

PROJECT BRIEF

1. IDENTIFIERS:

PROJECT NUMBER:

PROJECT NAME:

**IMPLEMENTATION OF INTEGRATED
WATERSHED MANAGEMENT PRACTICES FOR
THE PANTANAL AND UPPER PARAGUAY RIVER
BASIN.**

DURATION:

2.5 years

IMPLEMENTING AGENCY:

UNEP

EXECUTING AGENCY:

OAS

Secretaria de Recursos Hídricos (SRH) do
Ministério do Meio Ambiente, dos Recursos
Hídricos e da Amazonia Legal do Brasil
(MMA)

REQUESTING COUNTRY OR COUNTRIES:

Brazil

ELIGIBILITY:

Eligible under paragraph 9(b) of the
Instrument.

GEF FOCAL AREA:

International waters with relevance to the
cross-cutting area of Land Degradation

GEF PROGRAMMING FRAMEWORK:

OP 9 Integrated Land-Water Multiple Focal
Area

2. SUMMARY: This project catalyzes implementation of a detailed watershed management program for the Pantanal and the Upper Paraguay River Basin. Project activities will enhance and restore the environmental functioning of the system; provide protection to endemic species within the wetland; and implement strategic activities, identified in the World Bank-financed PCBAP program, that address the root causes of degradation. These actions with incremental costs will complement basin-scale interventions by the Government of Brazil, financed in part from national and state sources and by international loan funding, and sub-basin scale activities conducted under the World Bank-UNDP PRODEAGRO program, many of which address expected baseline activities. Strengthening of basin institutions, building of agency and organizational capacity, and integration of environmental concerns into economic development activities on a sustainable basis are the key elements of this project.

3. COSTS AND FINANCING (MILLION US):

GEF:	-Project	US\$ 5.879	million
	-PDF-B	US\$ 0.286	million
	-Project Support Costs	US\$ 0.4	million
	-Monitoring/Evaluation	US\$ 0.05	million
	Subtotal GEF:	US\$ 6.615	million
CO-FINANCING:	-UNEP	US\$ 0.175	million
	-WB (<i>PRODEAGRO</i> loan)	US\$ 0.27	million
	-WB (PROAGUA loan):	US\$ 0.98	million
	-OAS	US\$ 0.1	million
	-Government	US\$ 8.263	million
	Subtotal Co-financing:	US\$ 9.788	million
TOTAL PROJECT COST:		US\$16.403	million

4. ASSOCIATED FINANCING (MILLION US)

5. OPERATIONAL FOCAL POINT ENDORSEMENT:

Name: Daniel Ribeiro de Oliveira

Title: GEF Operational Focal Point,

Organization: Ministry of Environment

Secretário de Assuntos Internacionais.

Date: May 27, 1998

6. IA CONTACT:

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LIST OF ACRONYMS

CIBHAP-P	Comite de Integracao da Bacia Hidrografica do Alto Paraguai-Pantanal
COINTA	Consortio Intermunicipal
ECOPAN	Associacao Ecologica de Defesa da Bacia do Rio Miranda e do Pantanal
EMBRAPA	Empresa Brasileira de Pesquisa Agropecuaria
EMINWA	Environmentally-sound Management of Inland Water
EMPAER	Empresa de Pesquisa, Assistencia Tecnica e Extensao Rural de Mato Grosso do Sul
IWRN	Inter-American Water Resources Network
MMA	Ministry of Environment, Water Resources and Legal Amazon
OAS	General Secretariat of the Organization of American States
PCBAP	Plano de Conservacao da Bacia do Alto Paraguai
PROAGUA	World Bank Program for Water Development
PRODEAGRO	Programma de Desenvolvimento Agro-Ambiental
SANEMAT	Empresa de Saneamento do Estado de Mato Grosso
SANESUL	Saneamento Basico do Estado de Mato Grosso do Sul
SEMA	Secretaria Especial do Meio Ambiente
SEMADES	Secretaria do Estado de Meio Ambiente e desenvolvimento Sustentavel
SMA	Secretaria do Meio Ambiente
SODEPAN	Sociedad de Defesa do Pantanal
SRH	Secretariat of Water Resources of the Ministry of Water Resources and Legal Amazon
UPRB	Upper Paraguay River Basin
WMP	Watershed Management Program

PROJECT DESCRIPTION

1. Background and Context

1.1 GEF Programming Context. This project meets the objectives of the GEF Operational Program #9 International Waters Integrated Land-Water Multiple Focal Area Project component (paragraph 9.21). The project will implement strategic actions identified in the Plan for the Conservation of the Upper Paraguay River Basin (PCBAP) to control land degradation, wetland habitat loss, and contamination of waters by sediments, nutrients, heavy metals and persistent organic pollutants (including agro-chemicals) within the Pantanal, a globally significant wetland which is located predominantly within Brazil. Extension of the knowledge gained through this project to the other basin countries, Bolivia and Paraguay, is specifically provided for in the implementation of the watershed management program (see Component VI).

1.2 Implementing Agency Programming Context. The proposed actions are consistent with the GEF principle of linking project elements with major cross-cutting issues such as land-degradation addressed by the GEF, and with the UNEP Environmentally Sound Management of Inland Waters (EMINWA) integrated watershed management planning process.

1.3 National Programming Context. The Plan for the Integrated Development of the Upper Paraguay River Basin (EDIBAP) was completed by the Government of Brazil, with the support of the OAS and United Nations Development Program (UNDP), in 1981, and resulted in the formulation of a series of economic development proposals for the Pantanal region, based on the principles of environmental conservation, ecological balance, and rational use of land. The consequent strategy recommended specific actions to address some social problems and assess the impacts of several proposed development projects on the water regime of the Paraguay River Basin in Brazil. It included some flood control measures proposed to be achieved by the construction of reservoirs at several locations, which would also serve to improve river navigation without significantly changing water behavior downstream.

1.4 Subsequently, the Government of Brazil initiated the Pantanal Project in 1991 with the support of The World Bank. The federal Secretariat of the Environment (SMA/MMA), the Secretariat of the Environment of the State of Mato Grosso (SEMA), and the Secretariat of the Environment and Sustainable Development of Mato Grosso do Sul (SEMADES) joined efforts for the conservation of the Pantanal in the preparation of the PCBAP. This plan employed an environmental zoning approach to delineate general and site-specific guidelines for the conservation, rehabilitation and preservation of degraded lands; created a geographic information system to facilitate dissemination of available physical, biological, social, legal and economic information; and, proposed the operation of a real time flood warning system designed to prevent negative impacts in urban and rural areas.

1.5 In this context, the Government of Brazil requested technical assistance in implementing priority actions identified by PCBAP within the Upper Paraguay River Basin and the Pantanal (UPRB). The present project has been prepared using GEF PDF-B funds and is based upon extensive public consultation with stakeholders in both participating states. Public and stakeholder participation

remains an integral part of all activities identified in this citizen-driven project.

1.6 System Boundaries. The 496,000 km² UPRB is an international river basin shared by Brazil, Bolivia and Paraguay (Annex 7). Together with the Uruguay and Paraná rivers, the Paraguay River is one of the three main components of the Plata Basin System, which drains almost 20 percent of the South American continent. The Upper Paraguay Basin comprises two areas with significantly different water and natural resource conditions, i.e. the Plateau, or *Planalto*, and the Pantanal. The *Planalto* forms the eastern boundary of the drainage basin. Rainfall in this area exceeds 1,400 mm per year and has definite seasonality that determines the hydrological character of the basin. The land surface of the *Planalto* is used mainly for agriculture (i.e., cattle grazing, and soybean and rice production), that has expanded rapidly since the 1970s.

1.7 Surrounded by the *Planalto*, the Pantanal has been identified as a wetland of global significance by The Nature Conservancy and World Wildlife Fund. Major tributaries to the Upper Paraguay River are the Apa, Aquidauana, Cuiabá, Miranda, Negro, Sao Lourenço, and Taquari rivers, all of which discharge to the Pantanal. Of these tributaries, the Miranda, Negro and Taquari rivers are hydrologically dominant, while the Apa River is transboundary in nature, forming the border of Brazil and Paraguay. Approximately 80 percent of the UPRB, including the major headwater tributaries and the largest portion of the Pantanal, is located within the boundaries of the Federal Republic of Brazil.

1.8 Immediate and Intermediate Problems. Priority actions identified by PCBAP included the inspection and licensing of polluting activities; the regulation of exploitation of native flora and fauna; monitoring of water quality; the management and control of mining areas, and the rehabilitation of degraded areas (both by agriculture and mining); the creation of a center for the rehabilitation of wildlife; and, the promotion of informal environmental education activities. Since 1997, provisions set forth in the federal law 9433/97, the new water law of Brazil, have emphasized watershed-level management of water resources, an integral part of which has been the creation of basin committees, including the formation of the Committee for the Integrated Management of the Upper Paraguay Basin and Pantanal (CIBHAP-P). Explicit support for strengthening the ability of this institution and its human resources capacity to conduct effective integrated management actions within the Basin is included in this proposal.

1.9 Building upon the strategic actions identified by PCBAP, the primary objective of this project is to initiate implementation measures with incremental costs that address the key environmental concerns identified in this basin. Projects for the control of land degradation due to urban, agricultural and mining activities, wetland conservation, support to popular participation in the management of natural resources, and control of water-borne contaminants, including persistent organic pollutants, identified as priority actions under PCBAP within the framework of this project, have been selected in order to catalyze implementation of specific actions recommended in PCBAP.

1.10 Root Causes. Priority environmental concerns in the UPRB and Pantanal include soil loss from agricultural areas, contamination by organic pollutants and heavy metals from agricultural and mining operations, and nutrients from inadequately treated sewage from urban developments (Annex 4).

Although human settlement of the UPRB is sparse, most of the population, both on the plateau and in the lowlands, is in urban areas that currently lack adequate land use controls, wastewater and solid waste management infrastructure, and urban stormwater management systems. Soil quality and soil conditions, ease of access, and protection from flooding, as well as significant reserves of metals and minerals, favor agro-industrial and mining development within the basin, primarily in headwater areas upstream of the Pantanal.

1.11 Economic activities, currently being operated using unsustainable methods within a relatively weak institutional framework, contribute to high rates of soil loss, loss of hydraulic capacity (particularly in the wetlands), encroachment into wetlands and floodplains, loss of habitat, and agro-chemical and heavy metal contamination. Increased tourism is contributing to overfishing, alteration of floral and faunal units, and export of threatened and endangered species. In addition, river-borne transportation routes, including the controversial Paraguay-Parana Waterway Project (*Hidrovia*) which has been proposed as a means of facilitating the transport of agricultural products and minerals and metals, have the potential to negatively affect both the downstream passage of flood peaks and the upstream behavior of water flows. However, as of March 1998, the Government of Brazil has taken the decision not to proceed with implementation of the *Hidrovia* within the Pantanal upstream of Corumbá, in the foreseeable future.

1.12 Superimposed upon the anthropogenic impacts, the hydrology of the Pantanal is influenced by natural factors; namely, the fact that the average annual rainfall is less than the annual average potential evaporation resulting in a precipitation deficit. The Pantanal remains a wetland only because of the runoff from the highlands. Changes in rainfall, occurring during the last 25 years, have encouraged some landowners to consider building polders, that, if constructed in large numbers, could affect the character of the entire system. In broad terms, any changes in the hydrological integrity of the Pantanal could reduce the volume of water retained in the Pantanal, and potentially transform it from wetland to savannah.

2. Rationale and Objectives

2.1 Objectives. Building on the previous studies and the PDF-B Phase, the objective of this GEF is to assist the Government of Brazil to promote the sustainable development of the UPRB. The goal of the project is to support the incremental costs of measures identified PCBAP and integrate them into a watershed management program (WMP) for the basin that addresses the priority environmental issues within the world's largest wetland.

2.2 This project proposal is being compiled at a time when the Committee for the Integrated Management of the Upper Paraguay Basin and Pantanal (CIBHAP-P), the states of Mato Grosso and Mato Grosso do Sul, and the federal government of Brazil are beginning to implement the public participation and grass-roots level water resources management structures designed under Federal Law 9433/97. Implementation of these structures provides an opportunity for the creation, strengthening and/or implementation of effective organizations, controls and fiscal instruments to mitigate land and water management practices that degrade water quality, modify hydrological and hydraulic characteristics of the basin, and/or adversely affect the biological integrity of the Pantanal

and UPRB. In addition, PCBAP provides a relevant and appropriate regional planning context for site-specific interventions to be designed and catalyzed under the activities set forth in this proposal. The net result of these actions will be the environmentally sustainable development of the land and water resources of the UPRB, including the Pantanal. The strengthening of CIBHAP-P is anticipated to be a specific result of these actions.

2.3 Complementary Interventions. Activities proposed for implementation during the project period would be conducted in parallel with numerous on-going and proposed planning and development activities. Activities that directly affect the conduct of the proposed project include, *inter alia*, a US \$ 270,000 element of the Northwestern Regional Development Program (PRODEAGRO), financed by The World Bank and executed by UNDP, which is designed to combat soil loss and encourage environmentally sound and sustainable agricultural practices by small scale farmers in the state of Mato Grosso, and the State Program for Small Catchments and other programs executed by the Brazilian Corporations for Agricultural Research, Technical Assistance and Extension (EMPAER) and for Agro-pastoral Research (EMBRAPA) in the state of Mato Grosso do Sul. In addition, activities associated with the World Bank loan-financed Program for Water Development (PROAGUA), in an amount of up to US \$ 980,000, whose outcomes are complementary to the watershed management measures recommended under PCBAP, are anticipated to be conducted within the UPRB, especially focusing on the Rio Taquari and Rio Miranda sub-basins. Additional infrastructural investments of up to US \$ 400 million for wastewater, stormwater, and water quality management are being considered for financing from national and international sources.

3. Project Activities/Components and Expected results

3.1 The proposed project activities are designed to catalyze implementation of actions necessary to address the conservation of a wetland of global significance identified during the PCBAP program and elaborated in the issues identified during the PDF-B project activities. The relationships between these concerns, issues, and actions are shown in Tables 1 and 2 of Annex 8. The project activities are designed to implement the WMP for the UPRB, and are concentrated in six principal components as set forth below. Detailed information on each component is presented in Annex 8.

COMPONENT I: WATER QUALITY AND ENVIRONMENT PROTECTION. The objective of Component I is to quantify specific priority issues of concern, generally identified in PCBAP. This component is essential for the development and implementation of the remedial measures set forth in the subsequent components of the project. Activities will include:

- the quantification of levels of agro-chemical and heavy metal contamination and degree of transport within the basin in order to assess the nature and magnitude of the threats to environmental populations (including humans) from bioaccumulation of agro-chemicals and metals within the environment;
- an inventory of endemic fishes, fisheries activities (both traditional and nontraditional, commercial and recreational), and the reproductive biology of the endemic fishes in order to assess the reasons for the observed decline in endemic fish production and diversity;
- mapping of the meander cuts (*arombados*) and associated riparian community actions in their

creation in order to assess the nature of their deleterious impacts on such hydraulic interventions on the hydrology and contaminant movement within the basin; and,

- the quantification of water uses, users, and patterns of regional development impacting water resources in order to quantify the impacts of urban and rural areas on the river system (e.g., abstraction, pollution, etc.) as well as the impact of the river system on the such areas (e.g., flooding, etc.).

The results of this component will form the sound scientific and technical basis for the management of the basin, including assessments of agro- and mining pollutants and their transboundary movements; fisheries, fishing activities and fish biology; meander cut impacts; and water resources, that will underpin the development and implementation of the strategic program for sustainable economic development, and the implementation of remedial measures.

It is anticipated that the execution of these activities will be undertaken by the relevant federal and state agencies such as EMBRAPA, EMPAER, SEMADES, SANEMAT and SANESUL; federal research institutes; federal universities; NGOS such as Terrasul and Sodepan; and municipal consortia, and private enterprises, including parastatal corporations. The coordination and supervision will be ensured by the Technical Coordinator at the SRH/MMA. Component I is anticipated to be initiated during the first quarter of the project period. GEF: US \$ 1,141,000; co-funding: US \$ 1,668,000; total: US \$ 2,809,000.

COMPONENT II: CONSERVATION OF THE PANTANAL: PCBAP recommended the creation of conservation units within the Pantanal as a means of preserving the best remaining areas of natural habitat within the region. Units of this type have been established and implemented in the State of Mato Grosso. The objective of Component II is to refine these units and expand their usage to the State of Mato Grosso do Sul. Activities will include:

- the provision of assistance to the State government of Mato Grosso do Sul in implementing institutional mechanisms for the establishment of floral and faunal conservation units, delineated by PCBAP, within the lower portion of the UPRB in areas subjected to intensive agro-pastoral activity;
- the creation of buffer zones as a means of moderating human encroachment upon natural reserves;
- the identification of the root causes of the illegal export of live animals and endangered species from the Pantanal region as a means of protecting and preserving wildlife (including aquatic fauna) by enabling public and private sector (commercial organizations) agencies to develop means of controlling ecological damage arising from over-exploitation of land and natural resources through appropriate programs of environmental education, involvement of non-governmental organizations and their resources, identification of possible alternative economic activities, and implementation of relevant legislative initiatives and governmental actions; and,
- the preparation of community-based management programs and training of administrators for land and resource management, especially in the buffer zones around the reserves.

By demonstrating the feasibility of implementing programs and buffer zones as effective means of conservation and protection within the preserves, this activity element will catalyze the further adoption of community-based management techniques to restore degraded environments adjacent to

nature conservancy areas.

The results of this component will be the implementation of projects that will demonstrate:

- the feasibility of establishing conservation units in the State of Mato Grosso do Sul,
- the creation of buffer zones for the protection of around the Acurizal, Penha, and Doroche National Reserves,
- the use of alternative ways and means of protecting indigenous flora and fauna throughout the Pantanal,
- the utility of a community-based approach to the management of the Pantanal and UPRB in order to provide mechanisms for the sustainable development of communities in these areas.

It is anticipated that the execution of these activities will be undertaken by the relevant federal and state organizations such as EMBRAPA and SEMADES, and NGOs including ECOTROPICA and The Nature Conservancy. The coordination and supervision will be ensured by the Technical Coordinator at the SRH. Component II is anticipated to be initiated during the first through fourth quarters of the project period. GEF: US \$ 455,000; co-funding: US \$ 1,474,0000; total: US \$ 1,929,000.

COMPONENT III: LAND DEGRADATION. Component III addresses cross-cutting issues which relate specifically to land and water management activities designed to protect and/or rehabilitate critical areas within the Basin. Building upon Component I above, the objective of Component II is to implement community-based land management through the identification and demonstration of environmentally-sound practices within the agricultural, mining and urban economic sectors. Activities will include:

- the identification of practices contributing to sustainable (primarily agricultural) use of soils within the sub-basin and assist in identifying the fate of sediments already eroded;
- the determination of appropriate management practices to permit control of mining practices, restoration of the disturbed lands for other purposes including environmental purposes and public information and recreation, and environmental protection and education;
- the promotion of community-based land rehabilitation efforts contribute to mitigation of mining impacts and rehabilitation of degraded areas; and,
- the demonstration of the integrated management of the urban environment through planning, management, and public information as a means of reducing the quantity of potential pollutants generated from urban areas.

