STRATEGIC ACTION PROGRAM for the BERMEJO RIVER BINATIONAL BASIN Argentina - Bolivia

Presented by Jorge O’Connor d’Arlach
National Director - PEA Bermejo
• Area: Total: 123,162 Km²
  In Bolivia: 10 %
  In Argentina: 90 %
• Length of the main course of the river: 1,300 km
• Population: 1,200,000 inhabitants
Soil degradation, intense erosion and desertification processes, and water quality deterioration

TRANSBOUNDARY MANIFESTATION

- Erosion and sediment transport and deposition, influencing fluvio-morphological dynamics and with impact in the use of water resources, in the processes of formation of the Delta of the Paraná river and in the ship canals of the Plata river.
BERMEJO RIVER
Sediment Discharge

Upper Bermejo: 10 %
(5.086 Km²)

Pescado River: 6 %
(1.800 Km²)

Iruya River: 42 %
(3.002 Km²)

Blanco River: 7 %
(1.930 Km²)

San Francisco River: 20 %
(25.800 Km²)

Grande de Tarija River: 15 %
(10.760 Km²)

ARGENTINA

BOLIVIA

Bermejo River:
100.000.000 t/year (50.191 Km²) (Approximately 80 % of sediments in the Paraná Plata system.) Sediment loading 8 kg/m³ 20
AREAS WITH INTENSE EROSION PROCESSES

Iruya River Basin, Argentina
3.002 Km²; Deep, sedimentary soils, mostly silt-clay

Central Valley, Tarija, Bolivia
Fluviolacustrine flatland, 1600 square kilometers
Deep, sedimentary soils, mostly silt-clay

Huasamayo River Basin, Argentina
150 Km², Fine soils, mostly clay.
Central Valley, Tarija, Bolivia
Erosion, in ditches (Bad Lands).
Fluviolacustrine flatland
Erosion in Huasamayo river tributaries

River beds filled up with sediment (Junction of Huasamayo and Grande rivers. Town of Tilcara)
MUD FLOWING IN THE BED OF A TRIBUTARY OF THE RIVER COLANZULÍ

FALL OF MUD IN THE RIVER MILMAHUASI–IRUYA
CAUSES OF THE ENVIRONMENTAL PROBLEM

Causes of Natural Origin
• Adverse natural conditions (soil, topography, geology, climate).

Causes of Human Origin
• Destruction of vegetative cover by deforestation and overgrazing.
• Elimination of natural vegetation for agricultural use.

Basic Causes
• Deficient political, legal, and institutional framework.
• Deficient financial and support mechanisms.

Soil Degradation, Erosion, Desertification, & Water Quality Deterioration
LONG TERM MITIGATION STRATEGY

INSTITUTIONAL DEVELOPMENT AND STRENGTHENING

- Institutional strengthening
- Development of an Environmental Information System for the Basin.
- Development of economic instruments and financial mechanisms.

PROBLEM

SOIL DEGRADATION, EROSION AND DESERTIFICATION & WATER QUALITY DETERIORATION

ENVIRONMENTAL PROTECTION AND REHABILITATION

- Prevention and control of erosion and sedimentation
- Biodiversity protection.
- Strengthening and consolidation of the system of protected areas.

PUBLIC AWARENESS AND PARTICIPATION

- Strengthening of public participation.
- Environmental education.
- Dissemination of sustainable technologies for production.
- Access to and public dissemination of information to support decision making.

SUSTAINABLE DEVELOPMENT OF NATURAL RESOURCES

- Implementation of integrated management plans for the basin.
- Appropriate technologies, management practices and production methods.
- Sustainable water resources development and utilization projects.
- Research for natural resources development and management.
SHORT TERM STRATEGY

- Implementation of catalytic strategic projects
- Formulation of complementary studies
- Actions to catalyze long-term projects and programs
IMPLEMENTED CATALYTIC STRATEGIC PROJECTS
LA TABLADA and MENA BASINS

Small dams for sediment retention and consolidation of water beds with benefits to local communities
AGRO FORESTRY PRACTICES
BENEFICIARIES PARTICIPATION IS ESSENTIAL FOR SUCCESS
RÍO MENA BASIN

- Contour borders
- Barriers with vegetation
- Fruit tree plantations
- Enclosures
- Forestry Plantations
IRRIGATION CANNALS - RIVER
MENA BASIN
SEDIMENT CONTROL
CATALYTIC STRATEGIC
PROJECT IN THE MENA RIVER
BASIN

• Twelve dams for sediment retention, with 387,000 m³ of total reservoir capacity with an useful life of 12 to 15 years.
• The cost of retained sediment is 0.8 $us/m³, lower than the value of benefits (0.95 $us) of 1 m³ of reservoir of the project San Jacinto.
• The Project has a capacity of retention of sediments of 33,400 m³/year; representing 5% of the sediments that enter to the reservoir of San Jacinto (730,000 m³/year)
• These dams were complemented with small irrigation systems and agro forestry practices, designed and implemented with beneficiaries participation. These projects are transferred to beneficiaries for operation and maintenance.
Control works in the Huasamayo and Iruya rivers.

Defensive works at Iruya
Iruya and Huasamayo Catalytic Strategic Projects

• The initial objective of erosion mitigation was enlarged to incorporate local cultural particularities.

In the Huasamayo river sub basin were incorporated:

• Risk reduction to people and its goods,

• Local population training,

• Territorial classification, and

• Promotion of sustainable development.
IRUYA RIVER MANAGEMENT
CATALYTIC STRATEGIC
PROJECT

• Control dams: 6 with 1,200 m³. Defensive dams, 150 m in the Milmahuasi river

• Rainfall drainage canals in Iruya.

