussed with those representatives, resulting in improvements of the proposal. Additional comments were received at the GEFOP meeting of May 2nd, 1996, and have resulted in changes or additions to paragraphs 3, 5, 6, 23, 25, 31, 34, 40 and Annex 4.

35. **Sustainability.** Project activities and implementation are designed (including the participation process) to achieve sustainability. Demonstration projects have been selected on the basis of their sustainability, both from the ecological as well as the economic point of view. Studies proposed have the purpose of identifying the causes and effects of degradation of soils and forests, and of reclaiming once productive areas and keeping them productive. Wherever possible the project would develop opportunities for the establishment of financial incentives, private sector investment and cost recovery in environmental management (e.g., in reclamation of eroded lands, pastures and forests, management of areas infested by vinal, rational management of natural forests, exploitation of newly forested areas), and provide actual, working examples of the new or refined land management actions necessary for the sustainable development of the watershed. Use of demonstration projects on this scale would highlight issues affecting the sustainable implementation of practices allowing refinements or modifications to be made prior to large-scale use. The Binational Commission will be responsible for transmitting recommendations to the appropriate governmental bodies.

36. The national and regional governments of Argentina and Bolivia are committed to the sustainability of the project. They have pledged their support to actions implemented by GEF, with a budget of US\$ 2,500,000 for a period of two years. Moreover, once environmental considerations are included in the design of development projects they become parts of them, and make them sustainable projects.

LESSONS LEARNED AND TECHNICAL REVIEW

37. **Lessons Learned.** Lessons learned from previous international waters projects indicate that developing a Strategic Action Program is an important first step in addressing problems of international waters. The proposed project would provide linkages with ongoing initiatives in the Plata Basin, and would ensure a concerted international approach to achieve global benefits through linkages with on-going and planned national and regional development initiatives, laws and technical and institutional capacities.

38. **Project Monitoring and Evaluation.** Utilizing key process and status indicators would be an intrinsic process of the project through the establishment and integration of monitoring tools into project components. A monitoring and evaluation plan will be prepared by the Binational Commission before initiation, and will be approved by the Governments and UNEP. The objective of this monitoring is to contribute to improving, and, if needed, adapting management of program activities as well as creating the basis for project evaluation. A project implementation review would be undertaken jointly by the Governments and the UNEP two years after the end of the project.

39. **Technical Review.** The technical review of the proposal was prepared by W. D. Williams, Ph.D., D.Sc., Professor Emeritus, University of Adelaide, Australia. Dr. Williams is a designated expert for the STAP Roster of Experts. The review, presented as annex 5, concludes that:

1. "The proposal represents a significant transboundary project of water resource (and catchment) management for an economically disadvantaged region that has been subject to considerable environmental damage that in the long run is unsustainable. As such, it is a timely and sensible response to events which no government concerned to enhance or at least maintain the value of its natural resources should ignore.

1. "Whatever the case, it is certainly one of only a few proposals that attempt seriously and comprehensively to redress the lack of attention that the management of international rivers has attracted.

1. "The incremental costs of the proposal, i.e., the costs of implementing the proposal, are relatively modest. The costs of implementing the GEF alternative situation (vis-a-vis baseline situation) in absolute terms are not inconsiderable (US\$ 5.725 million, cf. US\$ 0.7 million for the baseline situation) but in relative terms, and when viewed against, for example, the costs of dam construction alone (US\$ 458.9 million), are insignificant. They become even more insignificant when the likely costs of ongoing and future environmental damage (especially erosion, desertification and decreases in productivity) are taken into account.

1. "In summary, this review gives substantive approval to both the over-arching objectives of the proposal and their rationale, and the ways proposed to achieve the objectives. Its acceptance is recommended."

PROJECT FINANCING AND BUDGET

40. The proposed Project budget is US\$ 5,725,000, being comprised of funds provided by the Governments of Argentina and Bolivia, UNEP and the OAS, as well as incremental GEF financing as set forth in Table 1 of Annex 4.