The results of Component III activities will lead directly to the determination of best management practices and their demonstration in mitigating priority environmental issues of concern. In this regard, it is anticipated that priority actions will be implemented through co-financed activities of the World Bank under their PRODEAGRO and PROAGUA loan programs (total US \$ 1,250,000). The results of Component III will be the implementation of practices which will demonstrate the feasibility of:

- appropriate soil conservation practices for reducing soil erosion loss from agricultural activities in the Rio Taquari sub-basin,
- reclaiming lands degraded by mining practices in the Municipality of Pocone,

- reestablishing riparian vegetation in the State of Mato Grosso as a means of reducing streambank erosion,
- the involvement of urban communities in the control of aquatic and environmental pollution through the adoption of sound planning and urban design practices, the adoption of urban “good housekeeping” practices at the community level, the adoption of sustainable land management practices at the industry level specifically within the mining industry, and the adoption of environmentally-sound practices at the household level within communities in the Rio Apa, Miranda and Taquari sub-basins and in the Municipality of Pocone.

It is anticipated that the execution of these activities will be undertaken by the relevant federal and state agencies and organizations such as EMBRAPA, COINTA and SEMADES, federal universities, municipal and prefectural agencies including sub-committees of the basin committee, and NGOs. The coordination and supervision will be ensured by the Technical Coordinator at the SRH/MMA. Component III is anticipated to be initiated during the second through fourth quarters of the project period. GEF: US \$ 916,000; co-funding: US \$ 892,000; total: US \$ 1,808,000.

COMPONENT IV: STAKEHOLDER INVOLVEMENT AND SUSTAINABLE DEVELOPMENT. The objective of Component IV is to involve the Basin communities in practical, "hands on"-type involvement in the identification and demonstration of remedial measures, as well as in a dialogue process. Experiences in environmentally-sustainable economic growth identified in Components I through III above will be transferred to the public at large. Activities carried out under this Component will identify alternative means of economic production or alternative economic activities, which have the advantage of benefiting from community insights and experiences, as well as minimize environmental degradation in a manner acceptable to the communities. Activities will include:

- the compilation and dissemination of a program of public environmental information designed to address current and potential future socio-environmental problems arising from tourism, agriculture, and urban development (through educational programming) in critical environmental habitat areas;
- the promotion of ecotourism, supporting not only a sustainable tourist industry but also a program of transmittal of environmental information to patrons;
- the promotion of community-based land management, through the educational system and nongovernmental organizations (NGOs), by demonstrating good stewardship practices within the basin;
- the development of alternative means of meeting the angling and commercial fisheries demand for native fishes and bait fishes from the Upper Paraguay River; and,
- the protection of native fishes within the natural ecosystem of the Paraguay River.

The results of this component will be the development and implementation of programs which will demonstrate the feasibility of:

- environmental education within the educational, tourism, agricultural and urban sectors as a means of protecting aquatic environmental quality through enhanced environmental awareness leading to minimization of pollution throughout the UPRB,
- eco-/ethno-tourism as an economic development strategy for indigenous populations on the

Island of Insua,

- citizen-based conservation initiatives and partnerships with NGOs as a means of promoting sustainable land-management practices for the protection of the environment at Porto da Fazenda, Mato Grosso,
- aquaculture as an alternative to the harvesting of river fishes as an economic opportunity for the fisheries sector within the Pantanal,
- protecting critical fish species and fish habitat through improved knowledge of fish biology within the fisheries sector in the Rio Taquari sub-basin.

It is anticipated that the execution of these activities will be undertaken by the relevant federal and state agencies and organizations such as FEMA and SEMADES, federal universities, municipal organizations such as COINTA, and NGOs such as ECOBRASIL, ECOPAN, ECOTROPICA, and Fundacao Pantanal. The coordination and supervision will be ensured by the Technical Coordinator at the SRH/MMA. Component IV is anticipated to be initiated during the second through third quarters of the project period. GEF: US \$ 448,000; co-funding: US \$ 990,000; total: US \$ 1,438,000.

COMPONENT V: ORGANIZATIONAL STRUCTURE DEVELOPMENT. Component V is designed to strengthen and improve institutional and staffing capabilities. The objective of Component V is to implement new laws, regulations, and procedures necessary for the longer-term success of the watershed management measures and embodied in federal law 9433/97. This component will help to increase participation in decision-making within the basin, and enhance the ability of the Basin Committee to carry out its mandate. Ultimately, this component will extend such actions throughout the entire multi-national area of the UPRB. Activities will include:

- a review existing environmental and water resources legislation within the basin and proposal of specific legislative actions required to harmonize and improve legal instruments for environmental and water resources protection;
- the development of an effective technical basis and information exchange network;
- the creation of training programs for municipal, state, and federal government agency staff, CIHBAP-P staff, and community leaders (especially those persons likely to be members of water agency committees); and,
- the identification of the need, and formulation of the conceptual and institutional frameworks, for a basin-wide system of decision support and hydrological models (to be prepared under subsequently-funded activities) that will underpin the sustainable management of the water resources of the UPRB.

The results of this component will be:

- development and implementation of a program of legislative actions designed to harmonize environmental and water resources protection legislation at all levels of government,
- formulation and implementation of ways and means of promoting the exchange of technical information and experiences within the basin through the creation of appropriate sub-committees and consortia developed under the auspices of the basin committee, including specific actions to strengthen integration between municipal agencies in Corumba and the Rio Apa and Rio Miranda sub-basins,

- development and implementation of curricula and training programs to support the introduction of citizen-based educational programming through schools, introduction of citizen-based educational programming through strengthening of agricultural extension services, and introduction of training programs for local government staff to support implementation of the program of legislative development identified under Activity IV above.
- development of the scientific and technical basis for the development and implementation of hydrological, water quality and decision support models and systems, identifying a detailed work plan and statement of parameters for such models.

It is anticipated that the execution of these activities will be undertaken by the basin committee, relevant federal and state agencies and organizations such as FEMA and SEMADES, federal universities, municipal organizations such as COINTA, and NGOs such as SODEPAN. The coordination and supervision will be ensured by the Technical Coordinator at the SRH/MMA. Component V is anticipated to be initiated during the third through fourth quarters of the project period. GEF: US \$ 1,899,000; co-funding: US \$ 1,099,000; total: US \$ 2,998,000.

COMPONENT VI: INTEGRATED WATERSHED MANAGEMENT PROGRAM IMPLEMENTATION. Component VI refines and implements the WMP. The objective of Component VI is to synthesize the data and experiences, feasibility assessments and cost analyses developed in the five preceding components. The activities explicitly provide for the cooperative refinement and implementation of the comprehensive WMP 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 and federal law 9433/97, in representative sub-basins of the Upper Paraguay River, and the extension of this experience to the entire UPRB. Activities will include:

- a review federal and state legal and financial mechanisms relating to the sectoral uses of water (e.g., agricultural subsidy schemes, urban land use planning regulations, etc. which affect disturbances of the land surface that encourage erosion, water pollution, etc. to the detriment of water courses and water resources management) leading to the endorsement and amendment as appropriate of those mechanisms that affect sustainable use of water resources and the management of watersheds within the UPRB;
- the optimization of water resources management policies, practices and programs as necessary to create a sound economic and legal basis for the sustainable development of the basin through the adoption of a detailed strategic framework for the allocation and determination of water charges, introduction of watershed management measures, including proposals for legislation leading to the strengthening of administrative mechanisms, and implementation of specific best management practices;
- the preparation of guidance materials for the application of catalytic and incremental financing, provided through the GEF and complementary national and international funding programs, during the implementation phase of the project;
- the implementation of an enhanced institutional capability to conduct a strategic program of watershed management;
- the dissemination of the experiences gained through this project, its demonstration project activities, and its associated public participation in the decision-making process throughout the

basin.

A practical result of the implementation of the WMP will be the explicit incorporation of methods and procedures for the solution of priority transboundary environmental problems into regional development programs. Additionally, the results of this component will be:

- documentation of a program of strategic actions within the basin supporting the initiation and implementation of legislative actions, policies, practices, and programs, and their dissemination on both a sectoral and community-wide basis,
- initiation of legislative actions to determine, develop and implement a system of water use charges and fiscal, financial and legal mechanisms for water quality and quantity management in the basin,
- implementation of policies, practices and programs, including those currently adopted under federal law 9433/97, to optimize the administration of water resources within the basin and their utilization and protection,
- application of the enhanced institutional and human resource capabilities within basin for the optimization of water resources development and protection of the Upper Paraguay River and Pantanal,
- conduct of national and regional symposia, workshops and seminars to transfer knowledge gained through this project to technical professionals throughout Brazil and Latin America, and the publication of this knowledge to the public-at-large through appropriate media including the establishment of a community-driven dialogue between the technical professionals and citizens as envisaged under federal law 9433/97.

It is anticipated that the execution of these activities will be undertaken by the basin committee, relevant governmental agencies such as SRH, FEMA and SEMADES, and NGOs. The coordination and supervision will be ensured by the Technical Coordinator at the SRH/MMA. Component VI is anticipated to be initiated during throughout the project period. GEF: US \$ 1,020,000; co-funding: US \$ 2,203,000; total: US \$ 3,223,000.

4. Risks and Sustainability

4.1 This project is designed to address priority environmental concerns needed for sustainable development of the UPRB in general, and for the protection and preservation of the Pantanal in particular. To effect this, it is necessary to formulate a comprehensive program of coordinated actions by the Federal Government of Brazil and the riparian states (Mato Grosso and Mato Grosso do Sul) which can ultimately be agreed by the downstream countries during later stages of project implementation. The principle risk facing development in the UPRB is that environmental considerations are not properly included in projects, programs, policies and actions in such a way as to ensure their sustainability. Serious undesirable environmental side effects, such as the catastrophic decline in the fisheries, damage to the underlying natural resource base, flooding, and pollution of downstream ecosystems, including economic units of production, may result from this failure. Notwithstanding, opportunities exist for the protection and rehabilitation of the Pantanal by strategically introducing effective and adequate environmental management practices and procedures. These opportunities have been given effect by the adoption by the state governments of

complementary legislation under the federal water law and implementation of comprehensive programs of environmental zoning as an initial step in this process. In addition, the CIHBAP-P has adopted an active posture that will catalyze and encourage an effective cross-sectoral role for this committee in the sustainable management of the river basin. Incremental GEF funding is intended to be catalytic in reversing the unsustainable development trends in this region by, *inter alia*, helping to popularize sustainable practices among the population, provide the institutional, legal and financial structures necessary for implementation of sustainable practices, and promote mechanisms for the continued economic growth, with minimal negative environmental impacts, within the basin.

4.2 Project activities and their implementation are designed (including the participation process) to achieve sustainability. Components have been proposed for the purposes of identifying the causes and effects of degradation of water and natural resources in the basin, and of reclaiming once productive areas and keeping them productive. Such components relate directly to the information needed to structure appropriate, sustainable responses, both structural and non-structural (e.g., legal, financial and administrative structures) within the basin. Similarly, demonstration projects have been selected on the basis of their sustainability, both from the ecological as well as the economic point of view. Wherever possible the project will develop opportunities for the establishment of financial incentives, private sector investment and cost recovery in environmental management (e.g., in reclamation of eroded or mined lands, pastures and forests, rational management of natural forests, exploitation of newly forested areas or newly irrigated areas), and provide actual, working examples of 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. Feasible and cost-effective techniques would be included in the recommended courses of action proposed to be implemented for the sustainable management of the UPRB.

4.3 The national and state governments have active, on-going programs of environmental management, and are seeking more effective ways to manage and conserve their natural resource base, including reviewing legal and administrative practices, operational procedures, and human resource needs. Many innovative approaches have been proposed by governmental agencies. Incremental financing provided through this GEF project is intended to allow pilot scale implementation of these approaches as a means of determining their feasibility and relative costs, and, thereby, catalyzing the more widespread adoption of innovative methods throughout the basin. Government support to these actions proposed to be implemented in part with GEF funding include a financial commitment of US \$ 8,101,000 over a period of two years, with additional funds proposed to be allocated to the implementation of specific demonstration projects under NGO-funded initiatives (e.g., the eco-regional zoning and tourism projects proposed by The Nature Conservancy and other community-based land management organizations) and international loan-financed programs, including the US \$ 1,250,000 World Bank-financed PRODEAGRO and PROAGUA programs. This national counterpart contribution, comprised of state, federal and international funds from domestic and loan sources, will help to minimize risks during project implementation, help to create support for the watershed management process, and assist in the development of practicable approaches to environmental resource management in the Basin. In addition, other nationally and internationally funded investment projects in the areas of wastewater,

stormwater, and water quality management infrastructure are being considered.

5. Stakeholder Participation and Implementation Arrangements

5.1 Participation. (Annex 5) The emphasis on public participation in the management of the water resources of Brazil is supported as an integral feature of the Federal Law 9433/97. In one of the first applications of this new water law, more than 200 persons, representing almost 60 civil, corporate, nongovernmental and governmental entities (having municipal, state, federal, and international interests) participated in the definition of more than 45 detailed project documents which were presented at three public meetings convened during the PDF process within the basin during November 1997 at Cuiabá, December 1997 at Corumbá, and February 1998 at Campo Grande. The full proceedings of these meetings and supporting documentation are available in different Government agencies, both of the Federal Government and the States. Contacts with those agencies, as well as with private sector representatives, academic institutions and NGOs, were the first activity completed during the PDF-B process. Follow-up consultations were held with the CIBHAP-P and the SRH/MMA in February 1998. Subsequently, numerous other communications were initiated between individual participants in the workshops and other selected persons in order to improve and clarify specific issues arising from component proposals and other observations made during the project preparation period. The GEF project preparation steering committee met in Brasilia during October 1997 and March 1998. In Washington DC, in March 1998, several meetings and consultations were held with representatives of the GEF Implementing Agencies, particularly The World Bank due to their previous experience in the basin. During project preparation, six consultants from within the Mercosul Region reviewed the existing literature base, conducted interviews with numerous public officials and representatives of NGOs, and synthesized the public contributions and available technical literature and information in order to identify specific gaps in knowledge and understanding of the concerns of global significance in the UPRB. Copies of the consultants' reports are available for consultation from UNEP and the OAS. The principle findings identified by the public, government officials, and consultants are contained within by this proposal, which has been prepared by the SRH/MMA of Brazil supported by UNEP and OAS specialists. Representatives of the neighboring countries were consulted during the preparation of this proposal.

5.2 Popular participation is built into the demonstration projects and will be continued in the development of the WMP for the UPRB. As noted above, work elements under all nine issues identified during the PDF investigations included various sub-elements which contribute to the overall stakeholder participation program within the project, including community- and corporate-based environmental information and education campaigns, training courses and symposia, and actions designed to increase the capacity and participation of institutions and personnel to undertake activities in support of the WMP proposed as the outcome of this project. Further, these explicit action will be conducted within the framework of Federal Law 9433/97 which, itself, explicitly provides for public participation in the water resources management decision-making process. Finally, specific actions are proposed to be conducted under the project which specifically address issues related to public and stakeholder participation in the planning process, and/or which provide support for the development of a sound public participation and involvement strategy as one of the strategic actions to be implemented under subsequent, implementation phases of the WMP.

5.3 Implementation Arrangements. All the proposed activities will be driven by a Project Steering Committee comprised of representatives of SRH/MMA; UNEP, as Implementing Agency; and, OAS, as Executing Agency; and, the CIBHAP-P (which includes, *inter alia*, representatives of the states of Mato Grosso and Mato Grosso do Sul). The other GEF Implementing Agencies will be informed of, and may participate in, meetings of the Steering Committee in an *ex officio* capacity. The Steering Committee, at its first meeting to be convened at the earliest possible moment following project approval by the GEF, will be chaired by the Secretary of Water Resources of Brazil who will act as Executive Director of the Project, in consultation with UNEP and the OAS. One Technical Coordinator, to be contracted by OAS as the Executing Agency in consultation with UNEP, will also be confirmed at this inaugural meeting of the Steering Committee. Further, the Committee will agree administrative and reporting procedures consistent with UNEP standards and OAS requirements for financial reporting. The Steering Committee also will determine a proposed concept of execution for the program of work outlined herein, and establish any necessary sub-committees needed for the execution of the project. This program of work and identification of contractors will be elaborated jointly by the Executing Agency and SRH/MMA, in consultation with UNEP, prior to the second meeting of the Steering Committee and inauguration of project activities. Finally, the Steering Committee, at its inaugural meeting, shall conduct any other such business as maybe required to initiate project activities, and set a date for the second meeting of the Committee. Participation of the national, state and municipal agencies of Brazil, and later Bolivia and Paraguay, with competence in the region, scientific and academic institutions, and concerned civil organizations (NGOs) will be by way of committees of the Steering Committee. Subsequent meetings of the Committee shall be scheduled by the Committee but shall be at least every six months during the project period. The activities of the Steering Committee will be supported by the SRH/MMA, with funds provided by GEF through the Implementing Agency. UNEP and OAS will support Project Execution. OAS, due to its historic involvement in the basin, its partnership with UNEP in similar projects within the region, and its role in implementing activities under related projects, will act as Executing Agency and manager of the funds provided to the project by UNEP on behalf of GEF, consistent with UNEP financial reporting requirements. The main coordination activities will be implemented from Brasilia, Brazil. All project activities will be conducted within the basin.

5.4 The Committee for the Integrated Management of the Upper Paraguay Basin and Pantanal (CIBHAP-P) is the legally-constituted river basin management authority convened under Title II, Chapter III, Articles 37 through 40 of Federal Law 9433/97, National Water Resource Policy for Brazil. The states of Mato Grosso and Mato Grosso do Sul are members of this committee.

5.5 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 SRH/MMA, in consultation with UNEP and OAS. To the extent possible, all activities will be executed by national agencies of Brazil and/or by consultants from Brazil. The SRH/MMA and Executing Agency will coordinate field activities, as directed by the Steering Committee, through coordinators appointed from their staff.

6. Incremental Costs and Project Financing. Recognizing the domestic benefits that will

accrue from this project (e.g., identification of techniques and strategies for the prevention and control of erosion, land degradation, sediment control, flood control, and water supply for drinking and agricultural uses), the Government of Brazil, the riparian states and municipal governmental units, and other parties participating in the GEF project activities defined herein have proposed various programs. These programs are funded from generally two sources. One is through loan-funding for the major infrastructural improvements required for the implementation of mitigation measures recommended under PCBA. The other source of funding is composed of counterpart contributions for the cost-sharing of work program activity costs, including cofinancing for this GEF project. The Government and other organizations are contributing or underwriting a substantial percentage of the total funds required, thereby demonstrating their full support and interest in this program. This investment is assumed to account for the full value of national benefits gained under this project, and will be applied specifically to costs associated with issues such as waste disposal, flood management, and navigation. Further, the Government of Brazil is contributing additional co-funding under the World Bank-financed PRODEAGRO. The total baseline cost is US \$9.788 million, and the value of the alternative is \$US \$16.403 million. Incremental GEF financing will be applied specifically to catalyze activities such as mitigation and prevention of land degradation, wetland protection, and control and minimization of persistent contaminants, at a cost of US \$5.879 million. A detailed description of incremental costs is presented in Annex 1.

Project Financing

Table 1. Component Financing (US \$).