• Sediment retention of 232,000 m³ was estimated, once the enlargements of dams are completed.
CATALYTIC STRATEGIC MANAGEMENT OF HUASAMAYO SUB-BASIN

- 64 small sediment retention and protection dams.
- Cleaning of river bed from Tilcara to the union with the río Grande
- Non structural measures:
  - Nursery of native plants
  - Training and environmental awareness.
  - Environmental zoning and land use regulation.
LESSONS LEARNED

• It is fundamental that sediment control projects secure strong long-term local benefits, such as irrigation and water for human and animal consumption, to guaranty global impact and benefits at the Plata basin level.

• Protection enclosures and tree plantations, have good results when made in individual property. In communal lands it is difficult to guaranty sustainability.

• Small dams are an effective way to control sediment transport and to prolong useful life of down stream dams. Once filled up, the small reservoirs stabilize the river bed, diminish the collapse of its sides and provide stabilized areas with good soil for cultivation.

• These small reservoirs, should be located in basins that produce greater quantity of sediments per unit of area.

• Peasant's permanent orientation for the operation and maintenance of the projects, must be provided.
SELECTED PRACTICES
FOR LONG-TERM SUSTAINABILITY

- Construction of small dams associated with irrigation and silvopastoral practices.
- Construction of contour borders for control of erosion ditches.
- Plantation of draw tolerant species.
- Enclosure of areas with depleted vegetation.
- Important public participation.
- Human resources qualification.
LOCAL BENEFITS

• Decrease of soil degradation and sediment production and transport.

• Increase of reservoirs useful life

• Safety improvement in river margins.

• Vegetation cover recuperation, water supply for human and animal consumption and irrigation.

• Protection of headwaters, water quality & quantity.

• Public participation increase.

• Increase environmental awareness and education.
GLOBAL BENEFITS AND ITS LINKAGE TO THE PLATA BASIN

- The “Study of Sediments of the Bermejo Basin and their Impact in the Plata Basin” made at request of the Inter-Governmental Committee of the Plata basin (CIC) will provide up to date information on the generation, transport and discharge of sediments, representing a real contribution from SAP Bermejo to the Plata basin.

- The above mentioned study will contribute to the knowledge base for the construction of the Cambarí dam in the Tarija River, which will be implemented by Argentina and Bolivia through the Bermejo Bi National Commission and will retain an estimated 8 million tons per year of sediment representing around 6% of the total annual sediments discharged in the Plata basin, according to current estimates.

- The retention of sediments will improve the functioning of the Plata basin, diminishing sediment deposits, the amount of drainage needed in the navigation canals of the Buenos Aires port (with an estimated total cost of 30 million dollars per year) and diminishing the cost of maintenance in irrigation systems.
GLOBAL BENEFITS AND ITS LINKAGE TO THE PLATA BASIN

• The implementation of a Hydro meteorological Network in the bi national basin that will include sediment monitoring is a contribution to the permanent up dating and analysis of the transport of sediments in the Plata basin.

• Generation of information useful for replication at the Plata Basin level and other basins (pilot project results, thematic charts, water course classification, carbon sequestration, biodiversity studies, and others)

• The sediment control demonstrative projects implemented in the two countries could be replicated in larger scales in the Bermejo, the Plata and other basins with similar conditions.

• A replication example of the demonstrative projects of the basins of Tablada (13 km2) and Mena (65 km2) is the “Study for the Control of Sediments in the Tolomosa basin” (432 km2) currently under way.

• Availability of projects for replication in La Plata river basin and other basins whose lessons learned and selected practices are already been used in the design of a Master Plan for the development of the Pilcomayo basin shared by Argentina, Bolivia and Paraguay.
GLOBAL BENEFITS AND ITS LINKAGE TO THE PLATA BASIN

• The consolidation of protected areas (Sama, Tariquía, Baritú Calilegua), the implementation of an environmental corridor among the last three, and a biosphere reservation, will diminish the degradation of soils and production of sediment and contribute to the maintenance of the headwaters in the upper Plata basin & protect biodiversity in the Yungas ecosystem.

• The establishment and functioning of a **Regional Coordinating Committee** with representatives of provincial administrations of Argentina and the Prefecture and Municipalities of Tarija; and the **Regional Advisory Committee**, with representatives of NGOs, academic institutions, scientific and technical organizations, the private sector, citizens and corporations, builds confidence among stakeholders and countries and allow scaling up to the Plata basin.
GLOBAL BENEFITS AND ITS LINKAGE TO THE PLATA BASIN

• Incorporation of SAP Bermejo projects in the planning of regional institutions and establishment of agreements with public and academic institutions.

• The methodological focuses, outputs, learned lessons, arisen recommendations and experiences of the Bermejo basin have been presented in the preparatory meetings of the Inter-Governmental Committee of the Plata basin (CIC) for the preparation of the Frame Program of the Plata basin, and they have served as basis for their formulation.

• The signing of a Collaboration Agreement between the Bermejo Binational Commission and the Committee of the Plata basin (CIC), with specific reference to SAP Bermejo, establishes a permanent coordination and collaboration among the SAP Bermejo and the Plata Basin.
COMPREHENSIVE STRATEGY

In addition to the catalytic strategic projects explained, others, for which there is no time to inform, have been implemented in different areas such as:

- Institutional Strengthening
- Public awareness and participation
- Environmental education.
- Strengthening of national parks and establishment of corridors between them.
- Carbon sequestration.
- Biodiversity protection and conservation.
- Information about these projects is shown in the PEA Bermejo stand.