Table 1 PROJECT BUDGET IN US\$

INCREMENTAL COSTS

41. Total cost of the project is estimated at US\$ 5,725,000. Total funding for the baseline situation without GEF financing is a minimum of approximately US\$ 700,000. For the alternative project, non-GEF financing by the Governments of Argentina and Bolivia is US\$ 2,510,000; by UNEP, US\$ 150,000; and, by OAS, US\$ 75,000. The requested GEF contribution is US\$ 2,990,000 (see Annex 4).

42. Domestic benefits from this project would be the prevention and control of erosion, land reclamation, sediment control, irrigation of the lowlands, and water supply for drinking and agricultural uses. The values of these benefits cannot be estimated now. The Governments involved are contributing a substantial amount of funds, demonstrating their full support and interest in this program, and this investment is assumed to account for local benefits.

ISSUES, ACTIONS AND RISKS

43. The main issue of this project is to address priority transboundary environmental concerns needed for sustainable development of the Bermejo Basin. To effect this, it is necessary to formulate a comprehensive program of coordinated actions by the Governments of Argentina and Bolivia for the solution of these matters.

44. The main risk facing development in the Bermejo River Basin is that environmental considerations are not properly included into projects under study. This might produce serious, undesirable environmental side effects, such as soil degradation due to agricultural use of soils not suitable for agriculture, or desertification of pasture areas due to continued practices of overgrazing. Some natural ecosystems are experiencing a loss of biological diversity, due to excessive pressure of the population on limited resources. This is the case with wildlife, which is being hunted or fished beyond the reproductive capacity by an impoverished population.

45. Opportunities exist for the reclamation of some natural resources, such as soils and forests, utilizing adequate environmental management procedures making economic sense. The GEF proposal could make a difference in the development of this region, helping to popularize those procedures among the population.

INSTITUTIONAL FRAMEWORK AND PROJECT IMPLEMENTATION

46. All the proposed activities will be driven by the Binational Commission, in consultation with the UNEP/OAS. The Binational Commission will appoint two Executive Directors of the Project, one for Argentina and one for Bolivia. Two Technical Coordinators, one for Argentina and one for Bolivia, will be contracted by the Executing Agency, in consultation with the Binational Commission, with funds provided by GEF through the Implementing Agency. UNEP/OAS will support Project Execution.

47. The Binational Commission has international legal status, autonomy in technical, administrative and financial matters, and legal capacity to acquire rights and assume obligations. Among its functions are: selecting projects to be carried out; arranging funding for studies and projects selected; and planning and executing activities necessary for the development of the basin. The Binational Commission is, therefore, responsible for managing the basin so as to achieve sustainable development, optimize the use of natural resources, generate employment, attract investments and provide for rational and equitable use of water resources.

48. Activities of national personnel, with the support of the international agencies, will be based upon preparatory work and Terms of Reference agreed with and approved by the Binational Commission, in consultation with UNEP/OAS. To the extent possible, all tasks will be executed by national agencies of Argentina and Bolivia and/or by consultants from those countries.

49. All three GEF implementing agencies will be asked to participate according to their comparative advantages. It is anticipated that UNEP will assist in preparing project elements relating to the environmental diagnostic and identification of transboundary priority issues; UNDP could assist in consultations among countries in the basin and in preparing project elements relating to institutional strengthening; and the World Bank could provide guidance for the preparation of project elements relating to economic development and associated sectoral policy issues and convene donors' meetings as necessary. To this end, the Binational Commission is encouraged to present its requirements for financing of specific activities, not covered under this proposal but identified in the process of formulating the SAP, to the Implementing Agencies at the earliest possible opportunity. OAS will act as executing agency and manager of the funds provided to the project by UNEP on behalf of GEF.