COMPONENT	GEF	Co-financing ¹			TOTAL
		Government	UNEP	OAS	
I. River Basin Environmental Analysis	1,141,000	1,668,000			2,809,000
II. Conservation of the Pantanal	455,000	1,474,000			1,929,000
III. Land Degradation	916,000	892,000			1,808,000
IV. Stakeholder Involvement and Sustainable Development	448,000	990,000			1,438,000
V. Organizational Structure Development	1,899,000	1,099,000			2,998,000
VI. Integrated Watershed Management Program Implementation	1,020,000	1,978,000	150,000	75,000	3,223,000
PRODEAGRO/PROAGUA		1,250,000			1.2500
TOTAL (Project Costs)	5,879,000	9,351,000	150,000	75,000	15,455,000
Project Support Costs	400,000				400,000
Monitoring and Evaluation	50,000				50,000
PDF Preparation	286,000	162,000	25,000	25,000	498,000
GRAND TOTAL	6,615,000	9,513,000	175,000	100,000	16,403,000

7. Monitoring, Evaluation and Dissemination

7.1 Monitoring and Evaluation. The administrative, technical and financial reporting framework will be provided by the Implementing Agency through the Executing Agency and Steering Committee using standard UNEP reporting protocols. Utilizing key process and status indicators will be an intrinsic part of the project. These indicators will be implemented through the establishment and integration of monitoring tools into project components, as agreed by the Steering Committee at their second meeting, as set forth above. A monitoring and evaluation plan, based upon GEF monitoring and evaluation indicators (process, stress reduction, and environmental status), will be prepared by the Executing Agency and SRH/MMA, and approved by the Steering Committee and UNEP. The objective of this monitoring is to contribute to improving, and, if needed, adapting management of work program activities as well as creating the basis for project evaluation. Implementing Agency supervision will be exercised through the Executing Agency and by participation in the regular meetings of the Steering Committee, the first and second meetings of the

¹ Application of the \$1,250,000 PRODEAGRO/PROAGUA loan components will be determined following signature of the agreements.

Steering Committee wherein the work plan and terms of reference for project staff and consultants will be discussed and agreed. A project implementation review consistent with GEF procedures will be undertaken jointly by the Government and UNEP two years after the end of the project.

7.2 STAP review. (Annex 3) This project proposal was reviewed by Dr. Claudio Campagna of the Centro Nacional Patagonia of Argentina, an International Waters Expert included in the STAP Roster of Experts. Comments made by Dr. Campagna regarding the need for a multinational approach to basin management have been incorporated into Component VI. In general, the comments of the STAP reviewer were strongly supportive of the project approach, methodology and design.

7.3 Dissemination. Incorporated into the WMP are specific activities (Component VI) which explicitly aim to promote and disseminate the experiences obtained during the WMP implementation process to the water resources professionals within the multinational basin, and to communities within the UPRB through a program of public information and education. Further, Component VI is explicitly designed to encourage the integration of the downstream riparian countries in various project activities, including transboundary pollutant transport and similar issue identification activities. As previously noted, all project activities will encourage and facilitate technology transfer and information dissemination through programs of public participation, stakeholder involvement, and professional and community-based education and information dissemination. State and municipal governmental, NGO, and citizen involvement in project execution will contribute to the dissemination of information on specific technologies and techniques that contribute to the sustainable environmental management and economic development of the watershed. This emphasis on public participation in the WMP process for the UPRB will facilitate communication with all concerned organizations, agencies and citizens, and the adoption of a comprehensive strategic approach for the management of this critical drainage basin.

**Brazil: Implementation of Integrated Watershed Management Practices For The Pantanal
and Upper Paraguay River Basin**

LIST OF ANNEXES

(Included in printed version)

Annex 1: Incremental Costs

Annex 2: Logical Framework Matrix

Annex 3: STAP Roster Technical Review

(included in electronic version or to be provided by the IA upon request)

Annex 4: Root Causes Analysis

Annex 5: Public Involvement Plan Summary

Annex 6: Available Reference Documents

Annex 7: Geography of the Upper Paraguay River Basin

Annex 8: Proposed Work Program

INCREMENTAL COSTS

1. Broad Development Goals. The goal of the watershed management program (WMP) for the Upper Paraguay River Basin (UPRB) and Pantanal is to promote environmentally sustainable development within the basin and wetland system, taking into consideration the programs of investments of the federal Government of Brazil and the states of Mato Grosso do Sul and Mato Grosso, as well as municipalities, local authorities and nongovernmental organizations in the basin.

2. Baseline Situation. The baseline situation consists of: (1) long term development programs for the Upper Basin of the River, where investments in sanitation, transportation and other infrastructure such as the natural gas pipeline development project, are being planned for construction during the next ten to fifteen years; (2) environmentally related activities (e.g., those activities indicated under PCBAP, PRODEAGRO, and on-going, government-supported investments in the hydro-meteorological network proposed to be financed by the Inter-American Development Bank), and, (3) relatively uncoordinated activities being planned or executed by many government agencies and/or private parties in the basin.

3. The estimated baseline investment upon which this GEF project consists of: a) ongoing operation and maintenance costs associated with private conservation parks, estimated at US \$ 240,000 for the two years of the GEF project and supporting Increased River Wildlife Diversity; b) operation costs of the avi-faunal reserve supporting Improved Coordination of Actions for River Management and Planning, estimated at US \$ 200,000; c) current operating costs of the Committee for the Integrated Management of the Upper Paraguay River and Pantanal, estimated at US \$ 150,000 per year and supporting Improved Coordination of Actions for River Management and Planning; and, d) the annual costs of supporting the hydrometeorological information network, estimated at US \$ 400,000 per year, and also supporting Improved Coordination of Actions for River Management and Planning.

4. GEF Alternative Scenario. The alternative scenario consists of the implementation of those actions needed to both introduce sustainable development into development projects in the UPRB, and achieve the resulting global environmental benefits embodied in the mitigation of transboundary environmental problems (see Table 5, Annex 8). The costs of these actions are those necessary to include sustainable development considerations in the projects within the basin over and above the requirements of the regular environmental impact assessments and mitigation measures required to be completed under existing Brazilian federal and state environmental laws and regulations.

5. Water resources management in the UPRB will be directed and coordinated by the Committee for the Integrated Management of the UPRB and Pantanal in consultation with the federal Ministry for Environment, Water Resources and the Legal Amazon, as set forth in federal law 9433/97. This agency will require strengthening, to be provided through GEF support.

6. Global Benefits. Six global benefits have been identified as being promoted by the GEF

intervention; namely, decreased transboundary transport of contaminants, increased river wildlife diversity, decreased degradation of soils, increased knowledge of river behavior, improved coordination of actions for river management and planning, and dissemination of knowledge. These benefits are reflected in the project activities as presented in Table 1 (see also Table 5, Annex 8). The benefits are:

Component 1 River Basin Environmental Analysis. The activities set forth under this component are designed to assess and quantify specific issues of concern within the basin identified during the PDF activities. This project considers reducing the flow of contaminants, especially mercury, other heavy metals and agro-chemicals into the river, and actions required to manage the possibly dangerous deposits of contaminants already present in the river bed. Improvement of knowledge about natural and anthropogenic influences on water flow and quality is expected to result in better use of water and natural resources in the basin, thus generating additional global and domestic benefits. Aside the investments, planned and ongoing, in the river basin and its environs, baseline costs represent counterpart government contributions in the amount of US \$1,668,000. The cost of the alternative is US \$2,809,000. The GEF incremental funding is US \$1,141,000.

Component 2 Conservation of the Pantanal. Several specific program elements are proposed with the objective of regulating fishing and aquaculture activities along the course of the river, resulting in increased fish and riverine wildlife all along the international UPRB. These actions may also result in domestic benefits arising from the possible increment in fish captures. The baseline cost of this component includes activities of The Nature Conservancy and local NGOs in establishing buffer strips around nature reserves and preparing ecoregional plans for the basin and government counterpart contributions amounting to US \$1,474,000. The alternative cost is US \$1,929,000. GEF incremental funding is US \$455,000.

Component 3 Land Degradation. Activities in this component include rehabilitation of natural vegetative cover, use of appropriate agricultural practices, and improved land use regulations. The cofinancing from government, representing a baseline counterpart, is US \$892,000. The alternative project cost is US \$1,808,000. The incremental GEF funding is US \$916,000.

Component 4 Stakeholder Involvement and Sustainable Development. Since uses of water in the basin tend to create unexpected results that could produce inconvenient or even dangerous outcomes to unsuspecting stakeholders, such as is the case of the “meander cuts”, a negotiated approach and agreement among the different stakeholders is often strongly recommended. The baseline costs of this component include US \$499,750, which is comprised of the equivalent cost incurred in establishing the avi-faunal reserve with stakeholder involvement, and the counterpart contributions of the Government of Brazil and local governmental and non-governmental organizations US \$ 490,250 to cover additional activities necessary for these activities and reinforce institutional capacity, for a total of US \$990,000. The alternative project cost is US \$1,438,000. The GEF incremental funding is US \$448,000.

Component 5 Organizational Structure Development. The baseline cost of this component is US \$1,099,000. It is comprised of the current operational costs incurred by the Committee for the

Integrated Management of the Upper Paraguay River and Pantanal under component 7.2 and government counterpart contributions. Improvement of knowledge about natural and anthropogenic influences on water flow and quality is expected to result in better use of water and natural resources in the basin, thus generating additional global and domestic benefits. The alternative cost is US \$2,998,000. GEF incremental funding is \$1,899,000.

Component 6 Integrated Watershed Management Program Implementation. The baseline for this component consists of the investments in inventory of river behavior and methods of negotiating and reaching agreements among different groups of stakeholders for improved management of the natural resources in the basin. Government counterpart contributions and cofinancing from UNEP and OAS, which may constitute part of the calculated baseline, amount to US \$2,203,000. The cost of the alternative would be US \$3,223,000. GEF incremental funding is US \$1,020,000.

9. Additional Domestic Benefits and Costs. Reduced soil loss, improved flood forecasting, and more effective and sustainable use of available water resources are local benefits to be expected as a result of the activities of the Project. Additional local costs are unknown at this stage. The PRODEARGO/PROAGUA program provides supplemental funding of over US \$1.25 million to achieve some of these benefits, but the full benefits from a comprehensive basin-wide protection and management program cannot be estimated at this time. Part of the baseline contributing to all project components includes project preparation activities co-financed by the government, UNEP and the OAS (\$212,000).

Incremental Cost Matrix (US \$M)

Component	Category	Amount	Domestic Benefits	Global Benefits
River Basin Environmental Analysis	Baseline	1.668	Reduced flow of contaminants, such as mercury, heavy metals, and agro-chemicals into the river; reduced sediment deposits in the river bed; improved knowledge of natural and anthropogenic influences on water flow	
	Alternative	2.809	Same as above.	Integration of sustainable development into riverine and basin development projects in the UPRB; mitigation of transboundary environmental problems beyond regular requirements for environmental impact assessments
	Increment	1.141		
Conservation of the Pantanal	Baseline	1.474	Improved regulation of fishing and aquaculture activities along the course of the river; increased fish capture	
	Alternative	1.929	Same as above.	Conservation of fish and riverine wildlife along the international UPRB;
	Increment	.455		
Land Degradation	Baseline	.892	Rehabilitation of natural vegetative cover; appropriate use of agricultural and land use regulations; increased agricultural productivity	
	Alternative	1.808	Same as above.	Increased protection of fish and marine habitats; reduced pollution of international waters in UPRB
	Increment	.916		
Stakeholder Involvement and Sustainable Development	Baseline	.99	Improved and rational use of water in the basin; support for national cooperation with nongovernmental stakeholders and regional partners	
	Alternative	1.438	Same as above.	Strengthened regional coordination for international waters along UPRB; enhanced regional cooperation and support; potential replicability for other international basins with multiple stakeholders
	Increment	.448		
Organizational Structure Development	Baseline	1.099	Capacity building for the Committee for the Integrated Management of the Upper Paraguay and Pantanal; improved knowledge on natural and anthropogenic resources in the basin	
	Alternative	2.998	Same as above.	Better coordination among institutions in the Mato Grosso do Sul and international UPRB sites;

				integraton of global water concerns into environmental assessments
	Increment	1.899		
Integrated Watershed Management Program Implementation	Baseline	2.203	Improved management of natural resources in the basin; better inter-agency cooperation on watershed management	
	Alternative	3.223	Same as above.	Strengthened capacities for negotiating and reaching agreements on shared waters; protection of marine and fish resources from improved watershed management
	Increment	1.020		
Total	Baseline	8.326		
	Additional Co-financing*	1.462		
	Alternative*	16.403		
	Increment	5.879		
Project Support Costs		.4		
Monitoring & Evaluation		.05		
PDF Preparation		.286		
Total Increment		6.615		

* Includes World Bank PRODEAGRO/PROAGUA loans (\$1.25m); UNEP and OAS co-financing (\$.05m) and government counterpart (\$.162m) for project preparation

LOGICAL FRAME WORK MATRIX

PROJECT PLANNING MATRIX			
SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	CRITICAL ASSUMPTIONS AND RISKS
OVERALL OBJECTIVES			
Improved management of the Pantanal and Upper Paraguay River Basin	Mitigation and prevention of land degradation, wetland protection, and control and minimization of persistent contaminants	Measurable reduction of land and wetland degradation and water pollution observed through regional monitoring	Governments ² will agree to invest the required baseline costs. This represents a low risk as there are agreed loan-funded activities for the major infrastructure improvements required for the implementation of mitigation measures
OUTCOMES			
Improved environmental functioning of the Upper Paraguay river system through preservation and protection of the river system and the Pantanal, a globally significant wetland, by implementation of strategic activities addressing the root causes of the current degradation	Endorsement of the Integrated Watershed Management Program by the Ministry of Environment, Water Resources and Legal Amazon, as well as by the Basin Committee (CIBHAP-P) and the basin stakeholders	Steering Committee reports and workshop reports	The principal risk facing development in the UPRB is that environmental considerations are not properly included in projects, programs, policies and actions in order to ensure their sustainability. However, this represents a low risk as the new federal water law recently adopted by the state governments encourages effective and adequate environmental management practices. In addition, the CIHBAP-P is active in catalyzing an effective cross-sectoral approach to the sustainable management of the river basin

²Governments means relevant federal, state, and municipal governments and agencies.

Improved individual capacities for economically sustainable development, and environmental protection, conservation and management through sustainable economic development in the Pantanal and Upper Paraguay River Basin	Numbers of individuals trained	Periodic reports to the GEF and UNEP by the project technical coordinator on the execution of training activities	It is assumed that the governments and industry will release appropriately qualified staff for the purposes of training. This assumption is likely to be met since the training programs will be endorsed by basin stakeholders
Improved public awareness, stakeholder participation, and organizational development	Endorsement of the public participation plans by appropriate basin and states meetings; adoption of the training programs identified in the Integrated Watershed Management Program	Implementation of techniques and strategies for the prevention and control of erosion, land degradation, sediment control, flood control, and water supply for drinking and agricultural uses	The emphasis on public participation and appropriate agency responses in the management of the water resources of Brazil is supported as an integral feature of federal law 9433/97; hence it seems likely that the assumption of government agreement to such involvement will be met

PROJECT PLANNING MATRIX			
SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	CRITICAL ASSUMPTIONS AND RISKS
RESULTS			
<i>Water Quality and Environment Protection</i> A sound technical and scientific basis for the development of a strategic program for sustainable economic development that will catalyze implementation of remedial measures	Completion of the various assessments and technical studies required for the strategic program for sustainable development by the basin stakeholders; and endorsement by the Steering Committee	Meeting reports and various technical publications	The various assessments can be finalized in a manner acceptable to the Governments. This is likely to be met since environmental monitoring is currently on-going in the baseline development programs and in the hydrometeorological network
<i>Conservation of the Pantanal</i> Jointly agreed community-based management programs and techniques to restore degraded environments adjacent to reserves. Efficient mechanisms for the sustainable development of communities Effective means of conservation and protection within the reserves.	Adoption by the basin stakeholders and Steering Committee of the means of conservation and protection within the Pantanal	Meeting reports and various publications; implementation of demonstration projects	Governments will agree and adopt the conservation community-based management programs and techniques. This is likely to be met since it is emphasized in the federal law 9433/97, recommended by the PCBAP and supported by The Nature Conservancy and others
<i>Land Degradation</i> A sound assessment of priority environmental impacts and their mitigation. Community-based agreed best management practices to rehabilitate critical areas.	Endorsement of the assessment and best management practices by the Steering Committee Numbers of rehabilitated degraded areas	Meeting reports and technical publications Activity progress reports of the technical coordinator to the GEF and UNEP/OAS	That the assessment can be finalized in a manner acceptable to the Governments and that the Governments and the basin communities will agree and adopt the proposed best management practices. This is likely to be met since it is emphasized in the federal law 9433/97, and recommended by the PCBAP

<p>Stakeholder Involvement and Sustainable Development Agreed sets of alternative means of economic productions. Better informed consumers with a better understanding of ecological principles. Programs of training and public environmental information dissemination</p>	<p>Endorsement of alternative means of economic productions by the Steering Committee and adoption by the basin stakeholders Numbers of informed consumers Numbers of individuals trained</p>	<p>Meeting reports, technical publications and training programs publications Activity progress reports of the technical coordinator to the GEF and UNEP/OAS</p>	<p>Governments and the basin stakeholders will agree and adopt the proposed alternative means of economic development, and training and public environmental information will be accepted and disseminated to a wide audience. This is likely to be met since it is encouraged in the federal law 9433/97, and recommended by the PCBAP</p>
<p>Organizational Structure Development A review of existing environmental and water resources legislation with proposals for specific actions. An information exchange network A conceptual and technical basis for the preparation of a basin-wide system of decision support and hydrological models to be prepared by loan-funded programs. Training programs on environmental issues, protection and rehabilitation methods for the community at large</p>	<p>Adoption of the legal assessment and its Improvement recommendations and the conceptual basis for DSS and hydrological models by the Steering Committee; inclusion of the DSS in economic development program Increased information exchange among basin stakeholders Numbers of individuals trained</p>	<p>Meeting reports, publication of the legal assessment and of the conceptual and technical basis for DSS Activity progress reports of technical coordinator to the GEF and UNEP/OAS</p>	<p>Governments will agree to and adopt the recommended legislative and institutional changes and will support the public participation programming, staff training and strategic planning. This is likely to be met as coordinated management actions are embodied in the new federal law 9433/97 which seeks to enhance and strengthen the ability of the CIBHAP-P to undertake planning and management activities within the basin</p>

<p><i>Implementation of the Integrated Watershed Management Program for the Basin</i> A Watershed Management Program</p>	<p>Adoption of the Integrated watershed Management Plan by the basin stakeholders and by the Steering Committee</p>	<p>Meeting reports and Watershed Management Program</p>	<p>As the Implementation of the Integrated Watershed Management Program builds upon the synthesis of data and experiences, feasibility assessments and costs analyses developed in the five preceding activities, it is imperative that these activities be finalized according to the workplan and in an acceptable manner. Based on the above assumptions, this is likely to happen.</p>
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LOGICAL FRAME WORK MATRIX (cont.)