50. The main Coordination activities will be implemented from Buenos Aires, Argentina and Tarija, Bolivia.

ANNEXES:

1. COSTS AND TECHNICAL PARAMETERS OF RESERVOIR SITES.
2. SUMMARY OF THE AGREEMENT FOR MULTIPLE USE OF THE RESOURCES OF THE UPPER BERMEJO AND GRANDE DE TARIJA RIVERS BASINS.
3. SUMMARY OF THE TREATY ON ENVIRONMENT BETWEEN THE GOVERNMENTS OF ARGENTINA AND BOLIVIA.
4. CALCULATION OF INCREMENTAL COSTS.
5. REVIEW OF UNEP/OAS BERMEJO RIVER GEF PROPOSAL.

Annex 1:

NOTE:

[FOR EFFECTIVE REVIEW OF THESE PROPOSALS, REFERENCE SHOULD BE MADE TO THE ORIGINAL DOCUMENTS AVAILABLE FROM THE SECRETARIAT. Please note that all of these documents have been converted from their original formats. Several of the Annexes and Tables are not available in electronic form - copies of these are available on request from the GEF Secretariat.]

ANNEX 2

SUMMARY OF THE AGREEMENT FOR MULTIPLE USE OF THE RESOURCES OF THE UPPER BERMEJO AND GRANDE DE TARIJA RIVERS BASINS: CREATION OF THE BINATIONAL COMMISSION

1. On June 9th, 1995, the Governments of Argentina and Bolivia agreed on establishing a Binational Commission for the Development of the Upper Bermejo and Grande de Tarija River Basins. This Binational Commission is responsible for managing those two basins, so as to achieve the sustainable development of their area of influence, optimize the use of their natural resources, generate employment, attract investments and provide for rational and equitable use of their water resources.
2. The Binational Commission has international legal status, autonomy in technical, administrative and financial matters and legal capacity to acquire rights and assume obligations. Among its functions are: selecting projects to be carried out; arranging funding for studies and projects selected; issuing international calls for bids; awarding contracts for water resources studies, programs and project works; granting concessions for the execution and use of planned works and projects, without Governments guarantees or endorsements; contracting the services necessary for fulfillment of the objectives of the Agreement; and planning and executing activities necessary for the development of the basins.
3. A specific paragraph establishes that power generated by hydroelectric plants built in Bolivia may be sold on the Argentinean market under the same conditions as for power produced in the Argentine Republic. Also, anyone constructing hydraulic works in the basins will agree with the parties to set aside capacity throughout the year or during certain months, to accumulate water during high water periods, and to mitigate negative impacts downstream.

ANNEX 3

SUMMARY OF THE TREATY ON ENVIRONMENT BETWEEN THE GOVERNMENTS OF ARGENTINA AND BOLIVIA

1. On March 17th, 1994, the Governments of Argentina and Bolivia agreed on carrying out joint or coordinated actions for the protection, preservation, conservation and of the environment, sanitation and promotion of the environment and rational and equitable use of natural resources, considering the relationships among environment, development and integration.

2. Fields of action will be:

- * Atmospheric Protection (Climate change; deterioration of the ozone layer and transboundary atmospheric contamination).
- * Protection of Soil Resources.
- * Protection and Use of Water Resources.
- * Development of Indigenous Populations and Other Local Communities.
- * Protection of Biological Diversity.
- * Treatment of Wastes and Dangerous Products.
- * Negative Environmental Impacts of Industry, Mining and Energy Production.
- * Prevention of Urban Contamination.

3. The parties agree to exchange information on existing legislation, on the creation of data banks, the exchange of scientific and technological information, the execution of joint investigations, the organization of seminars, symposia and workshops, and the harmonization of existing legislation.

4. A Subcommission on Environment is created within the Coordination Committee of the Permanent Council for Binational Integration.

5. Each party agrees not to execute actions that could cause a damage to the environment of the other party.

Annex 4:

CALCULATION OF INCREMENTAL COSTS

BROAD DEVELOPMENT GOALS

1. The goal of the Strategic Action Program for the Binational Basin of the Bermejo River is to promote environmentally sustainable development within the basin, taking into consideration the program of investments being prepared by the Binational Commission for the Development of the Upper Bermejo and Grande de Tarija Rivers Basins.

BASELINE SITUATION

2. The baseline situation consists of: (1) a long term development program for the Upper Basin of the River, where investments in three dams and reservoirs, hydropower generation, roads and some irrigation infrastructure are being planned for construction in the next ten to fifteen years; (2) A minimum of environmentally related activities, basically those considered as remedies to problems created by the construction of the reservoirs described in (1), and forming part of the environmental impact assessments: and, (3) Relatively uncoordinated activities and concerns being planned or executed by many government agencies of both governments and/or private parties, in the whole basin or even outside it - some creating negative impacts and others seeking to redress or mitigate negative impacts - requiring some coordination.

3. The baseline activities in category (1) include: (a) a program of investments for an estimated US\$ 460 million (See Annex 1), to be executed primarily with private sector participation, under a concessionary program to be devised in consultation with interested investors; (b) additional investments required for general development of irrigated agriculture, industry and urban infrastructure, not calculated yet, but possibly in an order of magnitude comparable to (a) above; and (c) possibly compensation or subsidies to investors willing to develop some of the activities in (a), not yet defined.

4. Costs of these general development programs have not been considered in the calculations presented in Table 1; those activities, however, are a main reason for a GEF financed project in the basin, and may be subject to substantial modification as a result of the GEF project, in order to take into consideration sustainable development. In this sense, a modest GEF project in the Bermejo might have a substantial leverage effect, redefining projects that might, otherwise, have not been environmentally aware.

5. Table 1 has included some of the costs belonging to category (3): activities presently being executed by some government agencies, having direct relation to specific Program Elements. Baseline costs are the amounts that would be justified in the next two years without consideration of tranboundary effects.

GEF ALTERNATIVE SITUATION

6. The alternative situation consists of the actions needed to both introduce sustainable development within projects of development in the Bermejo River Basin, and capture the resulting global environmental benefits, including transboundary environmental problems. These are the costs necessary to include sustainable development concerns in projects for the development of the basin over and above the requirements of regular environmental impact assessments.

7. Development of the Bermejo River Basin will be directed and coordinated by the Binational Commission. This new agency will require strengthening, to be provided through GEF support.

8. Each Activity of the project, its baseline cost and incremental cost is presented in Table 1, and analyzed below.

9. **Activity 1 (Project Element 1.1).** The baseline cost of this alternatives US\$100,000, and is associated with continued monitoring of the streamflow of the Paraguay and Parana rivers and the transportation of sediments, using the same methods as were utilized in the last year. During the PDF/B process it was concluded that additional observations were required in the Upper Bermejo tributaries, as well as additional simulations utilizing available models, to adequately evaluate the future behavior of Paraguay and Parana Rivers, as detailed in Program Element 1.1. The alternative project cost are US\$ 440,000: GEF funding in the amount of US\$200,000 is requested for consulting costs, travel expenses, preparation and use of models describing the behavior of the basin, and similar components. UNEP is expected to contribute US\$ 50,000, and the Governments of Argentina and Bolivia US\$190,000 to cover reinforcement of the hydrometeorological network, personnel costs, and additional operation costs.

10. **Activity 2 (Project Elements 2.1 through 2.6).** The baseline cost of this activity is US\$ 260,000, and is comprised of the cost associated with controlling erosion in the Santa Ana-Camacho area of the Central Valley of Tarija, Bolivia (S\$60,000) and the cost of providing improved information for environmental zoning in the Lower Basin within Argentina (US\$ 200,000). The alternative project cost is US\$1,735,000: GEF funding in the amount of US\$900,000 is requested for consulting costs, travel expenses, purchase of basic equipment and remote sensor imagery. Work required is described in Program Elements 2.1 through 2.6. UNEP is expected to contribute US\$ 100,000 and the Governments of Argentina and Bolivia US\$735,000 to cover strengthening of human resources capacity, reinforcement of institutions working in the basin, and additional operation costs.