PROJECT PLANNING MATRIX			
SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	CRITICAL ASSUMPTIONS AND RISKS
COMPONENTS/ACTIVITIES			
<i>Water Quality and Environment Protection</i> Assessment of root causes of agricultural soil loss, agro-chemical impacts, urban water use and hydrological impacts, mining impacts, river navigation impacts and fisheries impacts	Availability of various drafts and final versions of the assessment reports and development of a strategic program for sustainable economic development and inclusion of the findings in subsequent components/activities	Publication of assessments, consultant reports and meeting reports	It is assumed that the various drafts and final versions of the assessment reports and strategic program for sustainable economic development will be ready on time according to the agreed workplan. However, contingency delays may happen and their effects cannot really be evaluated
<i>Conservation of the Pantanal</i> Demonstration of the feasibility of community-based management Programs and training, and the feasibility of buffer zones as effective means of conservation and protection within the preserves	Preparation of community-based management programs and training according to agreed workplan. Adoption of the management programs and the concept of buffer zones at the community level Number of people trained Numbers off management measures implemented	Appropriate action at the state and local level and community level to implement the proposed programs	Governments and the basin community at large will agree to the management programs and training and with the concept of buffer zone. This seems likely to be achieved since the basin communities are to be involved in the identification and demonstration of conservation measures as well as in the dialogue process. Thus, actions formulated through this process will benefit from community insights and experiences and will be acceptable to the communities

<p>Land Degradation</p> <p>Protection and/or rehabilitation of critical areas in the basin: i.e. quantification of priority environmental impacts and their mitigation, determination of best management practices and demonstration of their utility in mitigating priority environmental problems through community-based land rehabilitation efforts</p>	<p>Preparation of draft proposals and initiation of state and community level discussions according to the agreed workplan</p> <p>Adoption of environmentally-sound practices within agricultural, mining and urban economic sectors aiming at the protection and/or rehabilitation of critical areas by the basin community</p>	<p>Appropriate action at the state and community levels to implement the proposed environmentally-sound practices</p>	<p>Governments and the basin community at large will agree to the environmentally-sound practices within agricultural, mining and urban economic sectors aiming at the protection and/or rehabilitation of critical areas by the basin community. This seems likely to be met since the basin communities are to be involved in the identification and demonstration of remedial measures as well as dialogue process. Thus, actions formulated through this process will benefit from community insights and experiences and will be acceptable to the communities</p>
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<p>Stakeholder Involvement and Sustainable Development</p> <p>Identification of alternative means of economic production or alternative economic activities that enhance the environment and/or minimize environmental degradation</p> <p>Initiation of basin communities in practical “hands on” type involvement in the identification and demonstration of remedial measures as well as in the decision making process.</p> <p>Compilation and dissemination of training programs on environmentally-sustainable economic development and programs of public environmental information.</p>	<p>Preparation of draft proposals and initiation of state and community level discussions according to the agreed workplan</p> <p>Adoption of the alternative economic activities by the basin community</p> <p>Preparation and dissemination of information and awareness materials</p> <p>Preparation of training programs and disbursement records according to the agreed workplan</p>	<p>Appropriate action at the state and community -based levels to implement the proposed alternative economic activities.</p> <p>Reports of training courses and numbers of individuals trained</p>	<p>Governments and the basin community at large will agree to the alternative economic activities, awareness materials, and to training programs . This seems likely to be met since the basin communities are to be involved in the identification and dialogue process. Thus, actions formulated through this process will benefit from community insights and experiences and will be acceptable to the communities</p>
<p>Organizational Structure Development</p> <p>Strengthening and improvement of institutional and staffing capabilities providing an effective framework in which activities of professionals are carried out, including legal, structural, economic and administrative activities as well as through the provision of training for institutions and individuals</p>	<p>Preparation of draft analyses and proposals for specific legislative actions, and initiation of basin level of discussions according to workplan</p> <p>Disbursement records according to agreed workplan</p>	<p>Appropriate action at the basin level to implement proposed actions .</p> <p>Reports of training courses and numbers of individuals trained.</p>	<p>Governments and the basin community at large will agree to the proposals of specific legislative actions and related capacity building programs. This seems likely to be met since the basin communities are to be involved in the dialogue process. Thus, actions formulated through this process will benefit from community insights and experiences and will be acceptable to the communities. Such reforms are also supported and encouraged by the federal law 9433/97</p>
<p>Implementation of the Integrated watershed Management Program for the Basin</p>	<p>Preparation of drafts according to</p>	<p>Publication and adoption of the</p>	<p>It is assumed that the governments</p>

<p>Implementation of an Integrated Watershed Management Program based on the synthesis of data and experience, feasibility assessments and cost analysis developed in the preceding activities,</p> <p>Dissemination and initial implementation of management actions to enhance international coordination and communication with other riparian countries.</p>	<p>agreed workplan</p> <p>Dissemination of information</p>	<p>Integrated Watershed Management Program</p>	<p>and basin communities will actively cooperate in the development and further implementation of the Integrated Watershed Management Program</p> <p>This assumption is likely to be met as the governments and basin communities will be directly involved in the preparation of the IWMP.</p>
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STAP ROSTER TECHNICAL REVIEW

Technical Review of the GEF Project entitled:

Integrated Watershed Management Programme for the Pantanal and the Upper Paraguay River Basin

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The Upper Paraguay River Basin (UPRB) is one of the world's most valuable freshwater environments. Covering a large area—shared by three countries—this environment maintains a rich and unique terrestrial and aquatic wildlife. The UPRB is now affected by growing unsustainable developmental practices that are devastating many parts and jeopardise the future of the entire region. Biogeographically, several flora and fauna units converge at this point. Within the boundaries of this river basin is the Pantanal, a vulnerable wetland rich in endemic species, sensitive to improper land and water use. Over 1,000 species of vertebrates contribute to the biological diversity of this large wetland. Human population is sparse but adds up to about one million people, mostly living in urban areas. Mining, agriculture and fishing are major development activities, and there is pressure for increased levels of economic activity. Pollution of land and water, land clearing, soil erosion and overfishing are some of the consequences of poor management and non-existent planning. Un-sustainable practices are producing negative impacts on the quality of human life, the future use of economic resources and the conservation of the biological value of the wetland. The root causes of the problems affecting the biodiversity of the Pantanal and the sustainability of present activities have been identified. Strategic guidelines for the conservation of the area have been summarised in a Plan for the Conservation of the UPRB, supported by The World Bank. The present project derives from the above-mentioned Plan and represents a series of actions aimed at mitigating the effects of increasing urbanisation, mining and agro-industrial development on the biological and water resources of the Pantanal. In general terms, this is an excellent proposal that addresses the protection of one of the world's most valuable treasures and deserves full support.

Scientific and technical soundness of the project

The project addresses broad, heterogeneous and complex problems in management and conservation of this globally significant and diverse wetland. Some of the basic objectives are to: (a) protect the habitat (land and water) and its biodiversity against present mismanagement actions, (b) diagnose, recommend and implement measures to enhance public awareness about the

relevance of the biological resources and the need to protect them, (c) promote sustainable economic activities that must replace present non-sustainable practices, (d) provide tools to strengthen and support institutions, train professionals and educate the community at large on the implementation of management programs, (e) develop an integrated WMP as a synthesis of the major activities conducted during the project. The analysis of the root causes of aquatic environmental degradation, done prior to the preparation of the project document, is a valuable contribution containing a diagnosis of current problems. This analysis has been used wisely as a basis for the development objectives.

All the elements in the work program have clear objectives but most of the components cannot be approached within a scientific framework. As this is not a scientific project—the strength of the project is in education, training, policy and sustainability of economic practices—the specific methods that will be used to accomplish those objectives that are within the realm of science were not presented in the proposal or were defined in general terms. This precludes an in-depth analysis of the scientific soundness of the proposed work. From a technical standpoint, the objectives of the project will allow the acquisition of specific information and experience necessary to solve priority actions identified in the PCBAP.

Global environmental benefits and/or drawbacks of the project

To assess the benefits of the project a list of success criteria for each of the activities to be implemented, would have been useful.

The project will be beneficial for the biodiversity of the Pantanal and the human communities that depend on the living resources of the region. The Pantanal and the UPRB are part of a larger basin that feeds into the Uruguay and Parana rivers. Although it is not clear how this project links with these other water systems, it has the potential to affect a much larger environment than that which is addressed by its specific actions.

There are no major drawbacks of this project. The concept of sustainable development may require greater discussion which goes beyond this project. The section on risks of the document addresses only a few issues related to the sustainability of the implementation of the proposed activities. It states that the main risk for the conservation of the resources of the Upper Paraguay Basin is that development initiatives do not include undesirable environmentally side effects. The consequences are a decline in biodiversity and biomass, pollution, land degradation and loss of economic opportunities. A more thorough analysis of the risks to the success of the present project would be appropriate. For example, the UPRB is shared by Brazil, Bolivia and Paraguay. Although most of the Pantanal system within this basin is in Brazilian territory, what could the effects on the whole system be if Paraguay and Bolivia do not, simultaneously, act to correct their mismanagement practices. How much could a truly international approach add to the conservation of the area? A non-simultaneous approach could have negative effects on the expected benefits for the Brazilian side of the ecosystem.

The project within the context of the goals of GEF

This project addresses relevant issues and concepts proper to large-scale, sustainable-development, community-based initiatives. Strategically, the project fits well within the framework of the GEF initiatives and has identified specific investment actions that meet GEF criteria. It also: (a) identifies the main priorities for the preservation of the Pantanal, (b) identifies actions to revert unsustainable development and (c) outlines a co-ordinated program to introduce environmentally sound management practices and procedures.

Regional context

The project is being proposed by the Brazilian Government, but it addresses a transboundary environmental issue that also involves Paraguay and Bolivia. It would be important to increase the efforts for an international, co-operative strategy to protect the water and biological diversity of the UPRB and related biogeographic areas. Within the Brazilian territory, efforts were made to integrate municipal, state and federal interests.

Replicability of the project

Although the project has been designed to fit the specific needs of the region where it will be conducted, some of these needs are global (pollution, overfishing, lack of institutional responsibilities, limited human resources, unsustainable development of extractive practices). The general conceptual framework of this project should be applicable to other ecosystems similar to the UPRB. The Paraguay River is one of the three components of the Rio de la Plata Basin System that also includes the Uruguay and Parana rivers. The combined basin includes other wetlands as part of this large system of rivers that drain about 20 % of the South American continent.

Sustainability of the project

The concept of sustainable activities has permeated every aspect of the project and the need for sustainability has been considered for virtually every practice. However, the real test will depend on the response of the community and stakeholders. Theoretically, the activities planned could be sustainable. Practically, success will depend on broad implementation of the education and training programs, as well as the alternative economic strategies that are proposed to a community that has a history of neglecting environmental issues.

Linkages to other programmes and action plans

The project document addresses the issue of integration with other national and international initiatives. The developmental and management problems that will be addressed by the project are known to the Federal Government of Brazil and to the states of Mato Grosso and Mato Grosso do Sul that have jurisdiction over the area. Relief efforts concerning the effects of mismanagement of the Pantanal are already underway. The federal Constitution addresses the

Pantanal as an area of national importance. A committee has been created to implement the federal water law in the region. A plan for the conservation of the UPRB and the Pantanal has been designed with the support of The World Bank. This project is part of the implementation actions indicated in the latter plan and is also consistent with programs of the Ministry of Environment of the Federal Government of Brazil.

At the international level, the project appears to be consistent with the UNEP Environmentally Sound Management of Inland Waters planning process. It is less clear how it will be linked to initiatives of the other two countries involved in this trans boundary wetland. During the process of preparation of the project, representatives of the neighbouring countries were consulted and the implementation arrangements consider the participation of Bolivia and Paraguay by the way of committees within the Steering Committee of the project.

Other beneficial or damaging environmental effects

This project has no apparent damaging environmental effects. The main negative effect could be the consequence of errors in the process of identifying the root causes of environmental degradation or in stating priorities and actions.

Degree of involvement of stakeholders in the project

The project includes activities designed to integrate the private sector, public officials and the community in general in the conservation initiatives. There are many elements in the work program that consider the interests of persons and agencies that have commercial or institutional responsibilities in the management and protection of the water resources and wetlands of the Pantanal and the UPRB.

Capacity-building aspects

There are plenty of work programs that will strengthen and improve institutional and staffing capabilities at the state and municipal levels. Training activities involve Science Educators that will implement education programs in schools, community extension agents that will support the implementation of community-based management practices, and technicians in the areas of hydrology and environmental science to increase local capacity for implementing management programs.

Innovativeness of the project

This project is not innovative in its objectives or practices, however, there is little room for innovation in a field which requires hard work and commitment in that oldest of human endeavors: education. The project is, nonetheless, an excellent example of a large-scale initiative for a large-scale environmental problem.

Implementing Agency Response

Dr. Campagna's review is strongly supportive of this project. However, he does note the importance of an holistic approach to the implementation of management actions within this multinational basin. To this end, Component VI of the project specifically provides for the sharing and dissemination of knowledge and experiences gained through the implementation of this project within Brazil to its neighboring riparian countries through seminars and other professional exchanges. Interchange of such knowledge and experiences at both the technical and legal-political levels will encourage adoption of best management practices and measures throughout the basin. The OAS, as Executing Agency, in its regional role and function is be strongly supportive of this type of information exchange, as is the use of the Inter-American Water Resources Network (IWRN) for which the OAS provides the Secretariat.

ROOT CAUSES ANALYSIS

1. Background. The UPRB is the second largest river system in Brazil, incorporating within its boundaries the Pantanal, a wetland of global value due to its high degree of biological endemism and potential sensitivity to hydrological perturbations and contamination from land use activities. The basin is also well endowed with a rich variety of natural resources, including minerals, fish, wildlife, and lands suitable for agricultural and pastoral development. In addition, the river and its tributaries form a natural transportation corridor serving southern Brazil. As a consequence, the river and its watershed have been subjected to intense economic development pressures in the recent future, pressures that appear to be increasing with time. In recognition of these increasing developmental pressures, the Federal Government of Brazil and the riparian states have initiated several actions designed to protect the resources of the region and contribute to the sustainable development of the area. These actions have included the designation, within the federal Constitution, of the Pantanal as a resource of national importance, the creation of a river basin committee tasked with monitoring and implementing the federal water law within the UPRB, and the completion, with the assistance of The World Bank, the plan for the conservation of the UPRB and Pantanal, PCBAP.

2. Issues. In order to move forward with the implementation and further definition of actions indicated under the PCBAP, the Federal Government of Brazil invited the United Nations Environment Programme, Organization of American States, The World Bank and the Global Environment Fund Secretariat to field a reconnaissance mission during 1996, which mission resulted in the invitation to UNEP to prepare a request to the GEF for a project development facility grant to develop a watershed management program for the Basin. In the PDF proposal, seven issues were identified on the basis of findings set forth in the PCBAP and other extant documentation and as the result of discussions between the reconnaissance mission and officials representing local communities, governmental and nongovernmental agencies, and federal agencies. These issues were: loss of wetland, land degradation, inadequate of stakeholder participation, unsustainable levels of economic development, a need for widespread environmental education, the need for more effective institutions, and the need for enhanced staffing capacity at all levels. During the PDF process, additional issues were identified, including declining fisheries, flooding and hydrological changes in river flows, increasing urbanization and industrialization (mining and agro-industrial development), and water quality degradation of surface and ground waters.

3. Problems and Symptoms. Each of the foregoing issues is indicative of specific problems or consequences that have, direct impacts on the biological and water resources within the basin.

3.1 Problems related to wetlands. Problems related to wetlands include declining species diversity among terrestrial flora, diminishing numbers of birds and reptiles (especially the caiman or jacare), loss of diversity among mammals, and declining fish numbers and diversity. Some of the loss in wetlands may be related to wildlife exploitation, both for hides and live-animal trade, and commercial exploitation, in the case of fish. Hunting pressures have also selectively modified

species composition and numbers, especially among fishes, mammals and birds that historically appeared to be almost limitless.

3.2 Problems related to land degradation. Problems related to land degradation include draining of wetlands, conversion of lands for agricultural purposes, disruption of the land surface for mining and residential purposes, and introduction of exotic species of plants and animals. Industrial farming operations not only disturb large areas of land, but also the land clearing practices which have resulted in the deforestation of river banks and uplands, and the water use regimes and types of crops and livestock, have aggravated the severity of land degradation in the basin. Further, dredging for river navigation has exacerbated problems of riverbank erosion.

3.3 Problems related to stakeholder involvement. Problems related to stakeholder involvement historically have been related to the lack of appropriate fora for encouraging stakeholder participation, and the low population density, primarily on a subsistence basis, that has exacerbated this lack of participation. In recent years, urbanization and industrialization has resulted in an influx of transient workers with limited stake in the region beyond the fact of their employment, although increased tourism has resulted in a wider appreciation of the value of the basin among environmentalists and others. In many cases, however, this latter interest has been issue-driven and related to specific economic development proposals.

3.4 Problems related to economic development. Problems related to economic development include unregulated exploitation of lands and natural resources for commercial purposes. Agro-industrial development in particular imposes unsustainable levels and types of production on the basin. Large numbers of subsistence farmers and commercial fisherfolk also operate on an increasingly unsustainable basis.

3.5 Problems related to environmental education. Although environmental awareness within the basin communities has improved in recent years, the small-scale and often subsistence nature of economic activities in the basin has contributed to a neglect of environmental considerations.

3.6 Problems related to institutions. Problems related to institutions, both legal and regulatory, and agency structures, historically have been related to lack of appropriate laws and regulatory regimes for controlling environmental pollution, and implementing and undertaking compliance monitoring and policing of violators. Funding, which has been in chronic short supply, has not allowed creation of laboratories, police forces, and other necessary appurtenances to control and regulate environmental pollution and degradation. Further, actions that were able to be undertaken were fragmented among agencies and between states often resulted in less than effective management of the river and watershed. Currently, local and national initiatives are strengthening water resources institutions in the basin, including the creation of the river basin committee under the new federal water law that provides a mechanism for integrated management of the basin.

3.7 Problems related to human resources. Related to the lack of institutional capacity, problems related to human resources include a paucity of trained staff, lack of authority to

control environmental problems, and fragmented and parochial jurisdictions that have failed to bring a comprehensive and cohesive approach to watershed management in the Upper Paraguay River. Initiatives set forth in PCBAP have proposed mechanisms to rectify many of these shortcomings, while the promulgation of the new federal water law has given the necessary legal effect to these recommendations.

3.8 Problems of fisheries. Problems related to fisheries include annual fish kills during low water periods, overharvesting of fishes for commercial and recreational purposes, contamination of fishes by heavy metals and agro-chemicals, and changes in species composition due to selective harvesting as a result of harvesting and/or changes in predation pressure as a consequence of changes in species composition. Increased tourism in recent years has increased angling pressure on fish resources.

3.9 Problems of hydrology and flooding. Problems related to hydrological processes include flooding and channel movement within the system, with the most severe problems being observed in the Rio Taquari which has been subject to intense farming pressure, land clearance and deforestation, and changes in soil condition. Further, cross river migrations of non-indigenous cattle have been implicated in the failure of river berms and the diversion of river flows into traditionally non-flooded areas. Likewise, intentional cutting of river meanders and draining of wetlands has altered river flow patterns often in negative ways.

3.10 Problems of urbanization and industrialization. Problems related to urbanization and industrialization include surface or open cast mining for many metals and minerals, agro-industrial product processing (alcohol, dairy and meat processing), residential area encroachment without adequate wastewater treatment and solid waste management, and the development of export processing zones (such as that associated with the gas pipeline linking Brazil with southern Bolivia). Mining operations contribute to sedimentation of the river by disturbing the land surface, while refining of extracted metals, especially gold, result in the use and release of mercury and other hazardous wastes also directly or indirectly from slimes dumps and slag heaps.

3.11 Problems of water quality. Problems related to water quality include contamination of surface and ground waters, including bacteriological contamination, heavy metal contamination, contamination by synthetic organic (agro-) chemicals, organic matter loading, and pH modification, many of which have a significant anthropogenic component. Siltation due to erosion of urban, industrial and agricultural lands has also contributed to the decline in water quality in recent years.

4. Root Causes. Despite the apparent proliferation of problems in the UPRB, there would appear to be relatively few root causes that contribute to the majority of the problems observed.

4.1 Anthropogenic causes. People have contributed almost exclusively to the degradation of the UPRB. As the population of the UPRB, rates of non-sustainable extraction of (renewable) natural resources (overexploitation of terrestrial flora, terrestrial fauna and aquatic fauna) have increased, while primary extractive industries are particularly destructive as they often lack post-

extraction site remediation. In the first instance, the influx of population into the basin has led to unplanned urbanization that in turn has contributed untreated human wastes and other contaminants to the system. These populations have also created an increased demand for foodstocks, including fish, cattle and row crops that have been met by overfishing, cultivating marginal lands (through increasingly large additions of agro-chemicals to maintain soil fertility), and grazing of non-native cattle and growing of non-native crops which selectively deplete the soil and insidiously modify natural floral communities. For example, introduction of livestock has led to the selective grazing of certain forbs that allowed the rampant growth of less desirable plant species that subsequently required control using chemical herbicides. In extreme cases, the native vegetation was totally replaced with non-native grasses that lacked drought resistance, died back in the dry season, and failed to provide soil cover at the start of the wet season--a fact that directly contributed to the high rate of soil loss experienced in the basin. Superimposed on these causative factors are modifications of the natural hydrological regime of the river which has proven especially destructive to organisms dependent on the quantity, quality, timing and rate of water flows for reproduction and survival, and to groundwater sources dependent upon surface water flows for recharge.

4.2 Legal and institutional causes. While human land use activities have contributed significantly to the degradation of the Upper Paraguay River ecosystem, legal and institutional shortcomings have historically exacerbated these problems by failing to control or regulate human actions in the watershed. While most of these shortcomings have been, or are currently proposed to be, rectified through state, federal and external interventions and initiatives, substantial and costly actions are needed to overcome the historic lack of regulation, and lack of an holistic approach to ecosystem and economic development.

5. Actions Identified to Address Root Causes. To help in overcoming the historical inertia inherent in the causative factors identified above, emphasis in project design has been given to those actions which address root causes that can be humanly managed; i.e., those anthropogenic causes and legal and institutional causes that can be modified through planning and subsequent implementation of corrective actions. Natural root causes generally cannot be effectively controlled by human actions and hence are of lesser importance from a watershed management perspective (although knowledge of these causes is an essential starting point from which to implement interventions to address human and institutional causes). The following actions have been proposed to address the human causative factors of environmental degradation in the UPRB.

5.1 Acquisition of basic scientific information and dissemination of knowledge. Project activities have been developed to acquire supplementary baseline information to support determination of root causes, provide quantitative insights into specific watershed management practices, and investigate alternative courses of action to ensure sustainable use. In addition, a further group of activities has been proposed as a means of synthesizing and disseminating information gathered through diagnostic studies. These include, *inter alia*, components which demonstrate ways in which citizens can contribute to the protection of aquatic avifauna in the basin, which address the need for public informational programming to enhance citizen participation in the decision-making process, and which train community-based extension agents

to disseminate information on issues and mitigation measures to citizens.

5.2 Promotion of financially-sound, integrated watershed management. Project activities have also been developed to identify alternative, sustainable economic activities that will contribute to the maintenance of the ecological integrity of the UPRB. These projects include, *inter alia*, components which address the conjunctive use of water resources in the Rio Taquari sub-basin, which provide insights into the development of community-based eco-/ethno-tourism alternatives for economic development, which investigate alternative means to achieve a sustainable fishery in the basin, and which are designed to strengthen local government water resources management capabilities in the Rios Apa and Miranda sub-basins as a prototype for use elsewhere in the basin.

5.3 Development of an holistic institutional watershed management framework. Project activities have been developed to provide an integrated management framework within which river basin management activities can be identified and carried out. Project activities in this category include, *inter alia*, components which address the need to harmonize legal instruments used within the multinational basin of the Upper Paraguay River, and which encompass the synthesis and integration of the strategic elements of the foregoing project activities in the integrated watershed management plan.

5.4 Support to river basin management and regulatory agencies. Finally, project activities have been developed to provide directed support to strength the operational capabilities of the river basin committee and related civic organizations. These activities include, *inter alia*, components which support the Committee for the Integrated Management of the UPRB and Pantanal (CIHBAP-P), and which promote the establish of intermunicipal sub-committees within the basin.

6. Concluding remarks. Significant progress has been made in the definition of issues and problems (and their root causes in some instances) within the UPRB. Work proposed under the GEF International Waters focal area builds on this progress in seeking to extend local actions to the multinational basin of the Upper Paraguay River. This work is predicated upon the principles of civic involvement, public participation, and responsible governmental action at all levels of government, and embodies a comprehensive program of research, demonstration projects, and information dissemination designed to identify a framework for subsequent remedial measures and management actions that will result in the sustainable economic development of this critical region of global significance.

PUBLIC INVOLVEMENT PLAN SUMMARY

1. The emphasis on public participation in the management of the water resources of Brazil is supported as an integral feature of the Federal Law 9433/97 on water resources management policy. In one of the first applications of this new water law, more than 200 persons, representing almost 60 civil, corporate, nongovernmental and governmental entities (having municipal, state, federal, and international interests) contributed more than 45 detailed project documents which were presented at three public meetings convened during the PDF process. These public meetings were held within the basin on 28 November 1997 at Cuiabá, on 12 December 1997 at Corumbá, and on 5 February 1998 at Campo Grande.

2. A list of those institutions that participated in the public meetings convened prior to the preparation of this project document, and which are expected to participate in project implementation as well as subsequent public meetings, is presented below. Governmental organizations are categorized as federal, state, or municipal government level agencies. Nongovernmental organizations and other governmental bodies are also listed. State governmental agencies and nongovernmental organizations are identified by state; namely, Mato Grosso (MT) and Mato Grosso do Sul (MS). Where the participating organizations are known by an acronym, the acronym is also shown.

3. FEDERAL GOVERNMENT ORGANIZATIONS

- Ministério do Meio Ambiente dos Recursos Hídricos e da Amazônia Legal - MMA
 - Secretaria de Recursos Hídricos - SRH
 - Secretaria do Meio Ambiente - SMA
 - Instituto Brasileiro do Meio Ambiente - IBAMA
- Ministério do Planejamento e Orçamento - MPO
 - Secretaria de Políticas Urbanas - SEPURB
- Ministério da Marinha
 - Capitania dos Portos
- Administração Hidrovia do Paraguai
- Comitê de Integração da Bacia Hidrográfica do Alto Paraguai-Pantanal - CIBHAPP
- Departamento Nacional da Produção Mineral - DNPM
- Empresa Brasileira de Pesquisa Agropecuária - EMBRAPA Pantanal/EMBRAPA Oeste
- Instituto de Pesquisas Hidráulicas – IPH/UFRGS
- Universidade Federal de Mato Grosso - UFMT
- Universidade Federal de Mato Grosso do Sul - UFMS

4. STATE GOVERNMENT ORGANIZATIONS

- Secretaria do Estado de Meio Ambiente e Desenvolvimento Sustentável - SEMADES (MS)
 - Superintendência de Meio Ambiente

- Fundação Pantanal da SEMADES
- Empresa de Pesquisa, Assistência Técnica e Extensão Rural de Mato Grosso do Sul - EMPAER (MS)
- Polícia Militar Florestal (MS)
- Saneamento Básico do Estado de Mato Grosso do Sul - SANESUL (MS)
- Universidade para o Desenvolvimento do Estado e da Região do Pantanal - UNIDERP (MS)
- Secretaria Especial do Meio Ambiente - SEMA (MT)
- Secretaria de Desenvolvimento e Turismo – SEDTUR (MT)
- Fundação Estadual do Meio Ambiente - FEMA (MT)
- Secretaria de Planejamento – SEPLAN (MT)
- Defesa Civil (MT)
- Empresa de Saneamento do Estado de Mato Grosso - SANEMAT (MT)
- Programa de Desenvolvimento Agro-Ambiental – PROGEAGRO (MT)

5. MUNICIPAL GOVERNMENT ORGANIZATIONS

- Consórcio Intermunicipal para o Desenvolvimento Sustentável da Bacia do rio Taquarí - COINTA (MS)
- Prefeitura Municipal de Antônio João (MS)
- Prefeitura Municipal de Corumbá (MS)
- Secretaria Municipal de Meio Ambiente e Turismo - SEMATUR (MS)
- Prefeitura Municipal de Costa Rica (MS)
- Prefeitura Municipal de Coxim (MS)
- Prefeitura Municipal de Pedro Gomes (MS)
- Prefeitura Municipal de Rio Verde (MS)
- Prefeitura Municipal de São Gabriel (MS)
- Prefeitura Municipal de Cuiabá (MT)
- Prefeitura de Municipal de Poconé (MT)
- Secretaria de Turismo e Meio Ambiente (MT)
- Prefeitura Municipal de Várzea Grande (MT)

6. NONGOVERNMENTAL ORGANIZATIONS (NGOs)

- Associação Ecológica de Defesa da Bacia do rio Miranda e do Pantanal - ECOPAN - Campo Grande (MS)
- Centro de Ação Ambiental do Pantanal - ECOA - Campo Grande (MS)
- Conservation International do Brasil - Campo Grande (MS)
- CONTI MAXI Ltda - Corumbá (MS)
- Federação de Agricultura do Mato Grosso do Sul - Campo Grande (MS)
- Federação das Indústrias de MS - FIEMS - Campo Grande (MS)
- Federação de Pescadores de Mato Grosso do Sul - Corumbá (MS)
- Fundação para Conservação da Natureza - FUCONAMS - Campo Grande (MS)
- Granel Química Ltda - Ladário (MS)

- Projeto Novas Fronteiras - PNFC - Campo Grande (MS)
- Sindicato Rural de Corumbá - Corumbá (MS)
- Sociedade de Defesa do Pantanal - SODEPAN - Campo Grande (MS)
- Associação Diamantinense de Ecologia - ADE - Diamantina (MT)
- Associação Ecológica Melgassense - AMEC - Barão de Melgaço (MT)
- Associação para Recuperação e Conservação do Ambiente - AREA - Cuiabá (MT)
- Associação Rondonopolitana de Proteção Ambiental - ARPA - Rondonópolis (MT)
- Cooperativa de Peixe - COOPERPEIXE - Cuiabá (MT)
- Ecopantanal - Cuiabá (MT)
- Federação da Agricultura de Mato Grosso – FAMATO (MT)
- Fórum das Organizações de Meio Ambiente e Desenvolvimento - FORMAD - Cuiabá (MT)
- Fundação Ecotrópica - Cuiabá (MT)
- Sindicato Rural de Mato Grosso - Cuiabá (MT)
- Instituto Internacional de Ecologia da Amazônia - São Paulo (SP)

7. INTERNATIONAL ORGANIZATIONS

- Organização dos Estados Americanos – OEA/OAS
- Programa das Nações Unidas para o Meio Ambiente – PNUMA/UNEP

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1. This annex presents a list of publications on the UPRB that were referred to during the PDF activities or that were prepared as a result of the PDF activities. These documents, categorized into publications relating to (a) water resources management, (b) natural resources and environment, (c) public participation and consultation, (d) institutional strengthening and support, and (e) regional economy, together with the project concepts presented during the public participation workshops (summarized in Annex 4), form the documented basis for the Implementation of the WMP proposed as the outcome of this project.

2. WATER RESOURCES MANAGEMENT

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GEOGRAPHY OF THE UPPER PARAGUAY RIVER BASIN

1. The 496,000 km² Upper Paraguay River Basin, shared by Brazil, Bolivia and Paraguay, is one of the three main components of the Plata Basin System, which drains almost 20 percent of the South American continent. The Upper Paraguay Basin comprises two areas with significantly different water and natural resources conditions, i.e. the Plateau, or *Planalto*, and the Pantanal. The *Planalto* forms the eastern boundary of the drainage basin. Rainfall in this area exceeds 1,400 mm per year and has definite seasonality that determines the hydrological character of the basin due to the rapid drainage of stormwater from the land surface. The land surface is used mainly for agriculture (i.e., cattle grazing, and soybean and rice production), that has expanded rapidly since the 1970s. Surrounded by the *Planalto*, the Pantanal has been identified as a wetland of global significance by The Nature Conservancy and World Wildlife Fund. Major tributaries to the Upper Paraguay River are the Apa, Aquidauana, Cuiaba, Miranda, Negro, Sao Lourenco, and Taquari rivers, all of which discharge to the Pantanal. Of these tributaries, the Miranda, Negro and Taquari rivers are hydrologically dominant, while the Apa River is transboundary in nature, forming the border of Brazil and Paraguay. Approximately 80 percent of the UPRB, including the major headwater tributaries and the largest portion of the Pantanal, is located within the boundaries of the Federal Republic of Brazil.

2. Human settlement of the UPRB is sparse, numbering only about 1 million individuals. Population densities are low, with a density of 2.2 inhabitants/km² in Mato Grosso do Sul, concentrated in the Maracaju-Campo Grande plateau, and 2.5 inhabitants/km² in Mato Grosso, concentrated in the *Baixada Cuiabana*. Soil quality and soil conditions favoring mechanized agriculture, ease of access, and protection from flooding are the underlying reasons for the concentration of population in these areas. Most of the population, both on the plateau and in the lowlands, is in urban areas that currently lack adequate land use controls, wastewater and solid waste management infrastructure, and urban stormwater management systems. Actions to address these issues are proposed to be implemented through complementary financing identified below.

3. In the lower sub-basin of the Upper Paraguay River, near Corumba, iron ore reserves are estimated at 800 million tons and manganese reserves at 100 million tons. Elsewhere in the basin known copper, peat, lignite, gypsum, WMPphires, amethysts and topaz deposits have good potential for exploitation. Minerals being exploited presently include gold, diamonds, marble, limestone and clay. These minerals are extracted by both large and small operators using, primarily, open cast mining techniques that result in soil loss and metal contamination of adjacent water courses. Further, as previously noted, the expansion of the agricultural frontier in the highlands, through large scale mechanized production of soybeans and rice, has increased soil erosion, soil compaction and water pollution. Soil erosion rates in the highlands are estimated at 300 tons/km²/year and at 40 tons/km²/year in the lowlands. Use of agro-chemicals has skyrocketed, increasing the content of undesirable residues washed by rain into the rivers. Environmental problems in the UPRB include land clearing, both along the river banks and in the

debouchment of the river into the Pantanal, that, between 1995 and 1996, is estimated to have cleared approximately 3% of the limited forest cover of the Pantanal. Throughout the basin, fish are threatened by overfishing and, most recently, by hazardous chemicals, especially large quantities of mercury used in gold mining. Notwithstanding, tourism, based mainly on the unique flora and fauna present in the region, is a growing industry, with ecotourism becoming more important.

4. Due to its location in the center of South America, the Pantanal area of the UPRB is a biogeographic meeting point of several South American floral and faunal units. The confluence of biologic elements originating in the Amazon, Chaco, Savanna and Mata Atlantica regions contributes to the extensive biological diversity of the region. Many different types of highland and lowland forests, as well as several different kinds of savanna known as *cerrado*, contribute to a unique and extremely rich array of wildlife (more than 230 species of fish, 80 species of mammals, 81 species of reptiles and more than 650 species of birds) in the basin.

5. The controversial Paraguay-Parana Waterway Project (*Hidrovia*) has been proposed as a means of facilitating the transport of iron and manganese ores from Corumba, and agricultural products from Mato Grosso and Rondonia. Some 5 million tons of grain and comparable volumes of minerals are expected to be transported each year. While the economic impact of the project may be considerable, the environmental risks involved also are significant. Rectification and dredging of specific river stretches, such as Posto de São Francisco and Fecho dos Morros, could modify both the downstream passage of flood peaks and the upstream behavior of water flows. In the areas most likely to be adversely affected, the river has a reservoir-like character (i.e., any modifications could create the risk of disastrous transboundary floods affecting people and infrastructure along the Paraguay and Parana rivers). Moreover, considering that Brazilian agriculture is heavily dependent on the use of fuel and agro-chemicals, it is highly probable that barges and other vessels carrying grain downstream will return bringing fuel, fertilizers, pesticides and herbicides. Under these conditions, any accident in the waterway would directly affect riverine flora and fauna, as well as water intakes from riverside cities downstream, thus creating dangerous transboundary risks. As of March 1998, the Government of Brazil has taken the decision not to proceed with implementation of the *Hidrovia* within the Pantanal upstream of Corumba in the foreseeable future.

6. In the Pantanal, hydrology is influenced by natural factors; namely, that the average annual rainfall is less than the annual average potential evaporation resulting in a precipitation deficit. The Pantanal remains a wetland only because of the runoff from the highlands. Like most wetlands, the Pantanal also is threatened both by anthropogenic factors such as channel dredging, removal of obstructions to free flow of water, and the construction of polders or dikes upstream of the wetland, and by natural factors such as changes in the rainfall patterns. Changes in rainfall, occurring during the last 25 years, have influenced strongly the livelihood of the population of the UPRB. Ranches that were free from flooding during most of the year (7 to 9 months) in the 1960s have seen the flood-free period reduced to only 3 to 5 months in more recent times. This has encouraged some landowners to consider building polders, and some have been built. While these are still few in number, it is possible that local changes in drainage patterns, each having

apparently limited local effects, could cumulatively combine to affect the character of the entire system. In broad terms, any changes in the hydrological integrity of the Pantanal could reduce the volume of water retained in the Pantanal, and potentially change it from wetland to *cerrado*. Thus, for people to live sustainably with these types of variations in system hydrology, whether due to natural climatic variation or modified land-uses and other kinds of economic development, it will be necessary to define the way in which hydrological changes affect flooding frequency and severity in both urban and rural areas.

PROPOSED WORK PROGRAM

Project Identifier: GF/1100-98-#

Project Name: **IMPLEMENTATION OF INTEGRATED WATERSHED MANAGEMENT PRACTICES IN THE PANTANAL AND UPPER PARAGUAY RIVER BASIN**

GEF Implementing Agency: UNEP

Executing Agency: OAS
Ministerio do Meio Ambiente, dos Recursos Hidricos e da Amazonia Legal do Brasil (MMA), Secretaria de Recursos Hidricos (SRH)

Requesting Country: Brazil

Country eligibility: Under paragraph 9(b) of the Instrument.

Focal areas: International waters

Cross-cutting areas: Land Degradation

GEF Programming Framework: OP 9

Estimated Starting Date: October 1998

Project Duration: 2.5 years.

1. This project seeks to catalyze implementation of a refined watershed management program for the Pantanal and the Upper Paraguay River Basin. Project activities will enhance and restore the environmental functioning of the system by protecting endemic species within the wetland and by implementing strategic activities, identified in the World Bank-financed Plan for the Conservation of the Upper Paraguay River Basin (PCBAP) program, addressing the root causes of degradation. These actions will complement basin-scale interventions by the Government of Brazil, financed in part from national and state sources and by international loan funding, and sub-basin scale activities conducted under the World Bank-UNDP Northwestern Regional Development Program (PRODEAGRO). Strengthening of basin institutions, building of agency and organizational capacities, and integration of environmental concerns into economic development activities on a sustainable basis are the key elements of this project.