11. **Activity 3 (Project Elements 3.1 through 3.4).** The baseline cost of this activity is US\$ 150,000, and is comprised of the cost incurred by the Governments and NGOs associated with controlling erosion in the Tolomosa area of the Central Valley of Tarija, Bolivia and the Yungas region, Salta Province, Argentina, including actions being taken by the University of Tucumán. The alternative project cost is US\$1,260,000: GEF funding in the amount of US\$725,000 is requested for implementation of demonstration projects activities (covering popular participation and the cost of the construction of dikes and sediment control works, the supply of seeds and seedlings, some agricultural equipment and partial on-farm costs). Work programmed has been described in Program Elements 3.1 through 3.4. The

Governments of Argentina and Bolivia are expected to contribute US\$535,000 to cover strengthening of human resources capacity, and additional operation costs.

12. Activity 4 (Project Elements 4.1 through 4.3). The baseline cost of this activity is US\$160,000, and is comprised of the cost incurred in monitoring streamflow and sediment transport within the Bermejo River Basin; and some costs associated with the improved management in Tariquia National Reserve. Needs for additional work were identified during PDF/B preparation, in order to obtain the information detailed in Program Elements 4.1 through 4.3, and in the consultants reports mentioned in paragraph 6 of the Proposal. The alternative project cost is US\$480,000: GEF funding in the amount of US\$ 230,000 is requested to improve the design of the international network of hydrometeorological observations, install a few additional key stations, support national efforts at improving environmental regulations and establish a corridor between Tariquia and Baritu National Parks. The Governments of Argentina y Bolivia are expected to contribute US\$250,000 to cover additional equipment and installation of new hydrometeorological stations and reinforcement of institutional capacity.

13. Activity 5 (Project Elements 5.1 and 5.2). The baseline cost of this activity is US\$20,000, and is comprised of the cost incurred in undertaking current statistical surveys of migrants at frontier stations. Needs for additional, environmentally focused research were identified in the PDF/B preparation, as presented in Program Elements 5.1 and 5.2. The alternative cost is US\$210,000: GEF funding in the amount of US\$120,000 is requested to conduct additional special surveys and investigations into the environmental costs of transboundary migrations, and a demonstration project on environmental education in Formosa. The Governments of Argentina y Bolivia are expected to contribute US\$90,000 in support of the migration surveys and environmental education project.

14. Activity 6 (Project Elements 6.1 and 6.2). The baseline cost of this activity is US\$10,000, and is comprised of the cost regularly incurred in public participation activities in Tarija, Bolivia. The alternative project cost is US\$1,600,000: GEF funding is requested in the amount of US\$815,000 is requested to cover costs of formulating the SAP (including public participation), personnel, travel expenses, and some equipment required for the interconnection the offices of the Binational Commission in Argentina and Bolivia and government agencies involved in the development of the basin. Description of requirements are shown in Program Elements 6.1 and 6.2. The purchase of vehicles needed for field operations is also included, as is the costs of out reach materials seminars, courses and workshops. OAS is expected to contribute US\$75,000, and the Governments of Argentina and Bolivia US\$710,000 in support of operational costs, maintenance and operation of vehicles, public participation programs and strengthening of the Binational Commission.

ADDITIONAL DOMESTIC BENEFITS AND COSTS

15. Increased productivity of soils and other natural resources is a local benefit to be expected as a result of the activities of the Program. Those benefits, as well as additional costs associated with increasing productivity cannot be estimated at this moment, but are expected to be substantial; the Program is expected to produce accurate estimates of additional costs and benefits. An indication of the importance of

additional domestic benefits to the Governments of Argentina and Bolivia is their willingness to co-finance 44% of the cost of the Alternative Project if GEF and UNEP/OAS contribute an additional 56%. At this stage of research it is reasonable to assume that this is the expected equivalent - and a reasonable compensation - for any local benefits originated in the Program.

Annex 5:

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