Table 1. Relationships Between PCBAP-, PDF-, and Project-related Issues and Actions

PCBAP Issue	PCBAP Priority Action	PDF Issue	Proposed Project Activity^a
Erosion	Erosion control	Land degradation	<u>Activity III: Land Degradation</u> Agricultural land management
Agro-chemical contamination	Monitor and assess problem	Issue identification	<u>Activity I: Water Quality and Environment Protection</u> Agricultural land management
Urban, industrial and mining	Monitor and assess problem, identify	Issue identification, and	<u>Activity I: Water Quality and Environment Protection</u>

pollution	mitigation measures (e.g., upgrade treatment infrastructure, inform public)	Institutional strengthening	<u>Environment Protection</u> Urban land management: River basin environmental analysis, land degradation, institutional strengthening, capacity building, and loan program
Seasonality in, and geography of, basin	Implement environmental zoning	Integrated watershed management program	<u>Activity VI: Integrated Watershed Management Program Implementation</u> River basin environmental analysis
Anthropogenic impacts on fauna	Assess root causes and formulate effective legal framework to minimize impacts	Wetland conservation	<u>Activity II: Conservation of the Pantanal</u> River basin environmental analysis, wetland conservation, sustainable development, environmental education, and institutional strengthening
Habitat degradation	Implement conservation practices	Wetland conservation	<u>Activity II: Conservation of the Pantanal</u> Wetland conservation
Development-related impacts	Evaluate impacts by implementing environmental impact assessment laws	Stakeholder participation	<u>Activity IV: Stakeholder Involvement and Sustainable Development</u> River basin environmental analysis, and institutional strengthening
Conservation	Create conservation units	Stakeholder participation, and Capacity building	<u>Activity V: Organizational Structure Development</u> Wetland conservation, stakeholder participation, and capacity building
Tourism	Encourage eco-ethno-tourism	Stakeholder participation	<u>Activity IV: Stakeholder Involvement and Sustainable Development</u> Stakeholder participation
Flooding	Flood control and warning systems	Institutional strengthening	<u>Activity V: Organizational Structure Development</u> Issue identification, sustainable development, institutional strengthening, and capacity building

2. The 496,000 km² UPRB is an international river basin shared by Brazil, Bolivia and Paraguay. Together with the Uruguay and Parana rivers, the Paraguay River is one of the three main components of the Plata Basin System, which drains almost 20 percent of the South American continent. The Upper Paraguay Basin comprises two areas with significantly different water and natural resources conditions, i.e. the Plateau, or *Planalto*, and the Pantanal. The *Planalto* forms the eastern boundary of the drainage basin. Rainfall in this area exceeds 1,400 mm per year and has definite seasonality that determines the hydrological character of the basin. The land surface

of the *Planalto* is used mainly for agriculture (i.e., cattle grazing, and soybean and rice production), that has expanded rapidly since the 1970s. Surrounded by the *Planalto*, the Pantanal has been identified as a wetland of global significance by The Nature Conservancy and World Wildlife Fund. Major tributaries to the Upper Paraguay River are the Apa, Aquidauana, Cuiaba, Miranda, Negro, Sao Lourenco, and Taquari rivers, all of which discharge to the Pantanal. Of these tributaries, the Miranda, Negro and Taquari rivers are hydrologically dominant, while the Apa River is transboundary in nature, forming the border of Brazil and Paraguay. Approximately 80 percent of the UPRB, including the major headwater tributaries and the largest portion of the Pantanal, is located within the boundaries of the Federal Republic of Brazil.

3. Building on previous studies, this GEF project that will help the Government of Brazil to promote the sustainable development of the UPRB, based on the implementation of the PCBAP guidelines summarized in Table 1, through a comprehensive and participative program of action addressing the root causes of degradation.

4. The emphasis on public participation in the management of the water resources of Brazil is supported as an integral feature of the Federal Law 9433/97. In one of the first applications of this new water law, more than 200 persons, representing almost 60 civil, corporate, nongovernmental and governmental entities (having municipal, state, federal, and international interests) participated in the definition of more than 45 detailed project documents which were presented at three public meetings convened during the PDF process within the basin during November 1997 at Cuiaba, December 1997 at Corumba, and February 1998 at Campo Grande. Follow-up consultations were held with the Committee for the Integrated Management of the Upper Paraguay River Basin and Pantanal (CIBHAP-P) and the Secretariat for Water Resources (SRH/MMA) in February 1998. Subsequently, numerous other communications were initiated between individual participants in the workshops and other selected persons in order to improve and clarify specific issues arising from component proposals and other observations made during the project preparation period. The principle findings identified by the public, government officials, and consultants are contained within by this proposal. Representatives of the neighboring countries were consulted during the preparation of this proposal. Continued popular participation and consultation is built into the project and will be continued in the development of the WMP for the UPRB.

5. Proposed project components correspond to the concerns of global significance and priority actions identified in PCBAP and are reflected in the nine issues identified in the PDF-B Grant Proposal. The relationships between these concerns, actions and issues are shown in Table 2. The project components, comprised of several activities arising from the public participation process conducted during the PDF phase, are designed to provide information on, and permit implementation of, an WMP for the UPRB, and are concentrated in four principal components as set forth below. The relationship between these components and the activities defined in the project brief is shown in Table 3. Preliminary descriptions and budgets for each of the 35 proposed activities have been prepared by the UNEP as Implementing Agency, in consultation with the OAS and the Federal Government of Brazil, and are summarized below. It should be noted that many of the components are multi-faceted in nature and include not only specific

issue-related activities, but also provide opportunities for stakeholder involvement, citizen and professional environmental education, and institutional strengthening, etc.; however, for the sake of brevity and clarity, each component has been categorized into only one issue area and has not been repeated under its related issue areas.

Table 1. Relationship Between PCBAP- and PDF-related Issues and Actions

PCBAP Issue	PCBAP Priority Action	PDF Issue	Proposed Project Component^a
Erosion	Erosion control	Land degradation	Land degradation (3.1, 3.3)
Agro-chemical contamination	Monitor and assess problem	Issue identification	Issue identification (1.5)
Urban, industrial and mining pollution	Monitor and assess problem, identify mitigation measures (e.g., upgrade treatment infrastructure, inform public)	Issue identification, and Institutional strengthening	Issue identification (1.4), land degradation (3.2, 3.4), institutional strengthening (7.4), capacity building (8.2), and loan program
Seasonality in, and geography of, basin	Implement environmental zoning	Integrated watershed management program	Issue identification (1.2; 1.3)
Anthropogenic impacts on fauna	Assess root causes and formulate effective legal framework to minimize impacts	Wetlands conservation	Issue identification (1.1), wetlands conservation (2.1, 2.4), sustainable development (5.1, 5.2), environmental education (6.1), and institutional strengthening (7.2, 7.3)
Habitat degradation	Implement conservation practices	Wetlands conservation	Wetland conservation (2.3)
Development-related impacts	Evaluate impacts by implementing environmental impact assessment laws	Stakeholder participation	Issue identification (1.7), and institutional strengthening (7.5)
Conservation	Create conservation units	Stakeholder participation, and Capacity building	Wetland conservation (2.2), stakeholder participation (4.2), and capacity building (8.1)
Tourism	Encourage eco-/ethno-tourism	Stakeholder participation	Stakeholder participation (4.1, 4.3)
Flooding	Flood control and warning systems	Institutional strengthening	Issue identification (1.6), sustainable development (5.3, 5.4), institutional strengthening (7.1), and capacity building (8.3)

^a Component number shown in parentheses; for brevity and clarity, each component has been categorized into only one issue area and has not been repeated under its related issue areas. The integrated river basin management program (components 9.1 through 9.4) is a cross-cutting issue linking all of the issues and actions.

Table 2. Proposed Project Activities, Work Program Activity Areas and Components.

Project Activity	Work Program Activity Area	Component
I. River Basin Environmental Analysis	A. River Basin Environmental Analysis	1.1 through 1.7
II. Wetland Conservation	A. River Basin Environmental Analysis	2.1 through 2.4
III. Land Degradation	A. River Basin Environmental Analysis	3.1 through 3.4
IV. Stakeholder Involvement and Sustainable Development	B. Public Participation	4.1 through 4.3; 5.1 and 5.2; and 6.1
V. Organizational Structure Development	C. Organizational Development	5.3 and 5.4; 7.1 through 7.5; and, 8.1 through 8.3
VI. Integrated Watershed Management Program Implementation	D. Integrated Watershed Management Program Implementation	9.1 through 9.4

A. COMPONENT I: WATER QUALITY AND HABITAT PROTECTION

6. Component I, including three issue areas, comprises the river basin environmental analysis. This Component is designed to provide for the collection and analysis of additional field data relevant to the diagnosis of those additional priority issues of concern, identified during the PDF investigations, which were not previously considered during the preparatory phase of the project. In addition, this Component provides for the acquisition of specific information, identified in PCBAP, necessary for the development of strategic approaches to resolving priority problems. This Component consists of fifteen Activities that will permit quantification of the three issues, thereby updating and consolidating older data, and providing for the forecasting of potential future conditions within the system. Based on analyses conducted as a result of PDF activities, some of the proposed Activities target specific, representative locales where specific data and information are required. Detailed work plans, setting forth detailed terms of reference and goals to be achieved during the project, will be developed for each component as one of the first actions initiated by the local executing agency in consultation with UNEP and the OAS.

Issue 1: Water-Resources Issue Identification

7. Consideration is given to those issues identified by PCBAP, and/or to those issues not previously identified but which were identified during the PDF activities as having impacts on the basin, that require further study and quantification to determine root causes prior to being addressed in the watershed management program.

Activity 1.1: *Formulation of Means to Promote Fisheries Conservation in the Rio Taquari.* PCBAP recommended that investigations into the root causes of the decline in fish numbers be

conducted so that appropriate legislative and other actions could be formulated to effectively sustain the fishery in this basin. This Activity seeks to identify the root causes for the observed decline in endemic fish production and diversity, which impacts commercial and recreational fisheries within the sub-basin. Knowledge of the root causes will allow formulation of a management program to strengthen and rehabilitate the fisheries within the Basin which is an essential element of the economic base of the region (see also Activities 5.1 and 5.2 below). The results of this management program will (i) identify the causes for the changes in fish production, (ii) permit determination of remedial actions, and (iii) promote restoration of a diverse and healthy fish community as the basis for sustainable economic development. Project deliverables will include an inventory of endemic fishes, documentation of fisheries activities including both traditional and other fisheries, and determination of the reproductive biology of the endemic fishes leading to the formulation of standards for the establishment of sustainable fishing in the UPRB. GEF: US \$ 83,000; co-funding: US \$ 375,000; total: US \$ 458,000.

Activity 1.2: *Water Resources Assessment in the Rio Taquari.* PCBAP identified the Rio Taquari sub-basin as one of the most critical tributary basins to the Upper Paraguay River, and recommended actions to quantify and control hydrologic soil loss within this sub-basin. This Activity seeks to contribute to this understanding by quantifying and evaluating the surface and ground water resources and their sectoral use within this sub-basin as a basis for sustainable conjunctive utilization. Knowledge of the pressures exerted on the water resources of the sub-basin will allow formulation of an appropriate regulatory program to allocate and plan for sustainable water use management, and contribute to developing a water management strategy consistent with implementation of appropriate and sustainable soil conservation measures (see Activity 3.1). The results of this management program will (i) identify and quantify the uses and users of surface and ground waters in the basin, (ii) assess availability and quality of water resources to meet specific uses including water for environmental purposes, and (iii) permit formulation of appropriate licensing and regulatory mechanisms. Project deliverables will include a documented basis upon which water allocation and use management can be regulated by fiscal means that potentially can be extended to the UPRB. GEF: US \$ 282,500; co-funding: US \$ 205,500; total: US \$ 488,000.

Activity 1.3: *Water Resources Assessment in the Transboundary Basin of Rio Apa.* This Activity seeks to identify, based upon an analysis of the surface water hydrology of the Rio Apa and contingent water uses, appropriate regulatory mechanisms in a transboundary sub-basin. Knowledge of the volume and demand for water in this sub-basin will allow preparation of a preliminary approach to equitable allocation of water resources for economic purposes, including environmental uses. The results of this study will (i) identify and quantify the uses and users of water in the basin, (ii) assess the institutional and regulatory basis for water management in the basin, and (iii) permit formulation of proposed means to sustainably manage the water resources of a transboundary basin. Project deliverables will include a documented diagnostic survey of water resources within the sub-basin, and a proposed institutional framework for sustainable utilization of water resources that potentially can be extended to other transboundary basins within the UPRB. GEF: US \$ 105,000; co-funding 225,000; total: US \$ 330,000.

Activity 1.4: *Distribution and Transport of Elemental Mercury within the Upper Paraguay River Basin.* PCBAP identified the need to quantify the magnitude of heavy metal contamination within the UPRB as the initial action in determining appropriate mitigation measures. This Activity seeks to quantify the level of mercury contamination and degree of transport within this multinational basin. Knowledge of the distribution and movement of mercury in the basin will allow assessment of the nature and magnitude of the threat to environmental populations (including humans) from bioaccumulation of mercury within the environment. Further, this knowledge will create a quantitative basis for an assessment of the need for regulation and control of mercury use in mining operations in the upper basin (see also Activity 3.2). The results of this study will (i) identify, using mass-balance techniques, the partitioning of mercury in sediments, water and biological organisms, including commercially important fish and aquatic plant populations, and (ii) permit formulation of appropriate mitigation measures. Project deliverables will include a data base and iso-concentration distribution map of the basin. GEF: US \$ 170,000; co-funding: US \$ 180,000; total: US \$ 350,000.

Activity 1.5: *Distribution and Transport of Agro-chemicals and Heavy Metals within the Upper Paraguay River Basin.* PCBAP identified two issues relating to the use and mobility of agro-chemicals, including POPs, within the UPRB; namely, the need to quantify the degree of agro-chemical contamination and fate of agro-chemicals within the basin, and the need to develop an integrated agricultural pesticide management approach to minimize the movement of contaminants within the basin. This Activity seeks to address the first of these issues by quantifying the level of agro-chemical and heavy metal contamination and degree of transport within the multinational basin. Knowledge of the distribution and movement of agro-chemicals and heavy metals in the basin will allow assessment of the nature and magnitude of the threat to environmental populations (including humans) from bioaccumulation of agro-chemicals and metals within the environment. Further, this knowledge will create a quantitative basis for an assessment of the need for regulation and control of agro-chemical use in (industrial) agricultural operations in the basin. The results of this study will (i) identify the partitioning of synthetic organic chemicals and heavy metals in sediments, water and biological organisms, including commercially important fish and aquatic plant populations, and (ii) permit formulation of appropriate mitigation measures. Project deliverables will include a data base and documented mitigation measures that potentially can be applied throughout the UPRB. GEF: US \$ 230,000; co-funding: US \$ 300,000; total: US \$ 530,000.

Activity 1.6: *Water Resources Management in the Vicinities of the Cities of Corumba and Cuiaba.* PCBAP identified urbanization within the UPRB as a major modifying influence on both water quality and hydrology within the basin. The plan recommended actions to assess the water quality impacts on the river due to urbanization, and the determination of measures governing the siting and expansion of urban areas to minimize flooding risk and other human consequences associated with water quality and hydrological variability. This Activity seeks to determine means of reducing the impact of urban development on the water resources of the Upper Paraguay River in the vicinity of the Cities of Corumba (in the Pantanal) and Cuiaba (on the Plateau), including the management of risks associated with flooding and nonpoint source pollution. Based upon an assessment of hydrological and water quality conditions in specific

sub-basins, flood risk analyses, and the determination of specific land use regulatory mechanisms to protect floodlands under various urban situations, experience gained from this project will define culturally-acceptable practices for minimizing urban impacts of natural water courses. The results of this project will (i) provide information necessary for the formulation of floodplain management plans and regulations that can be adopted by local units of government, and (ii) create a quantitative basis for implementing urban-related land use management measures at the local level. Project deliverables will include floodplain maps and a model for flood forecasting and early warning system plans in the urban environment, and a documented framework for communicating flood risk minimization practices to citizens within urban areas of the UPRB. Proposed loan-funded interventions aimed at upgrading and installing appropriate infrastructure in these areas of the basin are currently being considered by the state and federal governments. GEF: US \$ 200,000; co-funding: US \$ 345,000; total: US \$ 545,000.

Activity 1.7: *Community-based Problem-Solving Relating to “Meander Cuts” in the Rio Taquari Basin.* PCBAP identified human interventions within the UPRB as the major factor influencing changes in faunal composition and habitat, and recommended the conduct of specific investigations to quantify the magnitude of these interventions, and to form the basis of appropriate legal and other remedial measures. “Meander cuts” or *arrombados* are one type of human intervention in the basin, being created by riparian residents to navigate more efficiently through the river system, by-passing the longer routes around the meanders. Unfortunately, river flows preferentially follow these artificial routes, significantly modifying flow, flood and sedimentation patterns within the river system which create isolated, highly acidic oxbow-type lakes that adversely affect the biological resources of the river. This Activity seeks to assess the extent of this phenomenon and its impact on (i) the economic development of the riparian communities, (ii) the aquatic ecology of the river, and (iii) the hydrology of the river. Information gained through the conduct of this project will form the basis for enhanced public participation in the hydrological management of the river and determination of actions necessary to manage and mitigate deleterious impacts of meander cutting. The results of this project will identify affected riparian communities in the Rio Taquari basin (identified by PCBAP as one of the most critical sub-basins in the UPRB), and permit development, by a representative community, of actions designed to promote sustainable development throughout the UPRB. Project deliverables will consist of maps of the *arrombados* and associated riparian community locations, pictorial and technical documentation of the identified *arrombados*, and formulation by a typical community of an action program for mitigation of the negative effects of the *arrombados* that can potentially be transferred throughout the UPRB. GEF: US \$ 70,000; co-funding: US \$ 37,500; total: US \$ 107,500.

Issue 2: Wetland Conservation

8. Consideration is given to cross-cutting issues, which relate specifically to protection and conservation of ecologically-important aquatic flora and fauna, including fish and riparian wetlands and floodplains.

Activity 2.1: *Management Programs for the Development of Buffer Zones in the Vicinity of*

Acurizal, Penha, and Doroche National Reserves. PCBAP recommended the creation of conservation units within the Pantanal as a means of preserving the best remaining areas of natural habitat within the region. Coincident with this is the creation of an increased number of boundary areas wherein human activities can encroach upon the natural reserves. Previous experience gained by The Nature Conservancy has suggested the utility of buffer zones as a means of moderating this encroachment. This Activity seeks to assist local communities to prepare management programs and train administrators for buffer zones around the reserves. This project will demonstrate the feasibility of the program and buffer zones as effective means of conservation and protection of wetlands within the preserves. The results of this project will establish the effectiveness of buffer zones as management techniques to restore degraded environments adjacent to nature conservancy areas and provide a mechanism for the sustainable development of communities in these areas. Project deliverables will include a documented strategy for the establishment and management of buffer zones, based upon community participation, which potentially can be applied elsewhere in the UPRB. GEF: US \$ 150,000; co-funding: US \$ 127,500; total: US \$ 277,500.

Activity 2.2: Implementation of Conservation Units for the Protection of the Environment in Mato Grosso do Sul. PCBAP recommended the creation of conservation units within the Pantanal as a means of preserving the best remaining areas of natural habitat within the region. Units of this type have been established and implemented in the State of Mato Grosso. This Activity seeks to assist the State government of Mato Grosso do Sul to implement similar institutional mechanisms for establishment of floral and faunal conservation units, delineated by PCBAP, within the lower portion of the UPRB in areas subjected to intensive agro-pastoral activity. This project will demonstrate to local communities the feasibility of such units in managing pasturelands within the Basin while preserving the natural environment as an ecotourism resource. The results of this project will establish the effectiveness of conservation units in the protection of wetlands and promotion of sustainable agriculture and ecotourism, and strengthen the ability of communities to manage their natural resources. Project deliverables will include a documented program to enhance public participation in wetland protection and locally-sustainable economic development. GEF: US \$ 140,000; co-funding: US \$ 142,500; total: US \$ 282,500.

Activity 2.3: Ecoregional Planning in the Pantanal. This Activity complements, *inter alia*, Activity 2.2 above, and seeks to promote sound land use management and planning principals within the ecoregion of the Pantanal through a program of inventory and analysis designed to link the remaining high quality natural areas identified as conservation units in PCBAP. This project will contribute to the development of planning tools necessary for integrated and sustainable land use management within the Pantanal. The results of this project will permit the formulation of an ecoregional management program for the Pantanal, which, in future stages, will include Bolivia, Brazil and Paraguay. Project deliverables will include a synthesis of mapping (at an appropriate scale) and pictorial materials to establish a sound technical basis and detailed work plan for development of the ecoregional program. GEF: US \$ 90,000; co-funding: US \$ 682,500; total: US \$ 772,500.

Activity 2.4: *Measures for the Management of Live-Animal Trade in the Pantanal.* PCBAP identified the commercial animal trade as one mechanism by which the fauna of the Pantanal was being impoverished, and recommended that the root causes of this trade be identified in order to formulate appropriate legal remedies. This Activity seeks to identify the root causes of the illegal export of live animals and endangered species from the Pantanal region as a means of protecting and preserving wildlife (including aquatic fauna). Knowledge of the root causes of such trade will enable public and private sector (commercial organizations) agencies to develop means of controlling ecological damage arising from over-exploitation of such resources through appropriate programs of environmental education, involvement of non-governmental organizations and their resources, identification of possible alternative economic activities, and implementation of relevant legislative initiatives and governmental actions. This project will provide knowledge of the root causes of illegal live-animal trade in the Pantanal, enhance public awareness of the problem and means of its control, and provide governmental and non-governmental organizations with an understanding of not only the economic basis of such trade but also its ecological consequences. Project deliverables will include a documented analysis of the root causes of, and alternative measures of controlling damage resulting from, live-animal trade in the Pantanal as a means of wetland conservation. GEF: US \$ 75,000; co-funding: US \$ 522,000; total: US \$ 597,000.

Issue 3: Land Degradation

9. Consideration is given to cross-cutting issues, which relate specifically to land and water management activities designed to protect and/or rehabilitate critical areas within the Basin.

Activity 3.1: *Management of Soils and Soil Erosion in the Rio Taquari Basin.* As noted under Issue 1, above, PCBAP identified the Rio Taquari sub-basin as one of the most critical tributary basins to the UPRB, and recommended the implementation of appropriate measures to control soil loss. This Activity, which builds upon the water resources investigations conducted under Activity 1.2 above, seeks to determine the root causes of soil loss within the Rio Taquari sub-basin through an examination of natural and degraded areas within the sub-basin, and a quantification of sediment loads transported within the river sub-basin. Knowledge of the factors causing soil loss and factors affecting sediment transport will allow determination of soil and land management practices that will minimize soil loss. The results of this study will identify practices contributing to sustainable (primarily agricultural) use of soils within the sub-basin and assist in identifying the fate of sediments already eroded. This latter result will contribute to the assessment and quantification of priority environmental impacts and their mitigation. Project deliverables will include documented criteria governing the use of soils at the municipal and state levels, and recommended measures for limiting soil loss appropriate to specific sectoral users. GEF: US \$ 500,000; co-funding: US \$ 540,000; total: US \$ 1,040,000.

Activity 3.2: *Development of Measures to Rehabilitate Lands Degraded by Mining Activity in the Municipality of Pocone.* Pending the outcome of diagnostic studies designed to quantify the magnitude of this problem (see Activity 1.4), PCBAP recommended implementation of measures to mitigate mining-related water quality impacts and rehabilitate lands degraded by mining

activity. This Activity seeks to determine the technical basis for the mitigation of environmental problems arising from the degradation of lands due to mining activity. Within the Municipality of Pocone, vast tracts of land have been disturbed by excavation of minerals (gold) and disposal of mine tailings, and other mining-related activities which impact water quality and aquatic habitat. Knowledge of the means to rehabilitate degraded lands will allow determination of appropriate management practices to permit (i) control of mining practices, (ii) restoration of the disturbed lands for other purposes including environmental purposes and public information and recreation, and (iii) environmental protection and education. The results of this project will identify practices contributing to mitigation of mining impacts and rehabilitation of degraded areas. Project deliverables will include a variety of maps of the area of the mining concessions, both active and inactive; documented engineering investigations of the area; limited restoration of a typical site; and documented methodologies for the recovery of degraded lands elsewhere in the UPRB. GEF: US \$ 180,000; co-funding: US \$ 165,000; total: US \$ 345,000.

Activity 3.3: *Development of Measures to Rehabilitate Riparian Lands.* PCBAP identified the destruction of riparian forests and riverine vegetation as one of the anthropogenic factors altering faunal habitat in the Pantanal and recommended implementation of measures to restore these areas as an important step in the process of environmental protection in the region. This Activity seeks to determine the costs of restoration of riparian vegetation in the state of Mato Grosso. Knowledge of these costs will contribute to the promotion of community-based land rehabilitation efforts. The results of this project will provide a quantitative basis upon which to build community participation. Project deliverables will include a documented breakdown of restoration costs and a map of areas requiring rehabilitation within the UPRB. GEF: US \$ 136,000; co-funding: US \$ 120,000; total: US \$256,000.

Activity 3.4: *Environmental Management of the Urban Environment in the Vicinity of Rio Miranda and Rio Apa.* PCBAP recommended the identification and adoption of measures to mitigate the impacts of urban development on the UPRB. This Activity seeks to develop a framework for the integrated management of the urban environment through planning, management, and public information as a means of reducing the quantity of potential pollutants being generated from urban areas. Development of such a framework will contribute to the control of aquatic and environmental pollution. The results of this project will provide a comprehensive program for the management of pollution from urban areas in the UPRB. Project deliverables will include a comprehensive management program with public awareness as well as technical and institutional elements. Proposed loan-funded interventions aimed at upgrading and installing appropriate infrastructure in these areas of the basin are currently being considered by the state and federal governments. GEF: US \$ 100,000; co-funding: US \$ 67,500; total: US \$ 167,500.

B. COMPONENT II: PUBLIC PARTICIPATION

10. Component II, providing public participation 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 project process will have the advantage of benefiting from community insights and experiences, and of being acceptable to the communities as sustainable alternatives to presently-destructive practices. This Component consists of eight Activities that target three specific issues identified within the watershed.

Issue 4: Stakeholder Participation

11. Consideration is given to activities which identify and coordinate the interests of persons and agencies having commercial or institutional responsibilities within the basin, including the fisheries, navigation, mining and agro-industrial sectors (all nine issues contain projects that encourage stakeholder participation and provide information and/or methods appropriate for sectoral application in the protection of water resources and wetlands in the UPRB).

Activity 4.1: *Determination of Environmental Education Needs In the Tourism Sector.* PCBAP acknowledged the importance of the Pantanal as tourist destination, and recommended the conduct of diagnostic studies as the basis of minimizing the impacts of tourism on this sensitive environment. This Activity seeks to determine the need for, and subsequently compile and disseminate, a program of public environmental information designed to address current and potential future socio-environmental problems arising from tourism in critical environmental habitat areas. This knowledge will enhance the ability of the tourism industry to promote ecotourism, supporting not only a sustainable tourist industry but also a program of transmittal of environmental information to patrons. The results of this study will (i) enhance economic development in the region, (ii) encourage better informed consumers participating in ecotourism opportunities, and (iii) contribute to sustainable management of the UPRB through improved understanding of ecological principles. Project deliverables will include documented information on the root causes of environmental degradation associated with the tourism industry, and a documented program of training and information dissemination supporting ecotourism in the region. GEF: US \$ 60,000; co-funding: US \$ 285,000; total: US \$ 345,000.

Activity 4.2: *Development of Non-governmental Conservation Initiatives.* PCBAP recommended the implementation of measures to preserve avi-faunal habitat within the Pantanal. This Activity seeks to demonstrate the feasibility of, and identify measures for, the creation of habitat areas for the conservation of aquatic avi-fauna in the state of Mato Grosso, using the farm, "Porto da Fazenda", as a pilot preservation site. This demonstration will identify the utility of integrating private sector initiatives into conservation programs, contribute to the maintenance of aquatic avi-fauna within the region through enhanced knowledge of bird habitat and tourism impacts, and enhance environmental education and development of a sustainable eco-tourism industry for the UPRB. The results of this project will (i) identify alternative means of conserving wetlands, (ii) contribute to diversified eco-tourism opportunities which enhance both conservation and environmental education, and (iii) promote sustainable development in the basin. Project deliverables will include creation of a conservation unit, documented data base of aquatic avi-fauna and their habitats, and a documented process for transferring experiences gained,

including a framework for enhanced conservation education, to other private sector eco-tourism operators. GEF: US \$ 75,000; co-funding: US \$ 45,000; total: US \$ 120,000.

Activity 4.3: *Creation of Community-based Alternatives for Eco-/Ethno-tourism in the Indigenous Area of Guato (Ilha Insua).* PCBAP acknowledged the importance of the Pantanal as tourist destination, and recommended the conduct of diagnostic studies as the basis of minimizing the impacts of tourism on this sensitive environment. This Activity seeks to demonstrate alternative economic opportunities that preserve the indigenous culture of the Pantanal region which promote both ethnic distinctiveness and ecological integrity of their environment in the face of increased tourism pressures. This demonstration will address those aspects of economic development and environmental management which directly impact indigenous communities in the Pantanal, and which destabilize both the community structure and its natural resource base to the detriment of the natural environment. The results of this project will (i) identify alternative economic activities that will ensure the cultural survival of disadvantaged ethnic groups, their communities and natural surroundings, (ii) enhance opportunities for tourists to gain insights into both indigenous culture and the environment, and (iii) promote eco- and ethno-tourism opportunities in the region. Project deliverables will include documentation of the cultural base of the region, a documented program for the preservation of indigenous culture and customs, and a framework for enhanced public awareness of the environmental and ethnological distinctiveness of the region that can be extended to other native communities in the UPRB. GEF: US \$ 80,000; co-funding: US \$ 48,000; total: US \$ 128,000.

Issue 5: Sustainable Development

12. Consideration is given to activities that identify alternative means of economic production or alternative economic activities that enhance the environment and/or minimize environmental degradation.

Activity 5.1: *Aquaculture as an Alternative to River Harvesting of Fishes in the Pantanal.* PCBAP recommended that investigations into the root causes of the decline in fish numbers be conducted so that appropriate legislative and other actions could be formulated to effectively sustain the fishery in the basin. Building on knowledge acquired through diagnostic studies conducted under Activity 1.1, this Activity seeks to identify a technical basis for developing alternative means of meeting the angling and commercial fisheries demand for native fishes from the Upper Paraguay River. The knowledge gained through this project will contribute to the protection of native fishes within the natural ecosystem of the Paraguay River, while also contributing to meeting the demand for bait fish for commercial and recreational purposes. The results of the project will (i) develop a knowledge base on the reproductive biology of native fishes of the Paraguay River, (ii) enhance public knowledge of the fisheries of the River, and (iii) potentially provide the basis for future development of a sustainable fisheries industry in the region. Project deliverables will include documented information on sustainable fisheries in the Upper Paraguay River, and a documented program of information dissemination designed to enhance local knowledge and fisheries management capabilities. GEF: US \$ 100,000; co-funding: US \$ 472,500; total: US \$ 572,500.

Activity 5.2: Aquaculture in the Rio Taquari. PCBAP recommended that appropriate legislative and other actions could be formulated to effectively sustain the fishery in Pantanal. This Activity complements, *inter alia*, Activities 1.1 and 5.1, and seeks to reduce commercial fishing pressures in critical habitat areas through promotion of alternative means of native fish production. Further, this Activity seeks to promote knowledge of fish biology to reduce over exploitation of fishes and destruction of fish habitat, including minimizing the potential for introduction of exotic/non-native species into the Rio Taquari. Experience gained through the project will assess the potential for aquaculture in the basin and disseminate information on aquaculture within the region as an alternative means of meeting demands for fish. The results of the project will (i) contribute to the maintenance of an healthy fish fauna in the Rio Taquari through the promotion on alternative means of fish husbandry, and (ii) increase public awareness of fisheries issues within the sub-basin. Project deliverables include a documented study of alternative fish production methods supportive of sustainable fisheries management and protection of native fish fauna. GEF: US \$ 58,000; co-funding: US \$ 87,000; total: US \$145,000.

Activity 5.3: Identification of the Need for a Decision Support System for the Upper Paraguay River Basin. PCBAP recommended that the development of the UPRB be subject to an integrated and sustainable management plan, a key feature of which would be the permitting of appropriate economic activities in the various sub-basins of the system. This Activity recognizes the critical role of flood hydrology in the creation and maintenance of the UPRB and its ecosystems, and seeks to quantify water demand, for both surface and ground waters, within the basin. Knowledge of water demands will provide the basis for sustainable use of water resources within the basin, for economic purposes including environmental protection, and permit the future formulation of appropriate fiscal and legal instruments to control water usage. The results of this project will (i) assess the quality and quantity of surface and ground waters in the basin as the basis for identification of a sustainable water management strategy, and (ii) contribute to the formulation of appropriate water resources management measures. Project deliverables will include a documented basis for assessing and managing water demand within the basin, and detailed work plan and statement of parameters for developing an appropriate decision support system. GEF: US \$ 100,000; co-funding: US \$ 90,000; total: US \$ 190,000.

Activity 5.4: Identification of the Need for an Integrated Hydrological Management Model for the Upper Paraguay River Basin. PCBAP recommended development and implementation of a flood warning system and appropriate floodland management practices within the UPRB as a means of minimizing human, economic and environmental impacts within the system. Further, PCBAP recommended that the development of the UPRB be subject to an integrated and sustainable management plan, a key feature of which would be the permitting of appropriate economic activities in the various sub-basins of the system. This Activity complements *inter alia* Activity 5.3, and seeks to provide an overall methodology for assessing and managing not only water demand, hydrology and use, but also water quality and environmental management within the basin. A comprehensive model of the water resources within the basin, and the factors affecting its quality and quantity, will contribute directly to the development of appropriate technical, financial and legal measures to protect and manage the water resources of the UPRB in a

sustainable manner. The results of this project will provide a quantitative means for assessing alternative development strategies so as to achieve the optimal and sustainable level of development within the basin. Project deliverables will include a documented hydrogeological assessment of the basin, maps, and a detailed work plan and statement of the parameters for an hydrological and water quality model of the system that will form the basis for recommendations regarding appropriate water resources management measures. Proposed loan-funded interventions aimed at upgrading and installing appropriate infrastructure in these areas of the basin are currently being considered by the state and federal governments. GEF: US \$ 750,000; co-funding: US \$ 120,000; total: US \$ 870,000.

Issue 6: Environmental Education

13. Consideration is given to activities that promote and enhance public awareness, participation and support for environmental management programs including school, community and similar programs.

Activity 6.1: *Development of a Public Information Program in the Upper Paraguay River Basin.* PCBAP recognized, and federal law 9433/97 gave effect to, the key role of stakeholder involvement in the management of the water and environmental resources of Brazil, in general, and of the UPRB in particular. The principle element of effective stakeholder involvement is information and education. This Activity seeks to enhance public participation in the environmental management of the UPRB by disseminating information to communities and companies through environmental education courses which will provide them with the basic knowledge necessary to participate in the licensing and decision-making processes. This project will enhance public awareness and their ability to contribute to the process of environmental management. The results of this project will improve overall environmental management of the Basin by involving a broadly-based constituency in the process of environmental management. Project deliverables will include a document public participation system supported by appropriate course materials and informational documents, and supportive of a system of pollution control licensing and regulation. GEF: US \$ 75,000; co-funding: US \$ 52,500; total: US \$ 127,500.

C. COMPONENT III: ORGANIZATIONAL DEVELOPMENT

14. Component III, providing projects designed to strengthen and improve institutional and staffing capabilities to implement new laws, regulations, and procedures, is designed to provide for the equipping and training of institutions and individuals identified during the PDF Activities. Such institutional strengthening and capacity building will contribute to the longer-term success of the watershed management measures identified in the WMP for the UPRB. This Component consists of two principal issue areas and eight Activities that target specific institutions and skills needed within the basin.

Issue 7: Institutional Strengthening

15. Consideration is given to providing an effective framework in which activities of professionals are carried out, including legal, structural, economic and administrative activities.

Activity 7.1: *Strengthening Integrated Environmental Management in Corumba.* PCBAP recommended effective action at the municipal level as an important element in the mitigation of developmental pressures on the Pantanal. This Activity seeks to provide an environmental management system at the municipal level which will encourage integration of environmental issues into the local decision-making process, including inclusion of environmental curricula in local schools (see also Activity 6.1). This project will create a basis for improved decision-making within communities in the City of Corumba. The results of this project will (i) assess urban activities causing environmental degradation and contribute to the development of appropriate local legislation for environmental management, and (ii) disseminate environmental protection information within the community. Project deliverables will include a documented assessment of urban environmental impacts that will form the framework for an integrated program of local environmental management. Proposed loan-funded interventions aimed at upgrading and installing appropriate skills in these areas of the basin are currently being considered by the state and federal governments. GEF: US \$ 50,000; co-funding: US \$ 192,000; total: US \$ 242,000.

Activity 7.2: *Harmonization of Environmental and Water Resources Legislation in the Upper Paraguay River Basin.* This Activity seeks to review existing environmental and water resources legislation within the basin and propose specific legislative actions required to harmonize and improve legal instruments for environmental and water resources protection. Ultimately, this Activity will seek to extend such an analysis to the entire multi-national area of the UPRB. This project will promote comprehensive and coordinated governmental actions for environmental and water resources protection in the basin, and minimize potential impacts due to differing legal structures within riparian states. The results of this project will propose a program of legislative action designed to harmonize environmental and water resources protection legislation at all levels of government. Project deliverables will include a document review of existing environmental and water resources legislation and a documented program of proposed legislative actions. GEF: US \$ 125,000; co-funding: US \$ 150,000; total: US \$ 275,000.

Activity 7.3: *Institutional Support to the Committee for the Integrated Management of the Upper Paraguay Basin and Pantanal (CIBHAP-P).* This Activity recognizes the benefits to be achieved through coordinated management actions within the UPRB, as embodied in Federal Law 9433/97, and seeks to strengthen and enhance the ability of the CIBHAP-P to undertake planning and management activities within the basin through support for specific actions, such as public participation programming, staff training, and strategic planning. This project will increase participation in decision-making within the basin, and enhance the ability of the Committee to carry out its mandate. The results of this project will contribute to the improved ability of the Committee to undertake environmental management activities within the basin. Project deliverables will include a documented short-to-medium term action program for implementation of environmental management measures, including the use of economic instruments and public participation. GEF: US \$ 100,000; co-funding: US \$ 60,000; total: US \$ 160,000.

Activity 7.4: *Institutional Development of Inter-municipal Consortia as Members of the Basin Committee.* The Activity seeks to develop municipal consortia within specific sub-basins in the UPRB, as provided under Federal Law 9433/97. These consortia would participate on the Committee for the Integrated Management of the Upper Paraguay River and Pantanal (CIBHAP-P) and provide specific insights regarding the water resources needs and concerns of local communities within the basin. Strengthening of the municipal participation on the Committee will facilitate determination and implementation at the local level of management actions recommended by the Basin Committee. The results of this project will (i) create effective civil water-resources agencies at the local government level and (ii) increase the ability of the Basin Committee to function effectively at the community level. Project deliverables will include documented guidelines for the formation of inter-municipal consortia within the UPRB. GEF: US \$ 99,000; co-funding: US \$ 112,500; total: US \$ 211,500.

Activity 7.5: *Development and Strengthening of Institutions for Integrated Environmental Management in the Rio Apa and Rio Miranda Basins.* This Activity complements, *inter alia*, Activity 1.3, and seeks to create local government capacity to manage water resources in specific sub-basins of the Upper Paraguay River as a means of ensuring sustainable use of water for economic purposes including environmental protection. This project will identify the feasibility of creating local, transparent fora for compilation and execution of local water resources and environmental management programs and projects. The results of the project will strengthen participative management of water and natural resources within local communities. Project deliverables will include a documented procedure for establishing and empowering local institutions in the field of water resources and environmental management. GEF: US \$ 145,000; co-funding: US \$ 97,500; total: US \$ 242,500.

Issue 8: Capacity Building

16. Consideration is given to activities that contribute to development of a skilled professional staff needed to implement environmental management programs.

Activity 8.1: *Training Environmental Science Educators.* This Activity seeks to develop and implement (to determine feasibility and costs) curricula and training programs for educators within the UPRB to implement environmental education programs in schools. This project will provide the means whereby environmental concerns are introduced into early learning programs, and, thereby, knowledge is transferred to the community at large. The results of this project will enhance the ability of teachers to convey environmental information and of the community to internalize and apply such information for the protection of water resources and the environment. Project deliverables will include a documented curriculum and teacher training program, and the proceedings of a pilot training course. GEF: US \$ 100,000; co-funding: US \$ 157,500; total: US \$ 257,500.

Activity 8.2: *Training Community Based Extension Agents.* This Activity seeks to develop and implement (to determine feasibility and costs) a training program for community extension agents

as a means of disseminating information on environmental issues, protection and rehabilitation methods to the community at large, and, in support of initiatives of The World Bank within the watershed, to support the implementation of community-based land management practices by farmer organizations and agricultural cooperatives within specific communities. This project will strengthen the ability of local communities to understand and implement specific activities for the protection of the environment. The results of the project will create a body of trained personnel capable of working with communities and community groups (e.g., NGOs and farmer organizations) to carry out specific actions for the improvement of the environment. Project deliverables will include a documented needs assessment and training program that can be used throughout the UPRB, and documented best management practices for use in agricultural communities within the basin. GEF: US \$ 290,000; co-funding: US \$ 60,000; total: US \$ 350,000.

Activity 8.3: Training Water Resources and Environmental Science Technicians. This Activity seeks to provide post-secondary level training for local government staff, leading to additional educational qualifications, in the areas of hydrology and environmental science, as a means of enhancing the ability of local government agencies in meeting environmental management demands arising from the implementation of existing and proposed environmental legislation. This project will strengthen local capacity for implementing environmental management programs at the local level. The results of this project will provide a trained-body of professional staff within local government agencies, and provide opportunities for post-graduate advancement for existing municipal staff. Project deliverables will include a documented training program for technicians at the local government level, and the proceedings of two pilot training courses. GEF: US \$ 140,000; co-funding: US \$ 60,000; total: US \$ 200,000.

D. COMPONENT IV: INTEGRATED WATERSHED MANAGEMENT PROGRAM IMPLEMENTATION

17. Component IV, development of the WMP, is designed to provide for the synthesis of data and experiences, feasibility assessments and cost analyses developed in the three preceding Components. Included in the principal activities within this Component 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 WMP process. The three Activities explicitly provide for the cooperative development of a comprehensive WMP 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.

Issue 9: Integrated Watershed Management Program Implementation

18. Consideration is given to the synthesis and integration of the results of the studies, demonstrations, and other investigations previously described into a comprehensive, watershed management program for the UPRB. Pursuant to the GEF Operational Strategy dated February 1996, this program will identify transboundary water-related environmental issues, define the relationship of these issues to national (and state) environmental planning and economic

development plans, establish clear priorities, and determine realistic baseline and agreed incremental costs.

Activity 9.1: *Evaluation of Financial Mechanisms for Sustainable Watershed Management.* This Activity seeks to build upon activities funded under PCBAP and the experiences obtained in the pilot-scale development and implementation of water rights and water charges, as provided for under federal law 9433/97, in representative sub-basins of the Upper Paraguay River (see, for example, Activity 1.2), to the entire UPRB. In addition, this Activity seeks to promote a review federal and state legal and financial mechanisms relating to the sectoral uses of water (e.g., agricultural subsidy schemes, urban land use planning regulations, etc. which affect disturbances of the land surface that encourage erosion, water pollution, etc. to the detriment of water courses and water resources management) to identify and propose amendments as appropriate to those mechanisms that affect sustainable use of water resources and the management of watersheds within the UPRB. This project will provide a detailed framework of the allocation and determination of water charges and introductions of watershed management measures, including proposals for legislation and strengthening of administrative mechanisms necessary to implement an equitable water pricing scheme. The results of this project enhance the institutional capability to determine and implement a water use charges program, contribute to the identification of appropriate mechanisms to place water resources management within the basin on a sustainable footing, and encourage the optimization of water resources management policies, practices and programs, thereby creating a sound economic and legal basis for the sustainable development of the basin. Project deliverables will include a documented framework for the implementation of water use charges and restructuring of related fiscal, financial and legal mechanisms for water quantity and quality management in the two basin states consistent with an holistic concept of the UPRB. GEF: US \$ 250,000; co-funding: US \$ 370,000; total: US \$ 620,000.

Activity 9.2: *International Seminar of the Transboundary Water Resources of the Upper Paraguay River Basin.* This Activity seeks to inform, consult, and involve water resources professionals and others in the diagnosis and remediation of environmental concerns relating to the UPRB and Pantanal. In the first instance, two international seminars would facilitate discussion of the water resources issues of transboundary concern as a means of building appreciation of the transboundary nature of the Upper Paraguay River system. Subsequently, one further international seminar would facilitate dissemination of the experiences gained in the determination and initial implementation of management actions to a wider audience, enhancing the transfer of knowledge and approaches as encouraged under Chapter 15 of Agenda 21. This project will strengthen international communication and cooperation and potentially lead to enhanced international coordination within the international basin of the Upper Paraguay River. The results of this project will provide a framework for addressing the transboundary issues inherent in the management of the UPRB. Project deliverables will include the proceedings of three international seminars on the UPRB. GEF: US \$ 120,000; co-funding: US \$ 60,000; total: US \$ 180,000.

Activity 9.3: *Comprehensive Public Participation Programming.* This Activity seeks to provide a framework within which (a) a dialogue between the public and the agencies involved in the

implementation of the integrated river basin management program can be established, and (b) information can be transferred between the public at large and water resources and environmental professionals both during the period of program formulation and subsequently during program implementation. Inherent in such a program are activities that include public meetings, public information campaigns, and other opportunities for public involvement, either individually or within existing or future NGOs. Specific support for the Inter-American Water Resources Network (IWRN) is provided as a means of disseminating information regarding the conduct and findings of this project. The project will empower public action in support of planned objectives and actions, and increase the awareness and active participation of communities in relation to environmental concerns and their ability to interact in harmony with their environment. The results of the project will (i) involve the public in the determination and implementation of actions in support of a sustainable livelihood, and (ii) ensure a grass-roots level change in public attitudes and behaviors, as envisioned in Federal Law 9433/97, in support of sound water resources management practices within the UPRB. Project deliverables will include a documented public participation strategy. GEF: US \$ 200,000; co-funding: US \$ 348,000; total: US \$ 548,000.

Activity 9.4: *Implementation of an Integrated River Basin Management Program.* Refinement and implementation of an WMP is the principal objective of the project activities. This program consists of the identification and harmonization of development initiatives in the UPRB, and the strategic integration and rationalization of those initiatives and proposals for sustainable development in the region. It will build upon the environmental evaluation of the basin (PCBAP), emphasizing the analysis of transboundary problems and socioeconomic issues relating to environmental practices and their relationship with the education, health, income and organization of local population, as well as the identification and coordination of organizational arrangements. Support to Government efforts at introducing environmental considerations into the laws and regulations at the national and state levels is also part of the WMP. A practical result of the WMP will be the explicit incorporation of the focal areas of interest to GEF into regional development programs, incorporating methods and procedures for the solution of priority transboundary environmental problems and obtaining global benefit. Project deliverables will include the documented program for the integrated management of the UPRB. GEF: US \$ 900,000; co-funding: US \$ 1,200,000; total: US \$ 2,100,000 (inclusive of Administration fees and Monitoring and Evaluation costs).

19. Table 4 presents an indicative work plan under which this two year project will be implemented. Related work elements in which activities must be sequenced in order that relevant information or data might be available for use in later Activities are shown along the same timeline as the approximate date of Activity initiation. It should be noted that specific activities may be initiated at any time during the six-month period preceding the indicated start date, as human and financial resources, and prerequisite information availability, warrant. Further, it is anticipated that each Activity is likely to be executed over the period of at least a year.

20. The total cost of the project is estimated at US \$ 15,154,000. Total funding for the baseline situation without GEF financing is US \$ 9,642,500, as shown in Table 5. A further sum of US \$

270,000, included within the US \$ 1,250,000 World Bank associated financing amount, is currently earmarked for the UPRB under the World Bank-financed PRODEAGRO and may also be considered as baseline financing under existing loan agreements. For the alternative project, non-GEF financing by the Government of Brazil, the riparian states and other national, public and private sources, is US \$ 8,102,500. Financing by other international institutions is US \$ 225,000, comprised of funds provided by UNEP (US \$ 150,000, in kind) and by OAS (US \$ 75,000 in kind). These investments are assumed to account for the full value of national benefits gained under this project, and will be applied specifically to costs associated with issues such as waste disposal, flood management, and navigation. The requested GEF contribution is US \$ 6,328,500, as shown in Table 6. Incremental GEF financing will be applied specifically to catalyze activities such as mitigation and prevention of land degradation, wetland protection, and control and minimization of persistent contaminants.

Table 4. Indicative Work Plan showing initiation date for Activities.

October 1998	March 1999	October 1999	March 2000	October 2000
Steering Committee Formation	Steering Committee meeting	Steering Committee meeting	Steering Committee meeting	Steering Committee meeting
1.1		5.1		
		5.2		
1.2	3.1			
1.3		7.5		
1.4			3.2	
1.5				
1.6				
1.7				
2.1	2.2		2.3	
2.4				
	3.3			
	3.4			
	4.1			
	4.2			
		4.3		
		5.3	5.4	
	6.1	7.1		
	7.2			
	7.3			
	7.4			
	8.1			
	8.2			
		8.3		
		9.1		
			9.2	
9.3				
				9.4

Table 5. Incremental Cost Analysis (US \$).

	Baseline	Alternative	Increment
Global Environmental Benefits			
<u>Decreased Transboundary Transport of Contaminants</u>			
Activities 1.4, 1.5 and 3.4	0	500,000	500,000
<u>Increased River Wildlife Diversity</u>			
Activities 1.1, 2.4, 4.2, 5.1 and 5.2.	200,000	591,000	391,000
<u>Decreased Degradation of Soils</u>			
Activities 2.2, 2.3, 3.1, 3.2 and 3.3	0	1,046,000	1,046,000
<u>Increased Knowledge about River Behavior</u>			
Activities 1.2 and 1.3	0	387,500	387,500
<u>Improved Coordination of Actions for River Management and Planning</u>			
Activities 1.6, 1.7, 2.1, 4.3, 5.3, 5.4, 7.1, 7.2, 7.3, 7.4, 7.5, 9.1, 9.3 and 9.4	1,340,000	4,559,000	3,219,000
<u>Dissemination of Knowledge</u>			
Activities 4.1, 6.1, 8.1, 8.2, 8.3 and 9.2	0	785,000	785,000
Domestic Benefits			
<u>Decreased Transboundary Transport of Contaminants</u>			
Activities 1.4, 1.5 and 3.4	547,500	547,500	0
<u>Increased River Wildlife Diversity</u>			
Activities 1.1, 2.4, 4.2, 5.1 and 5.2.	1,501,500	1,501,500	0
<u>Decreased Degradation of Soils</u>			
Activities 2.2, 2.3, 3.1, 3.2 and 3.3	1,650,000	1,650,000	0
<u>Increased Knowledge about River Behavior</u>			
Activities 1.2 and 1.3	430,500	430,500	0
<u>Improved Coordination of Actions for River Management and Planning</u>			
Activities 1.6, 1.7, 2.1, 4.3, 5.3, 5.4, 7.1, 7.2, 7.3, 7.4, 7.5, 9.1, 9.3 and 9.4	3,298,000	3,298,000	0
<u>Dissemination of Knowledge</u>			
Activities 4.1, 6.1, 8.1, 8.2, 8.3 and 9.2	675,000	675,000	0

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Table 6. Component Financing (US \$).

WORK ELEMENT	GEF	NON-GEF	TOTAL
1.1 Formulation of Means to Promote Fisheries Conservation in the Rio Taquari/MS	83,000.00	375,000.00	458,000.00
1.2 Water Resources Assessment Rio Taquari/MS	282,500.00	205,500.00	488,000.00
1.3 Water Resources Assessment Rio Apa/MS	105,000.00	225,000.00	330,000.00
1.4 Distribution and Transportation of Mercury within the Upper Paraguay River Basin	170,000.00	180,000.00	350,000.00
1.5 Distribution and Transportation of Agrochemicals and Heavy Metals Within the UPRB	230,000.00	300,000.00	530,000.00
1.6 Water Resources Management in The Vicinities of Corumba and Cuiaba MS/MT	200,000.00	345,000.00	545,000.00
1.7 Community Based Problem Solving Relating to "Meander Cuts" in the Rio Taquari/MS	70,000.00	37,500.00	107,500.00
Sub-total	1,140,500.00	1,668,000.00	2,808,500.00
2.1 Management Program for Development Of Buffer Zones near Acurizal, Penha and Doroche	150,000.00	127,500.00	277,500.00
2.2 Creation of Conservation Units in Mato Grosso do Sul	140,000.00	142,500.00	282,500.00
2.3 Ecoregional Planning in the Pantanal MS/MT	90,000.00	682,500.00	772,500.00
2.4 Measures for the Management of Live Animal Trade in the Pantanal	75,000.00	522,000.00	597,000.00
Sub-total	455,000.00	1,474,500.00	1,929,500.00
3.1 Management of Soils and Soil Erosion In the Taquari Basin	500,000.00	540,000.00	1,040,000.00
3.2 Measures to Rehabilitate Lands Degraded by Mining Activity (Pocone/MT)	180,000.00	165,000.00	345,000.00
3.3 Development of Measures to Rehabilitate Riparian Lands. UPRB/MT	136,000.00	120,000.00	256,000.00
3.4 Environmental Management of Urban Areas in the Vicinity of Rio Miranda and			

Rio Apa/MS	100,000.00	67,500.00	167,500.00
Sub-total	916,000.00	892,500.00	1,808,500.00
4.1 Determination of Environmental Education Needs in the Tourism Sector/MS	60,000.00	285,000.00	345,000.00
4.2 Development of Non-Governmental Initiatives	75,000.00	45,000.00	120,000.00
4.3 Creation of Community Based Alternatives for Eco-Ethnotourism in Guato	80,000.00	48,000.00	128,000.00
Sub-total	215,000.00	378,000.00	593,000.00
5.1 Aquaculture as an Alternative in the Pantanal. MS/MT.	100,000.00	472,500.00	572,500.00
5.2 Aquaculture in the Rio Taquari	58,000.00	87,000.00	145,000.00
5.3 Identification of the Need for a Decision Support System for the Upper Paraguay River Basin	100,000.00	90,000.00	190,000.00
5.4 Identification of the Need for an Integrated Hydrological Management Model for the Upper Paraguay River Basin	750,000.00	120,000.00	870,000.00
Sub-total	1,008,000.00	769,500.00	1,777,500.00
6.1 Development of a Public Information Program/MS.	75,000.00	52,500.00	127,500.00
Sub-total	75,000.00	52,500.00	127,500.00
7.1 Strengthening Integrated Environmental Management in Corumba	50,000.00	192,000.00	242,000.00
7.2 Harmonizing Environmental Legislation within the Upper Paraguay River Basin/MS	125,000.00	150,000.00	275,000.00
7.3 Institutional Support to the (CIBHAP-P)	100,000.00	60,000.00	160,000.00
7.4 Institutional Development of Inter-Municipal Consortia. MS/MT	99,000.00	112,500.00	211,500.00
7.5 Development and Strengthening of Institutions for Integrated Environmental Management in the Rio Apa and Rio Miranda Basins/MS	145,000.00	97,500.00	242,500.00
Sub-total	519,000.00	612,000.00	1,131,000.00
8.1 Training Environmental Science Educators. MS/MT	100,000.00	157,500.00	257,500.00
8.2 Training Community Based Extension Agents. MS/MT	290,000.00	60,000.00	350,000.00

8.3 Training Water Resources and Environmental Science Technicians. MS/MT	140,000.00	60,000.00	200,000.00
Sub-total	530,000.00	277,500.00	807,500.00
9.1 Evaluation of Financing Mechanisms for Sustainable Watershed Management	250,000.00	370,000.00	620,000.00
9.2 International Seminar on the Trans - Boundary Water Resources of the Upper Paraguay River Basin	120,000.00	60,000.00	180,000.00
9.3 Comprehensive Public Participation Programming	200,000.00	348,000.00	548,000.00
9.4 Refinement of an Integrated River Basin Management Program	900,000.00	1,200,000.00	2,100,000.00
Sub-total	1,470,000.00	1,978,000.00	3,448,000.00
TOTAL (Project Costs)	5,878,500.00	8,102,500.00	14,431,000.00
Additional Financing World Bank Loans		1,250,000.00	1,250,000.00
TOTAL (Agency Contrib.)		1,250,000.00	1,250,000.00
PDF Preparation GEF Government of Brazil UNEP OAS	286,000.00	162,000.00 25,000.00 25,000.00	286,000.00 162,000.00 25,000.00 25,000.00
TOTAL (Preparation)	286,000.00	212,000.00	498,000.00
GRAND TOTAL	6,614,500.00	9,564,500.00	16,179,000.00